Time of feeding and fat supplementation affect plasma concentrations of insulin and metabolites during exercise

Six Thoroughbreds were used to evaluate time of feeding on changes in exercise response in horses receiving either a textured feed or a fat-supplemented textured feed. Using a crossover design, 3 horses were fed a fat-supplemented diet while 3 horses received a control ration of textured feed. Horses performed a standardised exercise test (SET) on a high speed treadmill. The SET was performed at 3 different times: 1) following an overnight 12 h fast, 2) 3 h after feeding and 3) 8 h after feeding. The SET consisted of a 2 min walk at 1.4 m/s, 800 m trot at 4.2 m/s, 800 m gallop at 7.7 m/s, 1600 m gallop at 11 m/s, 800 m trot at 4.2 m/s and 2 min walk at 1.4 m/s. Jugular blood samples were taken before feeding, hourly until the beginning of the SET, at the end of each exercise step, 15 min post exercise and 30 min post exercise. During the SET, heart rate was measured and blood samples collected for analysis of glucose, lactate, insulin and nonesterified fatty acids (NEFA). Feeding horses 3 h prior to exercise resulted in elevated concentrations of plasma glucose and insulin (P < 0.01) at rest. Elevated concentrations of insulin in horses fed 3 h prior to exercise decreased plasma glucose (P < 0.01) during exercise and appeared to have suppressed fat oxidation during exercise because horses that were either fasted or fed 8 h post prandial had a net disappearance of NEFA in the plasma during exercise. This study indicates that beginning exercise with elevated plasma insulin appeared to be of no benefit during the exercise conducted in this experiment.