

Feeding and microbial disorders in horses: Part 3—Effects of three hay:grain ratios on microbial profile and activities

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Abstract

Cecal and colonic fluid contents were collected from three ponies and analyzed to determine the effects of three hay:barley ratios on their microbial and biochemical characteristics. Three diets based on chopped meadow hay and rolled barley were tested in a 3×3 Latin square experiment: 100% hay (100:0, 114gDM/KgBW0.75/day), 70% hay-30% barley (70:30, 69gDM/KgBW0.75/day) and 50% hay-50% barley (50:50, 58gDM/KgBW0.75/day). Enumeration of total anaerobic and aero-anaerobic bacteria, lactate-utilizing and cellulolytic bacteria, lactobacilli and streptococci, as well as pH, lactate and VFA concentrations, were determined after 14 days adaptation to the new diet. In the large intestine, the concentrations of total bacteria were higher with the diets containing barley than with the hay diet, whereas cellulolytic bacteria were depressed with the concentrate diets. As the proportion of barley increased, concentration of lactate-utilizing bacteria, lactobacilli and streptococci increased in the colon while it did not interfere significantly on these populations in the cecum. These changes of the microflora were associated with a significant decrease in intestinal pH and [(acetate+butyrate)/propionate] ratio, and a numerical increase of lactate concentration.

In vitro evaluation of intraluminal factors that may alter intestinal permeability in ponies with carbohydrate-induced laminitis

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Objectives—To study the in vitro effects of cecal contents incubated with corn starch on colonic permeability in horses.

Animals—4 healthy adult ponies.

Procedure—Mucosal specimens were obtained from the right ventral colon and mounted in Ussing chambers. Changes in short circuit current, conductance, and large-molecule permeability in response to addition of cecal contents and cecal contents incubated with corn starch were evaluated for 120 minutes.

Results—Incubation of cecal contents with corn starch for 8 hours resulted in a decrease in cecal content pH and an increase in lactic acid concentration. These changes were similar to those reported in vivo for ponies given corn starch. Exposure of colonic mucosa to cecal contents incubated with corn starch resulted in an increase in tissue conductance and permeability of technetium Tc 99m pentetate, compared with mucosa exposed to cecal contents alone.

Conclusions and Clinical Relevance—In vitro exposure of colonic mucosa to cecal contents incubated with starch resulted in increased paracellular permeability. Fermentation of excessive