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Advances in Equine Nutrition

Volume II

Edited by

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TIMING AND AMOUNT OF FORAGE AND GRAIN AFFECTS EXERCISE RESPONSE IN THOROUGHBRED HORSES

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There is considerable debate among horse trainers about how to feed horses before exercise. Should horses be fed or fasted before work and how should hay be fed relative to grain? Three experiments were conducted to evaluate if feeding hay with and without grain affects glycemic and hematological responses in Thoroughbred horses at rest and during a simulated competition exercise test (CET) on a high-speed treadmill.

In experiment one, six Thoroughbred horses were fed 2.27 kg of a sweet feed mix either *1)* alone, *2)* with 2.27 kg of hay or, *3)* 2 h after receiving 2.27 kg of hay. Blood samples were taken 2 h before grain and hourly until 8 h post feeding. Blood was analyzed for glucose, insulin, lactate, PCV, and total plasma protein. Time of hay feeding affected glycemic response, plasma protein and water intake post grain feeding. Therefore, a second experiment was designed to evaluate how these changes would affect metabolic response to a CET.

In experiment two, four trained Thoroughbred horses were used in a 4 x 4 Latin square design. The four dietary treatments included: *1)* overnight fast, *2)* ad lib hay the night before and 2.27 kg of a sweet feed mix 2 h prior to exercise, *3)* 2.27 kg of hay 3 h prior to CET and 2.27 kg of grain 2 h prior to exercise, and *4)* 2.27 kg of grain 2 h prior to exercise.

The CET was performed on an inclined treadmill (3°) and consisted of a 10 min walk, 10 min trot (3.7 m/s), 2 min gallop (10.7 m/s), 10 min walk, 10 min trot (3.7 m/s), 10 min walk and 8 min canter (9 m/s). Blood samples were taken hourly before, at the end of each step during the exercise test, and 60 and 120 min post exercise. These samples were analyzed for glucose, insulin, cortisol, lactate, total plasma protein, PCV, Na^+, Cl^-, and K^+. Plasma volume was determined immediately before exercise using an indocyanine green clearance method. Ad lib hay feeding resulted in a 9% reduction in plasma volume. Fasted horses had lower blood lactate after the 8-min canter ($p<0.10$) compared to the other three treatments. Heart rate (HR) was significantly different between treatments. Based on these results, a third experiment was conducted to evaluate how different forage feeding regimes without supplemental grain would affect exercise response to the CET.

During experiment three, 4 horses (4 x 4 Latin square) completed the same CET as above after either *1)* fasting, *2)* 2.27 kg of hay 3 hours before CET, *3)* ad lib hay the night before, or *4)* overnight grazing in a grass paddock. No grain was fed before the CET and the same measurements were taken as in experiment two. Feeding hay or grazing affected plasma protein, PCV, electrolytes and glycemic response to exercise. The results of these experiments suggest that an overnight fast before an extended bout of exercise may be beneficial.


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