Hot Topics in Equine Nutrition

The latest research in equine nutrition from the 2005 Equine Science Society meeting.

By Edgar A. Ott, Ph.D.

The 19th Equine Research Symposium was held by the Equine Science Society, formerly the Equine Nutrition and Physiology Society, just outside of Tucson, Arizona, June 1-3, 2005. Two-hundred-seventy-six scientists from all over the world presented papers on equine nutrition, exercise physiology, production management and reproductive physiology. Included here are several summaries of equine nutrition topics from the Equine Science Society's 19th Symposium Proceedings.

Omega-3 Fatty Acids

There is considerable interest in the effects of feeding omega-3 fatty acids to horses because of the positive effects of these fatty acids in other species. Spearman et al., reported that gestating mares, fed a mixture of corn oil and linseed oil that provided an omega-6 to omega-3 ratio of about 2-to-1, resulted in increased omega-3 fatty acids in the mare's plasma, her milk and the foal's plasma. The results suggest that we can alter the fatty acid status of the foal by feeding the mare desired fatty acids. In a similar experiment, Kruglik et al. fed either corn oil or a protected fatty acid (PFA) mixture providing added omega-3 fatty acids to pregnant mares. Mare plasma and milk omega-3 fatty acid concentrations were increased in the mares fed the PFA as were those in the foals. The mares that were supplemented with a protected fatty acid mixture also produced colostrums that had higher IgG concentrations, which could have positive effects on the immune system of the foals.

Providing Omega-3 fatty acids to broodmares could strengthen foal's immune systems.

Photo by Summer Best

Feeding omega-3 fatty acids to mature horses resulted in increased red blood cell concentrations of the omega-3 fatty acidsEPA (C20:5n3) and DHA (C22:6n3) but it took at least 23 days before the increase was noted (King et al.). The Michigan State workers compared a long chained fatty acid supplement (LC) providing omega-3 fatty acids with corn oil to determine whether fatty acids would influence joint inflammation in exercising horses. The LC treated horses had higher plasma EPA and DHA concentrations and a trend for the LC treated horses to have a longer trot stride suggesting that the LC reduced the osteoarthritis problems (Woodward et al.). "These studies suggest that horses may benefit from using fat sources that provide higher levels of omega-3 fatty

acids than can be supplied by corn or soybean oil. Fish oil is a rich source of omega-3 fatty acids but it is not very palatable unless processed to remove the fish odor. Linseed oil, or flax seed oil, are also rich sources of omega-3 fatty acids and may be the source of choice in horse feeding programs."

Saccharomyces Cerevisiae

Yeast and yeast by-products have been used in other species for a variety of purposes. There is evidence in the literature that the mannan oligosaccharide from the wall of Saccharomyces cerevisiae may benefit the immune system. In another study, Saccharomyces cerevisiae in pelleted form was fed to geldings on an alfalfa-brome grass hay and 2 kg of corn. The yeast supplemented geldings had higher cecal pH values than the unsupplemented geldings at four-hours post-feeding. The results suggest that yeast may alter cecal metabolism and reduce the effect of starch overloads (Hall and Miller-Auwerda). Photo courtesy of Paula Haderle

Recent research suggests that yeast may reduce the effects of starch overload.

Protein

A number of authors have suggested that feeding high levels of protein to growing horses has a detrimental effect on calcium metabolism and subsequently bone mineralization. Texas A&M workers fed 10 month old foals NRC (1989) or 130% of NRC (1989) protein for 120 days. The results did not indicate a negative effect of excess dietary protein on blood, fecal or urinary pH. There was also no adverse effect of high protein intake on bone mineralization. Additional analyses of the samples and data is underway (Spooner et al.).

Silicon Supplementation

In earlier research, silicon supplementation of horses in race training reduced skeletal-related injuries and increased training distance to injury. A subsequent experiment using calves as a model, silicon supplementation did not improve bone strength, leaving the question of why horses benefit from silicon supplementation unanswered (Turner et al.). The source of silicon appears to be important. Weanlings fed sodium zeolite A had higher plasma silicon concentrations than weanlings fed azomite A, a natural source of silicon. All growth parameters were similar on both diets (Mazzella et al.). The results from the feeding of silicon to young horses have been mixed. Again, the benefits may be dependent upon the diet of the horse. Photo by Summer Best

A recent study confirmed that high levels of protein in the diet had no detrimental effect on growing horses.

Perennial ryegrass

Perennial ryegrass varieties vary in the amount of water soluble carbohydrates (WSC) they produce. Two varieties, that were not identified, were selected for normal (N) and high (H) levels of WSC. The N variety had 224 g WSC including 166 g fructan/kg dry matter. The H variety had 333 g WSC including 222g fructan/kg dry matter. The forages were ground and fermented in vitro for 72 hours using inoculum from the right ventral colon of ponies fed hay. Samples were collected at 0, 3, 6, 9, 12, 15, 25, and 72 hr. and analyzed for pH and lactate. Levels of pH did not differ between forages at any time. Lactate levels were higher for the H forage at 6 and 9 hr after inoculation (Ince et al.). The results suggest that forages high in WSC can increase lactate production in horses which may lead to metabolic disorders including hind-gut acidosis, colic and laminitis. When feeding perennial ryegrass or other spring forages, dilute the pasture with grass hay, so that horses do not consume excessive amounts of the pasture containing high levels of fructans.

Glycemic Index

Of similar interest is the glycemic index of various feed ingredients fed to horses. The glycemic index measures the amount of blood glucose an animal derives from a meal of a selected feed ingredient or ingredients. The blood glucose level is indicative of how quickly the starch is processed to glucose and how quickly it is absorbed.

The glycemic index is determined by feeding the ingredient along with a standard diet of oats and alfalfa hay and measuring the blood glucose levels before the meal and at 30, 60, 90, 120, 180, 240, and 300 minutes after the meal. The glycemic index is measured as area under the curve when compared to oats which is given a value of 100. Sweet feed, oats and corn all had values that were high (95 - 110). Barley and wheat bran were in the middle (55 - 76). Beet pulp, alfalfa, rice bran and soybean hulls were all low (0 - 20) (Rodiek and Stull). In another experiment, oats barley and corn were fed untreated, finely ground, steam-flaked and popped. The glycemic index did not seem to respond consistently to the processing even though earlier studies have shown that processing improves prececal starch digestibility in horses (Vervuert et al.).

The glycemic index is of value in trying to minimize the hind gut starch overload that occurs when performance horses are fed large amounts of feed concentrates. The use of beet pulp, rice bran and soybean hulls as ingredients in horse feeds appears to be effective in reducing the glycemic index of the concentrate. photo by Summer Best

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