Alterations in the Fecal Microbiome of Horses with Antimicrobial-Associated Diarrhea Compared with Antibiotic-Treated and Non-Treated Healthy Case Controls

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Horses with antimicrobial-associated diarrhea (AAD) have severe alterations of their fecal microbiome compared with control horses and minor changes compared with horses on antibiotics that maintained normal feces. Other factors may contribute to the development of diarrhea. Authors’ address: Texas A&M University, College of Veterinary Medicine, College Station, TX 77843; e-mail: carnold@cvm.tamu.edu. *Corresponding and presenting author. © 2020 AAEP.

1. Introduction
Horses receiving antimicrobials may develop diarrhea due to changes in the gastrointestinal microbiome. This matched case-controlled study compared the fecal microbiome in hospitalized horses on antibiotics that developed diarrhea (AAD), hospitalized horses on antibiotics that did not develop diarrhea (ABX), and a healthy, non-hospitalized control population (CON).

2. Materials and Methods
Naturally voided fecal samples were collected from AAD horses (n = 17) the day that diarrhea developed and matched to ABX (n = 15) and CON (n = 31) horses for diet, antimicrobial agent, and duration of antimicrobial therapy (≤ 5 days or > 5 days). Illumina sequencing of 16S rRNA genes on fecal DNA was performed. Alpha and beta diversity metrics were generated using QIIME 2.0. A Kruskal-Wallis with Dunn’s post-test and analysis of similarities (ANOSIM) testing was used for statistical analysis.

3. Results
Microbiome composition in AAD was significantly different from CON (ANOSIM, R = 0.568, P = .001) and ABX (ANOSIM, R = 0.121, P = .0012). The microbiome of AAD and ABX horses had significantly decreased richness and evenness than CON horses (P < .05). Actinobacteria (q = 0.0192) and Bacteroidetes (q = 0.0005) were different between AAD and CON. Verrucomicrobia was markedly decreased in AAD compared to ABX and CON (q = 0.0005).

4. Discussion
Horses with AAD have a dysbiosis compared to CON horses, and show minor differences in bacterial community composition to ABX horses.

Research Abstract—for more information, contact the corresponding author
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Declaration of Ethics
The Authors have adhered to the Principles of Veterinary Medical Ethics of the AVMA.

Conflict of Interest
The Authors have no conflicts of interest.