U of M Horse Newsletter

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Arthritis in the Knee

By: Lauren Bullock, Senior Vet Student, Univ. of Minn.

If you have ever been diagnosed with degenerative joint disease, you understand what a horse goes through when diagnosed with arthritis. Arthritis is caused by wear and tear damage that hasn't been repaired. A joint is composed of 3 parts: the cartilage, the synovial membrane, and the synovial fluid. Cartilage covers the ends of the bones and is mainly used as a shock absorber. Cartilage lacks nerves. However, as the cartilage is destroyed, the underlying bone is exposed. Pain is due to the pressure on the nerves in the bone as well as the inflammatory agents found in the synovial fluid and damaged cartilage. Unfortunately, these inflammatory agents create more cartilage damage, leading to a vicious cycle.

Treatment of damaged cartilage is difficult and often impossible in both horses and humans. This means osteoarthritis will continue to progress over time. Management of arthritis involves managing the pain and optimizing joint health. This will vary by the joint(s) affected and by the use of the horse. Your veterinarian may prescribe a combination of joint protectants (glucosamine, chondroitin), pain relief (phenylbutazone, firocoxib), and/or joint injections (corticosteroids, hyaluronan). It is also good to evaluate the need for weight loss, farrier work, altering exercise levels, and rehabilitation programs. These programs may vary by time of year and how your horse responds so it is good to have your horse re-evaluated on a regular basis.

Research Update - Restricted Grazing

Restricting grazing time is often implemented in horses requiring reduced caloric intake. However, preliminary research has shown that dry matter intake rate in the first 4 hours of grazing is double that of the dry matter intake rate in the second consecutive 4 hours of grazing, allowing horses to meet 55% of their daily maintenance digestible energy in the first 4 hours. The objective of this research, conducted at North Carolina State University, was to determine dry matter intake rate in horses having access to pasture for four different time periods: 3, 6, 9, and 24 hours.

Eight adult horses were used and were randomly assigned into one of the four treatments (3, 6, 9 and 24 hours) for seven days. The 3 and 6 hour groups were fed free choice grass hay and hay intake was measured daily. Body weight was measured prior to grazing at the beginning and end of each 7 day grazing period. Daily pasture dry matter intake was estimated by calculating the difference between initial and residual forage mass of each grazing cell while total dry matter intake was calculated as the sum of pasture and hay intake.

Average dry matter intake rate was 1.96, 1.52, 1.12, and 0.57 g of pasture dry matter per kilogram of horse body weight per hour for horses having access to pasture 3, 6, 9, and 24 hours, respectively.

The results supported the hypothesis that dry matter intake rate increases as time allowed for grazing is restricted, which suggests that extrapolation of 24 hour pasture dry matter intake estimates to shorter periods may underestimate pasture intake.

Summarized by Beth Allen, Univ. of Minn.

Inside This Issue

Upcoming Events

Draft Horse Owner Education Program
Saturday, February 18
Leatherdale Equine Center
To register ($25):
www.regonline.com/DraftHorse

Four State Equine Business Conference (MN, NE, IA, MI)
Saturday, February 25
Leatherdale Equine Center
To register ($30):
Registration Link

Lunch and Learn Webinar
Wednesday, February 29
Noon to 1pm
Equine Rehabilitation Therapies
To join the webinar (free):
https://umconnect.umn.edu/rehab/

Advanced Hands-on Evening Workshops
6:00 to 8:30 pm
Leatherdale Equine Center

Wound Management
Thursday, March 8th

Ration Balancing
Thursday, March 15th

$15 per workshop or $25 for both
www.regonline.com/AdvancedHandsOn

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Most Horses Tolerate Carbohydrates

By: Joe Pagan, PhD, Kentucky Equine Research

Traditionally, cereal grains have been staple feeds for horses. For generations, work horses, racehorses and show horses have been fueled by rations composed mainly of forage and grains. Cereal grains are high in nonstructural carbohydrates (NSC), including starch and water-soluble sugars that can be enzymatically digested and absorbed as glucose in the small intestine.

