

Glycemic Response in Thoroughbred Mares

by

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(ABSTRACT)

The objective of this study is to determine if fat and fiber in a pasture supplement will be beneficial to the digestion and metabolism of the horse as compared to a concentrate high in sugar and starch. In both experiments, plasma concentrations of glucose and insulin following a meal were compared in Thoroughbred mares. In the first experiment, 12 pregnant and lactating mares were used in three different glycemic response tests to determine the effect of feeds on reproductively active mares. The mares were fed a typical pelleted concentrate (PC) three months before foaling and after foaling they were divided into two groups and fed a traditional sweet feed high in sugar and starch (SS), or a feed high in fat and fiber (FF). The feeds had similar DE and CP, but differed in fat (19, 32, and 166 g/kg DM, respectively) and NDF (199, 185, and 369 g/kg DM, respectively). For the second experiment, the same 12 mares (R mares) and 10 barren mares (B mares) were used in three different tests to determine the effects of the SS or FF feeds relating to season and reproductive stage. For each test, mares were placed in stalls and deprived of feed overnight. A series of blood samples was collected via a jugular catheter from 0 to 390 min after consumption of 1.82 kg of feed. Plasma was analyzed for glucose and insulin. Baseline values, peak values, increments and areas under the curve (AUC) were compared by ANOVA. For the first experiment glucose and insulin baseline values were similar for each diet and stage. Responses to PC did not differ between the two groups, indicating the groups were metabolically similar. Peak plasma glucose ($P < 0.001$) and insulin ($P < 0.001$) concentrations were higher in SS than in FF during both early and late lactation. Glucose ($P < 0.002$) and insulin ($P < 0.003$) AUCs were higher in SS than in FF during both early and late lactation. In the second experiment the baseline values for glucose and insulin were similar for both groups of R mares and B mares;

however, there were differences between the R and B mares. The peak glucose increment had significant differences or a trend for a difference for the main effects feed, pregnancy and season, and interactions feed by pregnancy and feed by season. The glucose AUC values obtained have a similar significance level the main effects and the interaction feed by pregnancy. When the peak insulin values are expressed as increments there is a difference for the main effects feed and pregnancy, but not the interactions. Insulin AUCs revealed also a significant or trend for a difference between main effects feed and pregnancy, and also for season, and the interaction feed by pregnancy. These results indicate that metabolic fluctuations are moderated by the replacement of sugar and starch with fat and fiber. This replacement may reduce the risk of certain digestive and metabolic disorders that have been linked to feeding meals of grain-based concentrates.

(Key Words: Horse, Glucose, Insulin, Dietary fat, Dietary fiber)

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