



Effects of *Bacillus* probiotics and transfer of fecal microbiota on production, health, and gut microbiota of broiler chickens

Oral Defence by PhD Candidate Muhammad Bilal

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Abstract

The rise and spread of antibiotic resistance in pathogens have led to ban on the use of antibiotic growth promoters (AGPs) in chickens. In the absence of AGPs, alternatives are needed to enhance chicken's ability against diseases and maintain efficacy of production. In order to find suitable alternatives to AGPs, I investigated the effects of two potential probiotics, *Bacillus pumilus* and *Bacillus subtilis*, and transfer of fecal microbiota from donor birds of different ages on the chicken's production, gut microbiota and health parameters. Both probiotics significantly improved production parameters, gut health and immunity in broiler chickens. The health benefits in response to probiotics were prominent in early age of birds. The cecal microbiota was also studied, and diversity of microbiota significantly improved, hallmark of a good gut health, in response to probiotics and attained a mature configuration early in life. Further, fecal microbiota from young and old broiler chickens was transferred to day-old chicks through cohousing and impact of intervention was studied on production, immunity, and bone health of the day-old chickens. The chickens showed improved immunity, diversified cecal microbiota and stronger bones in response to cohousing with old age birds. These studies reflected potentials of *Bacillus* probiotics and fecal microbiota transfer for improvement of broiler performance and health.



About the Candidate

Muhammad Bilal obtained his bachelor and master's degrees in veterinary sciences from University of Veterinary and Animal Sciences, Pakistan. He worked as a research officer at Veterinary Research Institute, KP, Pakistan from 2012 to 2015, then he worked as research assistant in Animal Science Department McGill University in 2016 and later in 2017 he started his doctoral studies in the Department of Animal Sciences under the supervision of Professor Xin Zhao. His research focuses on evaluating the effects of novel probiotic strains and fecal microbiota transfer on production and health of broiler chickens.