effects of physical characteristics of feed on ESGD risk. It was hypothesized that prevalence and severity of ulceration would increase in horses fed diets of decreasing particle size. Eight geldings (528 ± 54 kg BW) ranging from 3 to 15 yr were used in a Latin Square design. Four dietary treatments fed at 2% BW were 100% hay (HA), 40% hay and 55% whole oats (HO), 40% hay, 27.5% whole oats, and 27.5% pellets (HOP), and 40% hay and 55% pellets (HP). Differences in dietary particle size are clarified by % feed particle length <1.18 mm in the HA, HO, HOP, and HP diets (1, 5, 33, and 60%; respectively). Pellets were formulated to have similar nutrient makeup to whole oats. To meet nutrient requirements HO, HP, and HOP diets had a balancer pellet added at 5%. Treatments were divided into 4 14 d periods; each proceeded by a 14 d hay only washout period. The last period was followed by a 14 d washout and a 7 d ulcer induction as a positive control. Endoscopies were performed on d 13 of every period in addition to d 7 of the ulcer induction. Video endoscopies were evaluated by 4 graders blinded to treatments. An established grading scale was used to evaluate 4 separate regions: greater curvature (GC), lesser curvature (LC), body (BD), esophageal orifice (EO), and an overall squamous mucosa score. A mixed ANOVA was used to investigate differences due to the fixed effects of diet and period. Differences were defined at $P < 0.05$ and trends at $P < 0.1$. Mean ulcer scores were different between graders, therefore grader was included as a random effect. An unpaired *t*-test showed that ulcer scores for ulcer induction (2.3 ± 1.2) were higher than during washout (1.5 ± 1.0) and treatment (1.6 ± 0.9) periods. The only difference detected was a lower ulcer score for the LC (0.7 ± 0.9) in the HA compared with HO, HOP, and HP (1.2 ± 0.9, 1.6 ± 0.9, 1.5 ± 1.0; respectively) groups. There was a trend for lower ulcer scores for the GC (1.3 ± 2.0) in the HA compared with HO, HOP, and HP (1.0 ± 2.0, 1.0 ± 2.0, 1.2 ± 2.0; respectively) groups. Due to its anatomical location, the LC is more frequently exposed to gastric acid secretions predisposing it to hyperkeratosis or ulceration, consistent with this study. Based on the findings of this study, horses may need to be on treatments longer than 14 d for clinical ulceration differences to be observed. These results support the idea that larger dietary particle size, i.e., hay, may reduce ESGD risk.

Key Words: ulcer, particle size, oats

92
Feeding DigestaWell Buffer to overconditioned horses mitigates the effects of rapidly introduced nonstructural carbohydrate

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Elevated intake of nonstructural carbohydrates (NSC) in the equine diet is associated with metabolic and digestive disorders, particularly in overconditioned horses. The prevalence of equine obesity and associated diseases necessitates the development of management strategies to counter the effects of elevated NSC intake. The objective of this study was to determine the efficacy of DigestaWell Buffer (DB; a proprietary blend of sodium bicarbonate, vitamin B12, and cobalt micro-encapsulated in a vegetable fat matrix) in mitigating the negative postprandial effects of a rapidly introduced moderate NSC meal in overconditioned horses. Six mature warmblood mares (BCS ≥6.5; 623 ± 51 kg BW; ages 15 ± 2 yr) were used in a randomized crossover design with a 10 d washout. Horses received both treatments including a concentrate that provided 1.2 g/kg BW of NSC alone (CON) or the concentrate topdressed with 150 g of DB. For the duration of the study, horses were offered free choice water. Horses were housed in a dry lot for 14 d before the study and offered grass hay (12.6% NSC) ad libitum. Horses were placed into 4X4m stalls, offered 2.5% BW grass hay and fitted with long-term indwelling venous catheters (MILACATH, MILA International Inc., Florence, KY) between 1600 and 1700. Hay was removed at 2200 and horses were fasted overnight. At 0800 h, all horses received CON or DB and at 0900 h, feed refusals and consumption rate were measured. Horses were offered 2.5% BW grass hay each d for the remainder of the study. Blood samples were collected at −1, 1, 2, 4, 6, 8, 12, 16, 24, 36, 48, and 72 h post feeding to measure plasma glucose, D- and L-lactate. Fecal samples were collected −1, 4, 8, 12, 16, 24, 36, 48, and 72 h post feeding to measure pH. Data were analyzed using mixed models ANOVA with repeated measures for the effects of time, treatment, the time by treatment interaction, and period. Data are presented as means and CI. Plasma glucose increased postprandially ($P < 0.0001$) with no effect of treatment. The buffer reduced postprandial L-lactate concentrations (642.69 [612.77–673.91] vs. 600.90 [572.93–630.09] umol/L) ($P = 0.05$), but did not have an effect on D-lactate ($P = 0.58$). Horses on the HB treatment tended to have a higher fecal pH than control horses (6.95 ± 0.034 vs. 6.86 ± 0.034, respectively) ($P = 0.08$). Given these findings, we believe DigestaWell Buffer may mitigate some of the negative effects of rapid starch and sugar fermentation in the hindgut of overconditioned horses. Further research is needed to evaluate the effects of the buffer on the metabolic and digestive responses in grazing horses.

Key Words: equine, nutrition, buffer

93
Assessment of oxidative stress and muscle damage in exercising horses in response to level and form of vitamin E

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Vitamin E is an essential vitamin that works as an antioxidant in the horse to combat oxidative stress caused by free radicals. It is abundant in fresh forages and included in most commercial equine feeds. Performance horses may have a higher requirement for vitamin E due to increased exercise and often lacking access to fresh forage. The molecule exists in multiple forms. Synthetic α-tocopherol is the form frequently included in horse feeds; there are also natural forms available for supplementation. Of the 8 isomers of vitamin E, the α-tocopherol isomer is most abundant in horse's tissue and exists as 8 sterioisomers. Of these, RRR-α-tocopherol has been shown to be readily transferred to various tissues in the body. Natural vitamin E supplements only contain RRR-α-tocopherol, while synthetic sources include all 8 sterioisomers. The purpose of this study was to (1) determine if supplemental vitamin E above NRC recommendations is beneficial to exercising horses and (2) to determine if there is a beneficial effect of natural as compared with synthetic vitamin E supplements. Over a 9-week period, 18 horses were grouped by age into 3 treatment groups (1) control diet (1000 IU synthetic α-