

MODERATE DIETARY CARBOHYDRATE IMPROVES AND HIGH DIETARY FAT IMPAIRS GLUCOSE CLEARANCE IN AGED THOROUGHBRED GELDINGS

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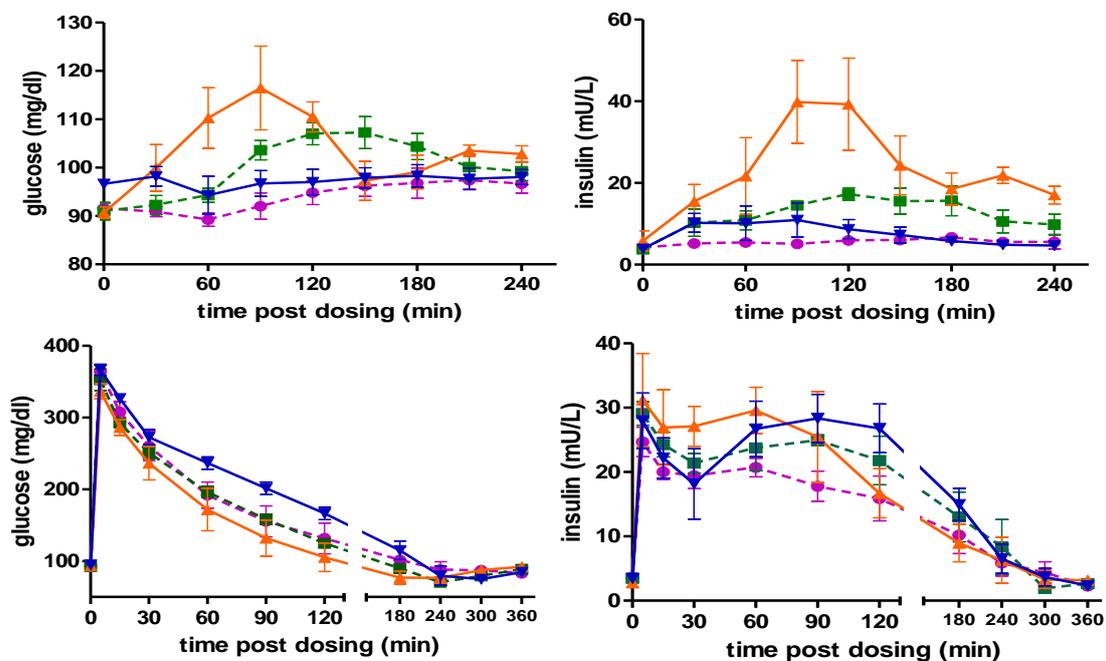
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Low carbohydrate diets are often recommended for horses with metabolic syndrome and high fat diets are useful for managing horses suffering from RER and PSSM. It is questionable whether these types of diets are appropriate for normal, non-obese horses. This study was conducted to determine whether a moderate daily intake of carbohydrate from oats or a high level of fat intake from vegetable oil would affect glucose clearance as measured by an intravenous glucose tolerance test (IVGTT).

Four aged Thoroughbred geldings (21.5 yrs \pm 3.32 yrs; Weight 572.16 Kg \pm 50.53 Kg; BCS 5.0-6.0) were used in a 4 X 4 Latin square design study to assess the effect of energy source on glucose, insulin, NEFA and triglycerides during a glycemic response test (GRT) and an IVGTT. Each period lasted 4 weeks. The treatments were isocaloric and consisted of ~11 Mcal DE/d from grass hay and ~7.5 Mcal DE/d from either 1. Additional grass hay (GRASS), 2. Lucerne/grass blend pellet (ALF), 3. Whole oats (OATS) or 4. Lucerne cubes + soybean oil (OIL). GRASS and ALF supplied 53-54% of DE from fiber, the OAT treatment supplied 31% of DE from NSC and the OIL treatment supplied 30% of DE from fat. On day 14 of each period the GRT was conducted where horses were fed $\frac{1}{2}$ of their regular daily intake (3.75 Mcal DE) of their respective treatment feed, Blood samples were taken before (0 m) and at 30 m, 60 m, 90 m, 120 m, 150 m, 180 m, 210 m and 240 m post feeding. On day 28 of each period the IVGTT was conducted where a 50% dextrose solution was administered IV at a rate of 0.5g glucose/kg BW over 10 min and blood samples were collected immediately before (0 min) and at 5, 15, 30, 60, 90, 120, 180, 240, 300 and 360 min post administration. Data were analysed using repeated measures ANOVA with Fisher's post-hoc test. Significant differences were accepted at the 5% level.

A moderate intake of NSC (31% of DE) improved glucose clearance during IVGTT compared to an all hay diet, while a high dietary fat (30% of DE) impaired glucose clearance during IVGTT compared to an all hay diet. Blood glucose returned to baseline in 126.6 \pm 25.8 min in OATS compared to 216.7 \pm 23.5 min in OIL ($p < 0.05$).

Figure 1. Plasma glucose and insulin during GRT (top) and IVGTT (bottom) in horses fed GRASS (●), ALF (■), OAT (▲), and OIL (▼).



The results of this study suggest that feeding a diet containing a moderate quantity of carbohydrate (31% of DE) improves glucose tolerance in non-obese aged horses compared to an all hay diet. Conversely, feeding a high fat diet (30% of DE) impairs glucose clearance. Moderate carbohydrate equates to 2.0-2.5 kg/d of grain and a high fat diet equates to about 500g/d of oil (for a 500kg horse). More research is needed to determine the effect of different energy sources on glucose clearance in horses with metabolic syndrome, obese horses and in non-obese exercised horses.