

## REVIEW &gt;

## Purina® WellSolve L/S® Horse Feed Elicits a Very Low Glucose and Insulin Response to Feeding

A SUMMARY OF NUTRITION RESEARCH CONDUCTED AT THE PURINA ANIMAL NUTRITION CENTER, EXAMINING THE EFFECTS OF MEAL SIZE AND FEEDING TWO LOW STARCH AND SUGAR FEEDS WITH DIFFERING NUTRIENT PROFILES ON GLUCOSE AND INSULIN RESPONSE TO FEEDING.<sup>1</sup>

### < INTRODUCTION >

Horses with insulin resistance, laminitis, PPID (Cushing's Syndrome), metabolic syndrome, and certain tying-up syndromes can benefit from a diet lower in sugar and starch to help control insulin response to feeding. However, there are many "low starch" products on the market for horses, and research is needed to determine if the sugar/starch content of the feed truly matters amongst "low starch" products and how horses respond to different meal sizes. In our first trial, the effect of glucose and insulin response to a meal were studied when feeding two isocaloric diets at the same rate, with an approximately 50% difference in starch content. The objective was to test the hypothesis that feeding a lower sugar/starch concentrate feed would cause a blunted glucose and insulin response. In a second trial, the effect of feeding diets at a rate to provide 0.3 g/kg body weight (BW) sugar/starch per meal, while providing different feed volumes was explored. The objective was to test the hypothesis that feeding meals equal in sugar/starch content would create similar responses in glucose and insulin dynamics, despite differences in meal size.

### < MATERIALS AND METHODS >

Six mature unfit Quarter Horse geldings were used for all testing. All horses were housed in 3m x 3m stalls overnight with group turnout in a dry lot during the day. In the first trial, horses received one of two dietary treatments (3.6 kg/day split into 2 feedings, Diet A or Diet B (WellSolve L/S®, Table 1) for 6 days before testing glucose/insulin responses on day 7. After day 7, horses received the next treatment in a crossover fashion. Grass hay was also fed at 1% BW. In Trial 2, the same dietary treatments were utilized as Trial 1, however the feeds were fed at a rate of 0.3 g/kg BW NSC split between 2 feedings for 6 days and on day 7 another glucose/insulin test was performed. After day 7, the geldings received the opposite dietary treatment in a crossover fashion. Consumption time was also recorded on all testing days.

<sup>1</sup>Gordon ME, ML Jerina, SL King, KE Davison, KJ Young and RH Raub. The effects of nonstructural carbohydrate content and feeding rate on glucose and insulin response to meal feeding in equine. 2007. *Journal of Equine Veterinary Science* 27(11):489-493.

## < RESULTS \* >

**Trial 1:** When diets A and B were fed in an isocaloric fashion and also at the same rate, horses on diet A had significantly higher ( $P < 0.01$ ) glucose and insulin responses compared with diet B, WellSolve L/S® (Fig. 1A, 1B). There was a significant treatment x time effect ( $P < 0.01$ ) for both glucose and insulin. Additionally, AUC for glucose and insulin, average glucose and insulin concentration, and peak glucose and insulin concentration were higher ( $P < 0.01$ ) for diet A than diet B. There were no differences ( $P > 0.05$ ) in time to peak glucose or insulin, or consumption time between diets. There were no correlations between consumption time and any other variable measured.

**Trial 2:** When diets A and B were fed to provide 0.3 g NSC/kg BW, there were no differences ( $P > 0.05$ ) in glucose response to the diets, except at the 6-hour sampling time ( $P < 0.01$ ). There were also no differences ( $P > 0.05$ ) in average glucose, AUC glucose, peak glucose, or time to peak glucose. However, diet A elicited a significantly lower ( $P < 0.01$ ) insulin response at the 4.0-hour through 5.5-hour sampling times (Fig. 2A, 2B). AUC for insulin and average insulin were lower ( $P < 0.05$ ) for diet A than for diet B. There were no differences ( $P > 0.05$ ) in peak insulin or time to peak insulin between dietary treatments. Consumption time was significantly different ( $P < 0.01$ ) between treatments, with diet A being consumed in approximately half the time of diet B. There were no correlations between consumption time and any other variable measured.

\*Because of factors outside of Purina Animal Nutrition's control, individual results to be obtained, including but not limited to: financial performance, animal condition, health or performance cannot be predicted or guaranteed by Purina Animal Nutrition.

