



## RESEARCH >

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## The Effects of Feeding Purina® Ultium® Growth and Omolene #300® Horse Feeds to Young Growing Horses on Insulin and Glucose Dynamics

A SUMMARY OF RESEARCH CONDUCTED AT THE PURINA ANIMAL NUTRITION CENTER, EXAMINING THE EFFECTS OF FEEDING YOUNG, GROWING HORSES ULTIUM® GROWTH AND OMOLENE #300® HORSE FEEDS, FOR A PROLONGED 2-YEAR PERIOD ON INSULIN SENSITIVITY AND GLUCOSE DYNAMICS.<sup>1</sup>

### < INTRODUCTION >

Previous research has suggested that feeding horses a diet higher in starch and sugar versus one that derives its calories predominantly from fat and fiber will result in an animal with a reduced sensitivity to insulin and altered glucose dynamics.<sup>2</sup> However, these studies utilized diets that were different from those available commercially, specifically the high starch diets contained larger amounts of starch and sugar than typically available feeds. Additionally, these studies investigated acute effects of high starch and sugar feeds on insulin and glucose dynamics without monitoring the long-term effects. Therefore, the objective of this study was to evaluate the effects of feeding a diet higher in starch and sugar (Purina® Omolene #300®) as compared to one higher in fat and fiber (Purina® Ultium® Growth) on insulin and glucose dynamics in young horses over a long-term feeding period. It was hypothesized that young growing horses would have a decreased insulin sensitivity when fed a diet higher in starch and sugar.

### < MATERIALS AND METHODS >

Twelve Quarter Horse foals (weaning BW 217 ± 25 kg; mean ± SD) were initially assigned to consume 1 of 2 dietary treatments, to which their dams also were previously randomly assigned. The groups received either Omolene #300® (S) or Ultium® Growth (F). Diets were analyzed for nutritional content and results are presented in Table 1. Foals were initially creep fed at 28 days of age, starting with 0.23 kg feed/day, and increased by 0.23 kg every other day until all horses reached an equal rate of 3.6 kg/head/day. No horse consumed more than 0.45 kg feed per month of age during the creep feeding stage. Foals also consumed grass hay along with their dams during the creep feed period, and then received 1% of their body weight in grass hay at weaning and thereafter. Insulin sensitivity was evaluated at 168 days of age, 364 days of age, and 728 days of age using a modified Frequently Sampled Intravenous Glucose Tolerance Test (FSIGTT), with data analyzed using MinMod Millennium software.<sup>3</sup> MinMod results including insulin sensitivity (SI), acute insulin response to glucose (AIRg), glucose effectiveness (Sg) and disposition index (DI) were analyzed with a mixed ANOVA using a Mixed procedure in SAS.

<sup>1</sup>Gordon M, Jerina M, Raub R and Williamson K, 2011. Insulin sensitivity in growing horses fed a higher starch versus a higher fat diet for two years. *J. Equine Vet. Sci.* 31: 277

<sup>2</sup>Quinn R, Burk A, Hartsock T, Petersen E, Whitley N, Treiber K and Boston R, 2008. Insulin sensitivity in Thoroughbred geldings: effect of weight gain, diet and exercise on insulin sensitivity in Thoroughbred geldings. *J. Equine Vet. Sci.* 28: 728.

<sup>3</sup>Hoffman R, Boston M, Stefanovski D, Kronfeld D and Harris P, 2003. Obesity and diet affect glucose dynamics and insulin sensitivity in Thoroughbred geldings. *J. Anim. Sci.* 81: 2333.

Definitions for the parameters measured are as follows:

- Insulin Sensitivity (SI): Ability of insulin to promote glucose clearance.
- Acute Insulin Response to Glucose (AIRg): Endogenous insulin secretion in response to glucose.
- Glucose Effectiveness (Sg): Ability of glucose to mediate its own disposal.
- Disposition Index (DI): Describes the effectiveness of insulin secreting beta cells.

