

Development of an in vitro Fermentation Chicken Ileum Microbiota Model

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Abstract : The chicken small intestine represents a dynamic and complex organ in which the enzymatic digestion and absorption of nutrients take place. The development of an in vitro fermentation chicken small intestinal model could be used as an alternative to explore the interaction between the microbiota and nutrient metabolism and to enhance the efficacy of targeting interventions to improve animal health. In the present study we have developed an in vitro fermentation chicken ileum microbiota model for unveiling the complex interaction of ileum microbial community under physiological conditions. A two-vessel continuous fermentation process simulating in real-time the physiological conditions of the ileum content (pH, temperature, microaerophilic/anoxic conditions, and peristaltic movements) has been standardized as a proof of concept. As inoculum, we use a pool of ileum microbial community obtained from chicken broilers at the age of day 14. The development and validation of the model provide insight into the initial characterization of the ileum microbial community and its dynamics over time-related to nutrient assimilation and fermentation. Samples can be collected at different time points and can be used to determine the microbial compositional structure, dynamics, and diversity over time. The results of studies using this in vitro model will serve as the foundation for the development of a whole small intestine in vitro fermentation chicken gastrointestinal model to complement our already established in vitro fermentation chicken caeca model. The insight gained from this model could provide us with some information about the nutritional strategies to restore and maintain chicken gut homeostasis. Moreover, the in vitro fermentation model will also allow us to study relationships between gut microbiota composition and its dynamics over time associated with nutrients, antimicrobial compounds, and disease modelling.

Keywords : broilers, in vitro model, ileum microbiota, fermentation

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