

Recent Updates in Equine Research

Racing Surfaces

In this study, forelimb hoof accelerations and ground reaction forces were measured and analyzed. Three Thoroughbred racehorses wearing dynamometric horseshoes were trotted and cantered on dirt, synthetic, and turf track surfaces at a racecourse. The lowest peak accelerations, mean levels of vibration, and peak ground reaction forces were recorded on the synthetic surface. This indicates that synthetic surfaces have a potential to reduce injuries in Thoroughbred racehorses. The researchers caution that because each track has unique characteristics, regardless of surface material, care should be used in extending results of this study to all tracks. *Setterbo et al., University of California-Davis.*

Insulin Resistance and Weight Gain

Three adult geldings were fed 200% of their digestible energy requirements for a period of 16 weeks to induce weight gain. Body weight increased by an average of 20% and body condition score rose from an average of 6 to 8. A number of measurements (glucose tolerance plus concentrations of insulin, triglycerides and nonesterified fatty acids) were recorded before and after weight gain to evaluate glucose and insulin dynamics. Insulin concentration increased with weight gain, and insulin sensitivity decreased by 71 +/- 28%. The decreased insulin sensitivity was compensated for by an increase in the secretion of insulin. Prevention of obesity is listed as a potential management strategy to avoid insulin resistance and high circulating insulin levels in horses. *Carter et al., New Bolton Center, University of Pennsylvania.*

Hormone Concentrations, Cushing's Disease, and Hours of Daylight

Groups of horses and ponies with or without Cushing's disease were monitored from February through October. Blood samples were collected eight times during the study and were analyzed for insulin concentration, adrenocorticotrophic hormone (ACTH), and alpha-melanocyte-stimulating hormone (alpha-MSH). ACTH and alpha-MSH are responsible for the clinical signs associated with Cushing's disease. ACTH concentration was higher in all groups during measurement periods for August through September in comparison with periods in February through June. ACTH measurements taken in June through September were higher in Cushing's equines than in clinically normal equines. Levels of alpha-MSH were higher in control horses from April through October compared to February and March, and also higher in Cushing's horses from August through October compared to February and March. Control horses showed lower plasma insulin concentrations in June than in February and March. The researchers concluded that, in these groups of equines, plasma alpha-MSH and ACTH concentrations increased as hours of daylight decreased from maximum in June to fewer hours in October. *Beech et al., New Bolton Center, University of Pennsylvania.*

Yeast Supplementation with High-Fiber or High-Starch Diets

Four horses with fistulas of the cecum and right ventral colon were fed high-fiber or high-starch rations with or without supplementation with yeast (*Saccharomyces cerevisiae*). The high-fiber and high-starch diets consist-

ed of pelleted feed and long wheat straw given in two daily meals to provide fiber-to-starch ratios of 3.5 and 1.0 respectively. Following a three-week adaptation period, intestinal contents were collected four hours post-meal and analyzed for levels of bacteria and yeast. Lactobacilli concentrations were higher in the cecum and colon and levels of streptococci did not change when dietary starch levels increased. In yeast-supplemented horses, yeast concentrations were higher in the cecum than in the right ventral colon, and did not show a change related to diet. Concentrations of lactobacilli and lactic acid utilizers were greater in the cecum but the same in the colon of yeast-supplemented horses. The authors stated that most enzymes involved in plant cell wall digestion were increased with the addition of yeast, and this fact may help to explain better digestion of fiber that has been reported in previous studies of yeast supplementation. *Jouany et al., ENESAD, Dijon, France.*

Laminitis and Gene Expression

A number of incompletely understood biochemical and cellular events take place in the inner hoof tissues in horses that are developing laminitis caused by an overload of ingested carbohydrates. In this study, six clinically normal adult horses with no history or evidence of laminitis were used. The horses were divided into two groups, control and trial. Control horses received no treatment, while trial horses were given oligofructose by nasogastric tube at the rate of 10 grams per kilogram of body weight. Horses in both groups were humanely euthanized 24 to 30 hours after the administration of oligofructose and before any clinical signs of laminitis were evident. Sections of lamellar tissue were harvested from the left dorsal hoof wall of each horse immediately after death, and were preserved by freezing. Analysis was conducted to compare gene expression between control (normal) and trial (pre-laminitis) groups. Results of analysis showed that 155 genes were up-regulated and no genes were down-regulated in the laminitis group. The majority of the up-regulated genes were those coded for the production of pro-inflammatory biochemical or cellular processes as well as those involved in protein degradation and turnover. Some anti-inflammatory genes were also up-regulated. These changes in gene regulation took place before the horses showed pain or discomfort, and also before the development of vascular changes, separation of dermal-epidermal tissues, and inflammation. The authors suggest that, for at-risk individuals, the use of early and targeted anti-inflammatory therapy may halt or prevent the development of laminitis. *Budak et al., New Bolton Center, University of Pennsylvania.*

Toxic Signs After Use of Commercial Deworming Products

While most horses tolerate commercial paste deworming products, occasional reactions have been documented, as in the following reported incidents. Three adult Quarter Horses were evaluated for neurologic signs 18 hours after the oral administration of a standard dose of 1.87% ivermectin. Signs included depression, ataxia of front and rear legs, drooping lips, decreased pupil reflex, and muscle twitching, and got progressively more severe until 36 hours after administration. The horses were treated with intravenous fluids and anti-inflammatory medications. Two of the horses recovered with no apparent long-term deficits, and one horse was euthanized. Examination of the euthanized horse's brain tissue showed an abnormally high level of ivermectin. Analysis of the paste product showed that the concentration of ivermectin was approximately what was indicated on the packaging. While it is uncommon to see reactions related to ivermectin toxicity, the authors state that the possibility should be considered in horses that show acute neurologic impairment after ivermectin administration. Horses with this condition can survive with supportive care. *Swor et al., Texas A & M University.*