

**Title:** Investigation of the impact of increased dietary insoluble fiber through the feeding of dried distiller's grains with solubles (DDGS) on the colonic microbiota of pigs with and without *Brachyspira*-associated colitis –  
**NPB# 13-212**

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**Scientific Abstract:**

In recent years, distiller's dried grains with solubles (DDGS), a source of insoluble dietary fiber, have been increasingly included in diets of swine; however, little is known regarding the impact of this feed component on *Brachyspira* infection. The structure of the colonic microbiome is likely a key component to the development of swine dysentery (SD), and dietary manipulations that alter the microbiota may favor or inhibit the establishment of a microbiome that is amenable to *Brachyspira* colonization and the development of disease. In the current study, colonic contents were analyzed from a previous experiment where one hundred 4-week-old pigs were divided into five inoculum groups (negative control, *Brachyspira intermedia*, *Brachyspira pilosicoli*, *B. hyodysenteriae* or "*B. hamptonii*") and fed one of two diets containing no (diet 1) or 30% (diet 2) DDGS. Pigs receiving diet 2 and inoculated with either *B. hyodysenteriae* or "*B. hamptonii*" developed SD nearly twice as fast as pigs receiving diet 1. The colonic microbiome in each necropsy sample was analyzed using 16S rRNA profiling and compared for differences in richness and diversity of bacterial species. In the non-inoculated control pigs, no difference in richness (alpha diversity) was observed; however, a significant difference was observed in the beta diversity between groups ( $P < 0.0001$ ) with a significant shift in the Bacteroidetes:Firmicutes ratio where higher ratios were observed in those pigs fed diet 2. For pigs that developed SD, there was a significant difference in richness relative to those that did not regardless of diet with fewer total species observed in SD pigs. The beta diversity was also significantly different between pigs with SD and those without where SD pigs had lower Bacteroidetes:Firmicutes ratios on average and a marked increase in relative abundance of proteobacteria. The relative abundance of spirochaetes was higher in pigs fed DDGS relative to pigs fed the control diet. Further investigation is warranted to better determine the specific bacterial species underlying these shifts in the colonic microbiome and the relationship of these bacteria with strongly beta-hemolytic *Brachyspira* spp. as pigs fed DDGS appear at increased risk for developing SD.

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