**TABLE 1**  
DIETARY COMPOSITION OF PURINA® OMOLENE #300® VS. PURINA® ULTIUM® GROWTH HORSE FEEDS

NUTRIENT	OMOLENE #300®	ULTIUM® GROWTH
CRUDE PROTEIN %	16.0	15.5
FAT %	5.0	9.5
CRUDE FIBER (MAX) %	6.5	13.0
STARCH %	29.4	16.6
WATER SOLUBLE CARBOHYDRATE %	10.6	10.0
ETHANOL SOLUBLE CARBOHYDRATE %	6.6	5.6
MCAL/KG	3.4	3.7

## < RESULTS >

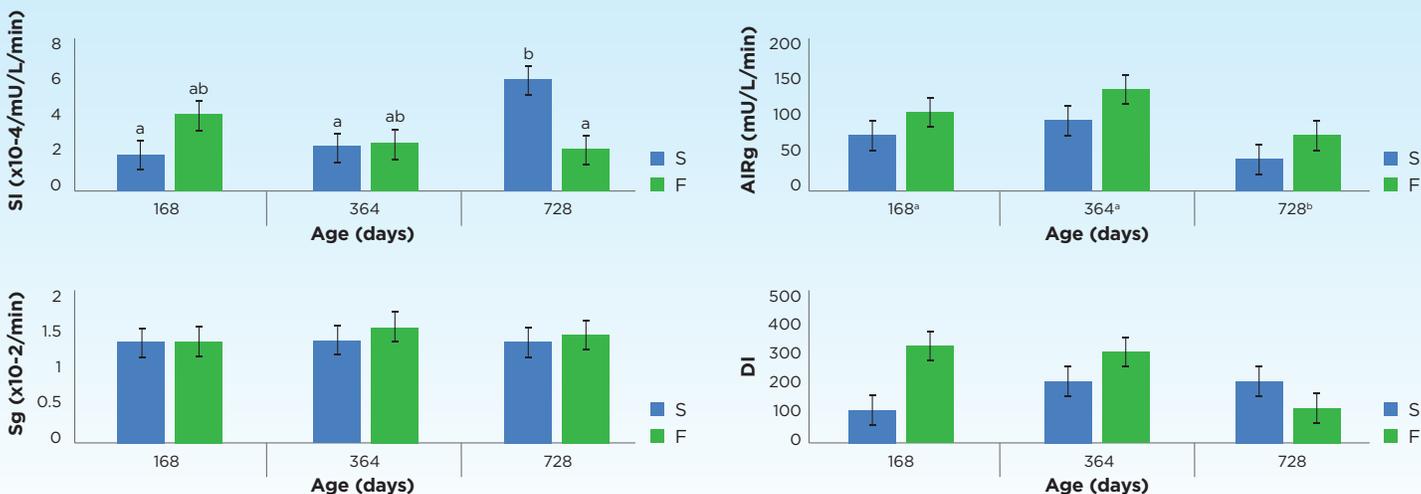
There was no difference ( $P>0.05$ ) due to dietary treatment for AIRg, Sg, or DI at any age. For AIRg there was a difference due to time ( $P=0.0136$ ), with day 364 values higher than day 728 values (Figure 1). A trend for a treatment by time interaction ( $P=0.0584$ ) was found for SI, with the Omolene #300® horse feed group showing the highest insulin sensitivity and differing from the Ultium® Growth group within the 728 day age period (Figure 1).

## < DISCUSSION AND IMPLICATIONS >

In contrast to previous work suggesting reduced insulin sensitivity for weanlings consuming a diet higher in sugar and starch, horses growing for two years on Purina® Omolene #300® horse feed, a diet which derives more of its calories from starch and sugar, vs. Purina® Ultium® Growth feed, which is higher in fat and fiber did not demonstrate a lower insulin sensitivity. Reasons for this discrepancy may be that Purina® Omolene #300® is lower in starch and sugar than the high starch and sugar diets previously evaluated, or the young horses readily adapted to the dietary regimen without consequence. Although there was a 40% and 62% difference in sugar/starch and fat content respectively, between diets, perhaps this differential was not of sufficient magnitude to alter insulin sensitivity. In conclusion, this research demonstrates that when fed as directed, both Purina® Omolene #300® and Ultium® Growth Horse feeds promote the sound growth and development of healthy young horses with no negative influence on insulin sensitivity and glucose dynamics.

**FIGURE 1**

Insulin sensitivity in growing horses fed Purina® Omolene #300® (S) vs Purina® Ultium® Growth (F). MinMod results are shown with different superscripts above the bars demonstrating a trend ( $P=0.0584$ ) for a treatment x time interaction. Differing superscripts along the x-axis labels demonstrate a difference ( $P=0.0136$ ) due to time. Bars represent means  $\pm$  standard error.



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