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Multi-Drug Resistant Coliforms in Poultry Meat: A Potential Public Health Concern

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Abstract:
Poultry flocks are often raised under intensive conditions using large amounts of antimicrobials to prevent and to treat disease, as well as for growth promotion. The wide distribution of antimicrobial-resistant coliforms in the meat and processing environment can play a role in the dissemination of antimicrobial resistance to other pathogenic and commensal bacteria. The high density of multidrug-resistant coliform bacteria in the poultry meat may pose a severe public health risk through related foodborne outbreaks.

Keywords: Multi-drug resistance, coliform bacteria, chicken meat, public health.

INTRODUCTION

Poultry production is one of the most important parts of farm industry worldwide and chicken is the most commonly farmed species, with over 90 billion tons of chicken meat produced per year (FAO, 2017). Poultry meat is a major component of diet and source of protein now a days (Ashraf *et al.*, 2016). The tremendous growth of poultry industry makes it more susceptible to diseases. The drinking water plays an essential role in spreading the bacterial, viral and protozoan infections to poultry. The health of birds is affected directly or indirectly by different chemical or microbiological contaminants present in drinking water (Ashraf *et al.*, 2019).

A large diversity of antimicrobials are used to raise poultry in most countries (Landoni and Albarellos, 2015), mostly through the oral route, with the aim to prevent and to treat disease, but also to enhance growth and productivity (Pagel and Gautier, 2012). A large number of such antimicrobials are considered to be of critical and high importance for human medicine (WHO, 2017).

In this issue, Shawish et al. report higher coliform count in chicken thigh and chicken breast collected from different butcher's shops at Menoufia Governorate. Coliform isolates were identified as *Escherichia coli*, *Citrobacter freundii*, *Citrobacter diversus*, *Enterobacter agglomerans*, *Enterobacter aerogenes*, *Enterobacter cloacae*, *Enterobacter hafniae*, *Serratia liquefaciens*, *Klebsiella pneumoniae* and *Klebsiella ozaenae*. Most isolates were resistant to tested antibiotics suggesting that antimicrobial-resistant coliform isolates are widely distributed in the meat and processing environment in Egypt, which can play a role in the dissemination of antimicrobial resistance to other pathogenic and commensal bacteria (Shawish *et al.*, 2020).

Antimicrobial agents are essential tools for treating and controlling bacterial infections in poultry production (Landoni and Albarellos, 2015; Rasool *et al.*, 2018). Antimicrobial agents are used throughout the world, across a diverse array of extensive and intensive livestock production systems, to protect the health and welfare of livestock and to improve their performance (Pagel and Gautier, 2012). The indiscriminate use of antimicrobials in animal farming is likely to accelerate the development of antimicrobial resistance (AMR) in pathogens, as well as in commensal organisms. In addition to the concerns due to the emergence of AMR in bacteria from poultry production, there are also human health concerns about the presence of antimicrobial residues in meat (Reig and Toldrá, 2008) and eggs (Goetting *et al.*, 2011).

Antimicrobial resistant pathogens from poultry can infect humans directly and indirectly with food. Though seldom, these resistant bacteria may colonize in the human gastrointestinal tract and may also transfer resistance bacteria to human endogenous flora (Sáenz *et al.*, 2003).

The practice of using antimicrobials in feed may change the intestinal flora by posing a selective pressure in favor of resistant bacteria populations that could find their path into the environment and food chain (Furtula *et al.*, 2010). The widespread of antimicrobial resistance of bacterial isolates highlighted the need to monitor the spread of antimicrobial resistance genes in poultry farms and the environment (Ibrahim *et al.*, 2019).

In most countries, worldwide farming is conducted without veterinary supervision, and a wide range of antimicrobials is normally available to farmers "over the counter" (WHO, 2017). Measures such as education on good farming practices, limiting the availability of antimicrobials, and building up a knowledge base on the AMR profile of poultry pathogens, contributing to reduce treatment failure of poultry diseases, therefore helping reduce associated economic losses.

The existing uses of antimicrobial agents can be improved, by increased utilisation of

veterinary professional services, the introduction of enhanced infection control measures, and improved point-of-care diagnostic tests.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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