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Review of "Evaluation of indicators of weight-carrying ability of light riding horses"

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Why was this study done?

A horse's weight-carrying ability depends on a number of factors that include size, conformation, body condition, age, and the duration and speed of the work to be done. Various guidelines and theories have been put forth as ways to determine how much weight a horse can safely carry.

In its 1920 Manual of Horse Management, The U.S. Cavalry suggested a horse should not be asked to carry more than 20% of its body weight. This assumed a combined weight of rider, saddle, bridle, and other equipment.

In a more recent study of Arabian horses ridden in endurance races, figures showed the horses carried between 20% and 30% of their body weight for the 100-mile duration of the race. Another related study showed that larger-bodied endurance horses with smaller cannon bone circumference had an increased incidence of biomechanical failure that prevented the horses finishing the race.

A widely held belief is that the width of the loin (the area between the last rib and the croup) determines a horse's capacity to carry weight, but no studies have tested or confirmed this idea.

The objective of this study was to see whether weight-carrying ability could be related to a horse's height, cannon bone circumference, or loin width.

How was the research carried out?

Eight horses (one mare and seven geldings), all of light-horse breeding and weighing between 391 and 625 kilograms, were used in the study. The horses ranged from 6 to 18 years old. Following four months of pasture rest, the horses were brought into individual box stalls and also had daily turnout. They were fed hay and grain and had free access to water and trace-mineralized salt.

The horses were weighed once a week. Cannon bone circumference, loin width, and withers height were measured for each horse. Muscle soreness and tightness was measured 24 hours before and 24 hours after exercise. The same professional animal massage therapist did all muscle evaluations, using a scale from 0 (no pain detected) to 2.5 (severe pain elicited). Scores were given for 20 locations on each side of the horse. The score for a particular horse could thus range from 0 (no pain detected at any point) to 100 (severe pain detected at all 40 test sites).

Four treatments were used, with horses carrying 15, 20, 25, or 30% of their weight. Each horse worked one day and then was rested for 14 days. Work periods consisted of carrying tack (saddle with space for additional lead weights) and a rider at a walk, trot, and canter for a set distance in an indoor arena. Riders were experienced and skilled at staying balanced, picking up the correct diagonal when rising to the trot, and helping the horse stay on the correct lead at a canter. A wireless heart rate monitor was used to collect pulse data. Blood samples were collected before, immediately after, and 10 minutes after exercise and were analyzed for plasma lactate concentration

and serum creatine kinase activity. Blood samples were also taken 24 and 48 hours after work for creatine kinase analysis. Work rates during the trot and canter phases were determined, and the relationship between oxygen uptake and work rate was recorded.

Linear regression and correlation analyses were performed to find relationships between the variables of cannon bone circumference, withers height, loin width, and scores for muscle soreness/tightness.

What results were found?

There were no changes in body weight throughout the study. Changes in heart rate, respiration rate, and rectal temperature indicated a greater work rate when the horses carried 25 and 30% of their body weight compared to when they carried 15 and 20%.

Plasma lactate concentrations immediately after and ten minutes after exercise were lower when horses carried 15, 20, and 25% of their body weight compared with carrying 30%. Levels of creatine kinase measured immediately after exercise and also 24 and 48 hours following exercise showed the same pattern.

Mean percentage of change in muscle soreness measured 24 hours before and 24 hours after exercise was greater in horses carrying 25 and 30% of their body weight than when they carried less weight.

Loin width demonstrated a relationship to percentage of muscle soreness at 20, 25, and 30% of body weight. Indexing loin width and cannon bone circumference together, this trend was continued, with increased muscle soreness resulting when horses carried 25 and 30% of their body weights.

What does this tell us about weight-carrying ability and matching horses to riders?

This study was designed to test the weight-carrying ability of light-breed horses performing 45 minutes of light to moderate exercise, simulating a riding lesson for a student at an intermediate skill level. In this study, weight loads of 25 and 30% of the horse's body weight were shown to influence work rate, heart rate, and lactate concentrations. No differences were found in heart rate, plasma lactate concentration, respiration rate, rectal temperature, and work rate for horses carrying weights of 15 and 20% of body weight.

Serum creatine kinase activity, commonly used as a measure of muscle damage in exercising horses, was not changed when the horses carried 15 and 20% of their body weight. Post-exercise creatine kinase activity was greater in horses carrying 30% of body weight, and levels remained elevated 24 and 48 hours after exercise.

Considering loin width, horses with wider loins experienced less muscle soreness than horses with narrower loins after exercise when carrying a heavier load.

Results of this study suggest that, for lighter riding horses, a total weight (rider, saddle, other equipment) not in excess of 20% of the horse's body weight is quite acceptable and does not stress the horse. The authors indicate more studies considering total loin area and muscle depth as well as hoof size could be helpful in determining weight-carrying capacity of light riding horses.

While the authors do not specifically state that an experienced, balanced rider is easier for the horse to carry, it can be inferred that an inexperienced rider may be more difficult for the horse to carry comfortably due to shifts in balance, confusion in applying the aids for various gaits, and decreased ability to follow the horse's motions efficiently.

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