

The Microbiome of Big versus Small Birds: An example of the Anna Karenina Principle

Join Dr. Steve Lerner, as he presents this novel research on the Microbiome as a TechTalk at IPPE, on Wednesday at 3:00 pm EST in B Hall, Booth B3649 or stop by the Chr. Hansen booth at IPPE, Booth #B7183 to learn more from our experts about this novel research.

Research Background: Despite low genetic variation of broilers and deployment of considerate management practices, there still exists considerable body weight (BW) heterogeneity within broiler flocks which adversely affects the commercial value. The purpose of this study was to investigate the role of the cecal microbiome in weight differences between animals. Understanding how the gut microbiome may contribute to flock heterogeneity helps to pave the road for identifying methods to improve flock uniformity and performance.

Results: Two hundred eighteen male broiler chicks were housed in the same pen, reared for 37 days, and at study end the 25 birds with highest BW (Big) and the 25 birds with lowest BW (Small) were selected for microbiome analysis. Cecal contents were analyzed by a hybrid metagenomic sequencing approach combining long and short read sequencing. We found that Big birds displayed higher microbial alpha diversity, higher microbiome uniformity (i.e. lower beta diversity within the group of Big birds), higher levels of SCFA-producing and health-associated bacterial taxa such as Lachnospiraceae, Faecalibacterium, Butyricoccus and Christensenellales, and lower levels of Akkermansia muciniphila and Escherichia coli as compared to Small birds.

Conclusion: Cecal microbiome characteristics could be linked to the size of broiler chickens. Differences in alpha diversity, beta diversity and taxa abundances all seem to be directly associated with growth differences observed in an otherwise similar broiler flock.

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