

Chicken Gut Microbiome and Human Health: Past Scenarios, Current Perspectives, and Futuristic Applications

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Received: 16 January 2019 / Accepted: 28 January 2019 / Published online: 8 February 2019
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Abstract Sustainable poultry practices are needed to maintain an adequate supply of poultry products to the increasing human population without compromising human wellbeing. In order to achieve the understanding of the core microbiome that assumes an imperative role in digestion, absorption, and assimilation of feed as well as restrict the growth of pathogenic strains, a proper meta-data survey is required. The dysbiosis of the core microbiome or any external infection in chickens leads to huge losses in the poultry production worldwide. Along with this, the consumption of infected meat also impacts on human health as chicken meat is a regular staple in many diets as a vital source of protein. To tackle these losses, sub-therapeutic doses of antibiotics are being used as a feed additive along with other conventional approaches including selective breeding and modulation in feed composition. Altogether, these conventional approaches have improved

the yield and quality of poultry products, however, the use of antibiotics encompasses the risk of developing multi-drug resistant pathogenic strains that can be harmful to human beings. Thus, there is an urgent need to understand the chicken microbiome in order to modulate chicken gut microbiome and provide alternatives to the conventional methods. Although there is now emerging literature available on some of these important microbiome aspects, in this article, we have analysed the relevant recent developments in understanding the chicken gut microbiome including the establishment of integrated gene catalogue for chicken microbiome. We have also focussed on novel strategies for the development of a chicken microbial library that can be used to develop novel microbial consortia as novel probiotics to improve the poultry meat production without compromising human health. Thus, it can be an alternative and advanced step compared to other conventional approaches to improve the gut milieu and pathogen-mediated loss in the poultry industry.

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Keywords Chicken gut microbiome · Integrated gene catalogue · Probiotics · Co-culturing · Human health

Introduction

The major requirement of human consumption for protein is directly met by the poultry industry in the form of chicken meat. As of 2016, the overall global production of poultry eggs and meat were approximately 74 and 119 million tons respectively [1, 2]. Poultry meat production was expected to increase to 122 million tons by November 2018 [2]. However, it has been estimated that by 2050, the global human populace is predicted to reach approximately 9.8 billion [3]. Hence, to maintain an adequate supply