

Advances in Equine Nutrition

Volume II

Edited by

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FEED TYPE AND INTAKE AFFECT GLYCEMIC RESPONSE IN THOROUGHBRED HORSES

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A 6 x 6 Latin square design experiment was conducted to determine glycemic response in horses fed six different feeds at 3 different levels of intake. Six Thoroughbred geldings were fed mixed grass hay and one of six diets: cracked corn, whole oats, sweet feed (45% cracked corn, 45% whole oats, and 10% molasses), sweet feed + 10% corn oil, alfalfa forage, or a low starch, high fermentable fiber mix (25% rice bran, 25% soy hulls, 25% wheat bran, and 25% soaked beet pulp). Horses were randomly assigned low (.75 kg), medium (1.5 kg), or high (2.5 kg) intake levels at each feeding during six 3-day test periods. Diets were fed at medium intake (1.5 kg/feeding) twice each day and each horse received 5.45 kg hay per day during transitions between test periods, during which time treatments were altered for the subsequent period. Horses were given access to free exercise on pasture during the day, although they were not allowed to graze. On test days, morning feeding levels equaled 750, 1,500, or 2,500 g of the treatment diets in every case except sweet feed + corn oil. Horses on this diet received 750, 1,500, or 2,500 g of sweet feed with an additional 75, 150, or 250 g corn oil, respectively. Blood samples were taken prior to the morning feeding on test days to determine baseline glucose values and at 30-min intervals following feeding until glucose levels returned to or dropped below baseline for 120 min. The morning allotment of hay was fed following completion of sample collection. Area under the curve, mean glucose (mg/dl), peak glucose (mg/dl), and time to peak glucose (min) were determined. Plasma glucose concentrations were statistically analyzed by the general linear model procedure for analysis of variance. Period, horse, day, diet, and intake were included in the model. Using area under the curve for whole oats at medium intake (1.5 kg) as a standard of reference, a glycemic index was generated from area under the curve for all diets and intake levels.

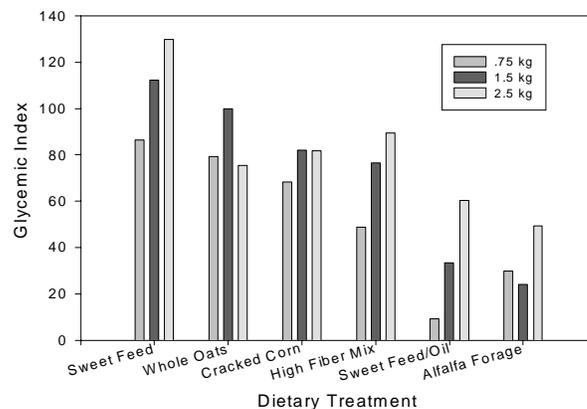
Area under the curve indicated differences in glycemic response between low (.75 kg) and high (2.5 kg) intake levels of all diets combined (Table 1). Sweet feed and whole oats demonstrated the greatest glycemic response, while alfalfa and sweet feed + corn oil provided the lowest response. Plotting the glycemic index by feed and level of intake revealed an appreciable drop in the index for whole oats fed at 2.5 kg, compared to that at 1.5 kg and relative to glycemic indexes generated for other feeds and intake levels (Figure 1).

Table 1. Area under the curve, mean glucose, peak glucose, and time to peak for all diets and intakes.

	Area under curve	Mean glucose (mg/dl)	Peak glucose (mg/dl)	Time to peak (min)
Dietary Treatment				
Sweet Feed	2,073 ^d	99.6 ^c	108.5 ^b	148 ^a
Whole Oats	1,602 ^{cd}	99.2 ^c	102.7 ^{ab}	142 ^a
Cracked Corn	1,438 ^c	97.3 ^b	105.6 ^b	153 ^a
High Fiber Mix	1,378 ^{bc}	99.3 ^c	106.8 ^b	108 ^a
Sweet Feed + Oil	898 ^{ab}	96.9 ^b	105.8 ^b	238 ^b
Alfalfa Forage	733 ^a	94.5 ^a	99.1 ^a	135 ^a
SEM	177	.63	2.1	20
Statistical Significance	.01	.01	.05	.01
Intake Level (all dietary treatments combined)				
.75 kg	1,087 ^a	97.1	101.5 ^a	120 ^a
1.5 kg	1,428 ^{ab}	98.4	106.5 ^b	165 ^b
2.5 kg	1,546 ^b	98.0	106.2 ^{ab}	178 ^b
SEM	125	.45	1.5	14
Statistical Significance	.05	NS ^e	.05	.05
Diet x Intake Interaction				
Statistical Significance	NS ^e	NS ^e	NS ^e	NS ^e

^{abcd} Treatments lacking a common superscript differ ($P < .05$)

^e Not significant



Mean glucose (mg/dl) was highest for sweet feed, whole oats, and the low starch, high fiber mix and lowest for the alfalfa diet. Peak glucose (mg/dl) was similar for all diets except alfalfa forage. Time to peak glucose (min) was greatly increased in the sweet feed + corn oil diet, while the remaining diets demonstrated similar responses. Increasing the level of intake from .75 kg to 1.5 kg per feeding increased time to peak glucose by 45 ± 14.1 min. Results of this study indicate that different grain diets demonstrate different glycemic responses and adding fat reduces both area under the curve and peak glucose values, as measured within this experimental design. More research is required to determine the relevance of glycemic response in predicting the effects of different feed ingredients on a horse's performance or behavior.

