

# **Food Microbiology and Food Safety**

Practical Approaches

**Series Editor:**

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## **Food Microbiology and Food Safety Series**

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# Food Safety in Poultry Meat Production

 Springer

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# Preface

Poultry meat is an economical source of high-quality protein for human consumption. The United States leads the world in poultry meat production; the US poultry industry produced 55.6 billion pounds of broiler meat in 2016, with a monetary value of \$28.7 billion. Poultry production at the global scale is projected to dominate across the different meat types and account for 45% of the total meat produced over the next 10 years. The peaking growth in broiler meat production over the past decades primarily stemmed from systematic genetic selection of poultry breeds targeting greater feed conversion efficiency, short production cycle compared to other food animals, and growth. Further, the use of antibiotics as growth promoters in poultry feed also contributed to increased body weight gain in birds.

The microbiological safety of poultry meat is essential for the economic viability of the poultry industry. *Salmonella* and *Campylobacter* are two major food-borne pathogens epidemiologically linked to the consumption of poultry products. Although the poultry industry implements several interventions to improve food safety, poultry-borne outbreaks linked to *Salmonella* and *Campylobacter* persist to occur, resulting in significant economic losses and adversely affecting public health. In addition, we continue to face the challenge posed by drug-resistant bacterial strains, including multidrug-resistant *Salmonella* Heidelberg and fluoroquinolone-resistant *Campylobacter jejuni* that have a significant impact on human health. Thus, sustained research to develop interventions to control these two pathogens and others, both at pre-harvest and post-harvest broiler meat production, are critical.

Although the growth-promoting efficacy of antibiotics in livestock and poultry has not decreased despite their prolonged use over decades, their continued use in animal agriculture especially at sub-therapeutic levels has received substantial scrutiny from the scientific community and regulatory agencies. This is due to the development of antibiotic resistance in food-borne bacteria and evidence linking antibiotic use in animal agriculture to potential resistance development. Thus, in light of consumer demand for a wholesome diet with enhanced food safety, the US Food and Drug Administration recently issued a directive, limiting the use of antibiotics in livestock and poultry production as growth promoters. This has triggered intensive research to identify effective alternate growth promoters to antibiotics in poultry

production. The steady growth of the US organic poultry sector has also fueled the need for growth promoters alternative to antibiotics. There is also a need to strengthen farm biosecurity measures and find new and efficacious antimicrobials that can counteract the challenge posed by drug-resistant pathogens.

The gastrointestinal tract (GIT) is the largest immune organ of the body, and GIT health in chicken is increasingly gaining research attention, since it is recognized as critical for bird welfare and productivity. This is because GIT health includes a complex unison of interrelated factors such as nutrient digestion, absorption, epithelial barrier function, endocrine regulation, gut microbiome, and mucosal immune responses. A thorough knowledge of how management and dietary factors, including antibiotics and non-antibiotic growth promoters which affect GIT health, would help in enhancing overall health and performance of chickens and poultry product safety.

Scientific advancements in microbiology, molecular biology, and immunology, coupled with access to next-generation “omics” disciplines such as genomics, transcriptomics, and metabolomics, have intensified our efforts for improving the microbiological safety of poultry by targeting virulence mechanisms of pathogens, developing new-generation vaccines, and enhancing gut health in chickens. Readers of this book are expected to gain a comprehensive understanding of current information on all aspects of food safety in poultry meat production. We sincerely thank our colleagues who worked hard to provide their input to the different chapters. It would not have been possible without their valuable contributions.

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