

CONCENTRATE COMPOSITION, FORM, AND GLYCEMIC RESPONSE IN HORSES.

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Concentrate feeds for horses are available in an ever-increasing variety of compositions and forms. Recently there has been interest in the effect of feed composition and processing on the blood glucose and insulin responses of horses. This experiment was performed to compare the effects of six concentrate feeds, varying in composition and/or form, on blood glucose and insulin responses to a meal. Six mature, sedentary Thoroughbred and Standardbred geldings were randomly assigned to six diets in a 6 x 6 Latin square experiment. Horses were housed in 3 x 15 m partially-covered, limestone-floored pens with free access to water and an iodized salt block. Daily diets included *ad libitum* timothy hay and two 1.35 kg meals of one of six concentrate feeds, including whole oats (WO), a high-fat sweet feed (FaSF), a low-fat/low-fiber "control" sweet feed (CoSF), a high-fiber/low-starch pellet (FiP), a low-fat/low-fiber "control" pellet (CoP), and a high fiber/low starch nugget (FiN). Each horse received a different diet during each of six 10-d experimental periods. On the seventh d of each period, the time each horse took to eat the morning meal (1.34 kg) was recorded. On d 9 of each period, the horses were fasted overnight in preparation for sampling on d 10. On d 10 of each period, jugular catheters were inserted in the horses and venous blood samples were drawn before and at 30 min intervals for 6 h after a 1 kg test meal was fed. Each horse's test meal consisted of 1 kg of the concentrate which that horse had been consuming during the current feeding period.

Morning meal eating times were higher ($P<0.05$) for WO at 14.3 min versus CoSF at 9.0 min and CoP at 9.3 min. The morning eating times for the other concentrate feeds were intermediate to WO and CoSF. Peak glucose concentration for CoP at 8.3 mmol/L was higher ($P<0.05$) than for CoSF, FiP, FiN, and FaSF (7.1 mmol/L, 7.0 mmol/L, 7.3 mmol/L, and 6.9 mol/L, respectively). Similarly, time to peak glucose was longer ($P<0.05$) for CoP at 137 min than for CoSF, FaSF, and WO (100 min, 108 min, and 109 min). Time to peak glucose was longer ($P<0.05$) for FiN and FiP than for CoSF (129 min and 133 min vs. 100 min). Area under the glucose curve was greater ($P<0.05$) for CoP than for CoSF. There was a trend ($P<0.10$) for area under the insulin curve to be greater for CoP than for FaSF, FiP, and FiN. Peak insulin concentration showed a trend ($P<0.10$) to be greater for WO than for FaSF or FiP (38.3 ? IU/ml vs. 25.5 ? IU/ml or 25.5 ? IU/ml). There was also a trend ($P<0.10$) for time to peak insulin to be longer for WO than for FiP (158 min vs. 88.6 min).

In this study the control pellet (CoP) and the control sweet feed (CoSF) contained similar concentrations of starch but produced different responses. Plasma glucose for the control pellet peaked later and higher than the control sweet feed. Area under the glucose curve was also greater for CoP than for CoSF. These results suggest that pelleting facilitates more complete digestion and absorption in the small intestine, and thereby causes a greater plasma glucose response. Composition also influenced glucose response to a meal. CoP elicited higher peak glucose response than FiP. Although the form of these two feeds was the same, the CoP had a higher starch content and a lower fiber content than the FiP. Among the two sweet feeds tested, the 4.7% higher fat content in the FaSF than in the CoSF was insufficient to cause any differences in the variables measured. These results indicate that glycemic response to a concentrate meal was affected by form as well as carbohydrate composition within a form. *This study was supported by Cooperative Research Farms, Richmond VA and the Kentucky Agricultural Experiment Station.*