## < DISCUSSION AND IMPLICATIONS >

Feeding a low sugar and starch concentrate feed (Purina® WellSolve L/S®) provides a lower glucose and insulin response to feeding, compared to another “low carbohydrate” feed. Small alterations in fat content may also be influencing the altered physiologic response in horses, but it is likely mostly driven by starch content. On the contrary, when the higher sugar/starch diet (diet A) is fed at a smaller amount to equal the sugar/starch content of WellSolve L/S®, diet A elicited a lower overall insulin response to feeding. Therefore, in relation to glucose and insulin response to feeding, meal size matters. Hence, feeding Purina® WellSolve L/S® while also providing it via a small meal are important recommendations for horses that can benefit from a lower glucose and insulin response to feeding.

TABLE 1

	DIET A	DIET B (WELLSOLVE L/S®)
CRUDE PROTEIN %	15.7	14.1
FAT %	2	5.5
ADF %	30.4	29.8
NDF %	44.1	45.7
STARCH %	14.5	6.18
SUGAR %	3.55	3.25
DE (MCAL/KG)	2.42	2.42

FIGURE 1 Plasma glucose and insulin responses to feeding two diets with ~50% difference in sugar and starch content.

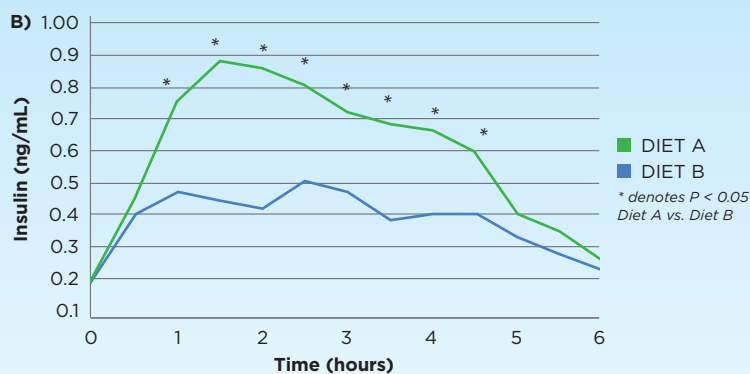
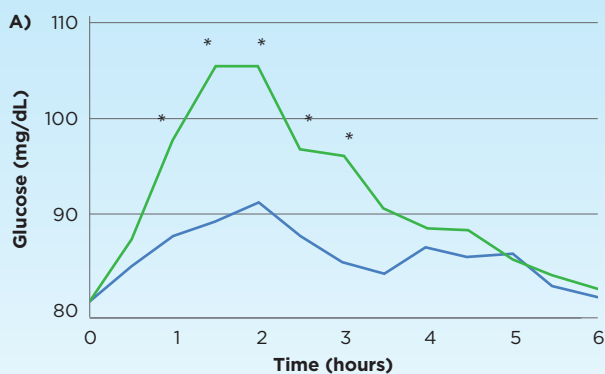
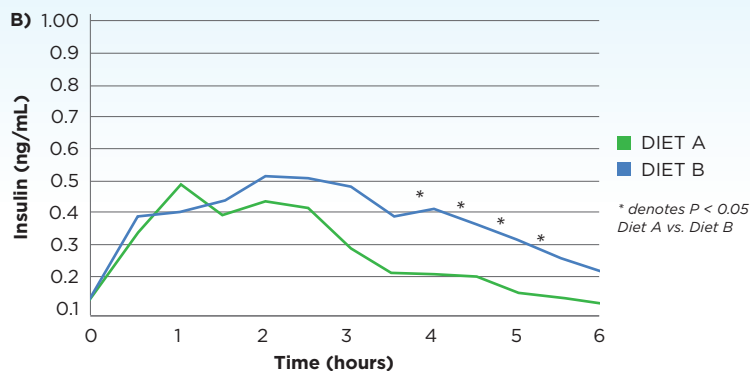
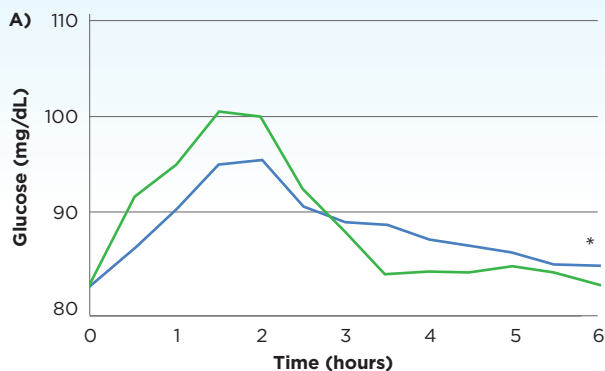


FIGURE 2 Plasma glucose and insulin responses to feeding two diets at 0.3 g sugar/starch per kg BW in two different meal sizes.



< FOR MORE INFORMATION > Contact your local Purina representative if you would like more information about this study.