

The Influence of Dietary Energy Source on Microbial Diversity in the Equine Gastrointestinal Tract

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Horses are commonly fed diets that contain different sources of energy including starch, fiber and fats. These different energy sources may be digested and absorbed in differing segments of the gastrointestinal tract, thereby altering the gut microbiome. The objective of this study was to determine if dietary energy source can influence microbial diversity in the equine gastrointestinal tract. Six mature geldings (8.3 ± 3.5 yr) were used in a 6x6 Latin Square design and randomly assigned to one of six diets for six 14d periods. Diets consisted of mixed grass hay plus one of three energy supplements (oats, beet pulp, rice bran) at two levels (high: 75% supplement/25% hay or low: 40% supplement/60% hay). All diets were identical for digestible energy, however, dry matter intake (DMI) varied. Trace mineral was added to the ration to meet daily requirements and was constant across all treatments. On d14 of each period, fecal samples were collected and pooled by treatment group. DNA was extracted from fecal samples and subjected to PCR-DGGE with universal primers specific to 16S rRNA gene sequences to evaluate changes in bacterial diversity. PCR-DGGE images were analyzed using BioNumerics software to generate dendrogram comparisons based on the position and number of bands. There were no differences in band counts representing total bacteria between dietary energy sources. Dendrograms indicated differences in the microbial profiles of horses fed different energy sources. Further investigation with Principal Coordinate Analysis (PCA) also revealed differences in the microbial profiles due to the different levels of dietary energy supplement fed. A small amount of orts were noted for horses fed BPH which could affect the results. These findings suggest that dietary energy source and level of inclusion may influence microbial diversity in the equine gastrointestinal tract and further research using species specific primers is needed.