Recently, the use of cereals as a major component of horse feed has been questioned. These concerns are based on the somewhat flawed premise that feeding even moderate quantities of NSC will lead to metabolic disturbances and disease in clinically normal horses. Nonetheless, this has led many feed manufacturers to drastically alter their horse feed formulation to cater to the “low-carb” craze.

There are legitimate concerns about feeding excessive NSC to horses. Feeding too much starch in a single meal can overwhelm the small intestine's digestive capacity, resulting in large quantities of starch escaping to the large intestine, where it is rapidly fermented to volatile fatty acids and lactic acid. Changes in the pH of the hindgut due to alterations in the microbial populations and acid profiles may result in hindgut acidosis. Horses suffering from hindgut acidosis may develop anorexia, colic or display stereotypical behaviors such as wood chewing and stall weaving. Furthermore, long-term exposure to pH levels of less than 5.8 will begin to have deleterious effects on the epithelial lining of the colonic and cecal walls, which may affect absorptive capacity.

With good feeding management, carbohydrates in grains are well tolerated by most horses. Performance horses depend on NSC as a major source of dietary energy. Digestion of NSC results in increases in blood glucose. Under the influence of insulin, blood glucose is taken up by the liver, muscle and adipose tissue, and stored as liver glycogen, muscle glycogen or fat. These substrates are later used as fuels for muscle contraction during exercise. Kentucky Equine Research (KER) has evaluated the rations of hundreds of sport horses and racehorses competing successfully at the highest level. The vast majority of these horses consume feeds that contain 30-40% NSC, which supplies 35-50% of the concentrate's digestible energy (DE) content. A typical high-performance ration of forage plus concentrate contains 18-22% NSC, which provides 28-32% of the ration's total DE.

At the other end of the equine spectrum are horses that cannot tolerate even moderate amounts of NSC in their rations because of metabolic disorders. The most prevalent of these disorders is equine metabolic syndrome (EMS), which results in insulin resistance (IR) and an increased risk of laminitis. Horses and ponies with EMS tend to be obese with cresty necks. These animals often have had prior bouts of laminitis and are easy keepers. Management strategies to reduce the incidence and severity of EMS include exercise, weight loss and a ration (hay plus grain) that contains no more than 10% NSC.

In between the extremes of the elite equine athlete and the obese, laminitic pony lies the majority of horses in the population. These horses are clinically normal, and while many may be older and sedentary, they have not displayed any signs of EMS. Will a carbohydrate-rich ration make these horses insulin resistant and thus more susceptible to? Are high-fat, low-carbohydrate diets more suitable?

To answer these questions, KER conducted a study with aged Thoroughbred geldings (average of 21.5 years old) with body condition scores of 5.0-6.0 to determine whether an oat-based ration (20% NSC, with 31% DE from NSC) or a high-fat ration (12.7% fat, with 30% DE from fat) would affect glucose tolerance as compared to an all-grass hay diet (9.4% NSC, with 17% DE from NSC).

Glucose tolerance was measured using an intravenous glucose tolerance test. The amount of time it takes for blood glucose to return to normal indicates how well the horse's liver, muscle and fat cells are able to take up and utilize glucose. Horses with impaired glucose tolerance take longer for blood glucose to return to baseline levels. During the intravenous glucose tolerance test, it took significantly less time (average of 127 minutes) for blood glucose to return to baseline in the oat-fed horses compared to either the all-hay (average of 198 minutes) or the high-fat diet horses (average of 217 minutes). These results suggest that feeding normal, non-obese horses a ration with a significant quantity of its calories coming from NSC is not detrimental to, and may even improve, glucose tolerance.

In conclusion, horses with specific metabolic issues certainly can benefit from low-NSC (less than 10% hay and grain) diets, but these types of “super low-carb” diets are not necessary for normal sedentary or exercised horses.

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