

Advances in Equine Nutrition

Volume II

Edited by

J.D. Pagan



A COMPARISON OF GRAIN, VEGETABLE OIL AND BEET PULP AS ENERGY SOURCES FOR THE EXERCISED HORSE

K. CRANDELL¹, J.D. PAGAN¹, P. HARRIS², AND S.E. DUREN¹

¹*Kentucky Equine Research, Inc., Versailles, KY*

²*WALTHAM Centre for Pet Nutrition, Leicestershire, UK*

A number of studies have evaluated the effect of adding fat to a performance horse's diet. Most have replaced a portion of the grain in the ration with fat, so that total carbohydrate intake was reduced. Little research has been conducted to evaluate the effect of substituting other energy sources for starch. Therefore, this experiment was designed to compare a traditional high grain diet with diets which provide 15% of the total caloric intake from either vegetable oil or a highly fermentable fiber source (beet pulp).

Six three-year-old Thoroughbreds (4 geldings, 2 fillies) were fed one of three diets in a replicated 3 x 3 Latin square design where each period lasted 5 weeks. Diet 1 (CONTROL) consisted of 3.62 kg of sweet feed (47% oats, 42% corn and 11% molasses) and .9 kg of a balancer pellet. Diet 2 (FAT) contained 15% of the daily DE as soybean oil and Diet 3 (FIBER) contained 15% of the daily DE as beet pulp. The oil and beet pulp replaced sweet feed so that the diets remained isocaloric on a digestible energy basis. The horses were also fed 5.43 kg of an alfalfa/whole corn plant cube daily.

During the last week of each period, the horses performed a standardized exercise test (SET) on a treadmill. The SET consisted of a warm-up (WU), which included a 2 minute walk and an 800 meter trot (~4 m/s), an 800 meter gallop at 8.5 m/s (20 mph) and a 2400 meter gallop at 11 m/s (26 mph) followed by a warm down (wd) of 800 meters at the trot (~4 m/s) and a 2 minute walk. Each horse performed the test 3 hours after eating only the grain portion of its morning meal. Heart rates were recorded during the last 15 s of each 800 meter interval. Blood samples were drawn from an indwelling jugular catheter before eating, at 30 minute intervals up to the SET, after the warm-up, at the end of every 800 meters at the gallop, after the warm down and at 15 and 30 minutes post exercise. The collected plasma was analyzed for lactate, glucose, cortisol, insulin, triglycerides and glycerol.

Blood glucose was significantly lower ($p < .05$) in the FAT horses during the three hours post feeding as compared to either the CONTROL or FIBER horses. Insulin was also significantly lower ($p < .05$) in the FAT horses both post feeding and throughout exercise. Cortisol was significantly lower ($p < .05$) in the FAT horses as compared to the CONTROL horses during exercise. Following the SET, the FAT horses drank significantly more ($p < .10$) water (7.0 liters) than either the CONTROL (4.8 liters) or the FIBER (4.7 liters) horses. Substituting 15% of DE as vegetable oil had a greater effect on metabolic response to exercise than a 15% substitution of beet pulp.