

# How Using Probiotics in Poultry Can Fight the Spread of Antibiotic Resistance to Humans?

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**Abstract.** Globally, there is a severe problem with antibiotic resistance in animals and humans. It may result in diseases that are extremely challenging to treat. In certain situations, conventional antibiotics used to treat an illness may no longer be effective in poultry and an alternative treatment is used. Therefore, using probiotics instead of antibiotic therapy to treat specific health issues in both humans and animals can achieve the desired result, such as preventing infectious zoonotic diseases and enhancing general health. Probiotics are friendly live microorganisms like normal flora, when consumed in a sufficient dose which produces positive effects on the host. This review aimed to prove that using probiotics in poultry instead of antibiotics can fight the spread of pathogenic bacteria such as Salmonella and Campylobacter to humans by ingestion of undercooked poultry meat infected with these bacteria and also increase antibiotic resistance to humans. Finally, concluded that probiotics play a potential role in the spread of antibiotic-resistance genes in our natural environments, we believe it is crucial to implement proper regulation on their use in both livestock and human applications globally.

**Keywords.** Antibiotic resistance, Probiotics, Poultry meat, Infectious diseases.

## 1. Introduction

For many years, antibiotics have been utilized as growth enhancers. They act as growth boosters and help poultry develop their immune systems so they are less susceptible to infectious diseases [1,2]. The use of antibiotics in poultry has advantages and disadvantages one advantage is can increase the body weight by up to 8.0% and drop the ratio of feed conservation by up to 5.0% as the disadvantage opposed to an antibiotic-free diet [3]. Unfortunately, the use of antibiotics in food of poultry has resulted in antibiotic resistance in the poultry's gut and this raises the risk of the transmission of antibiotic resistance to humans) [4,5]. Therefore high use of antibiotics and incorrectly improper use,

mainly in poultry has boosted the development and spread of antibiotic resistance in humans [7]. Now probiotics are being used as alternative treatment, and their efficacy for both humans and animals is being experimentally tested [8]. Because of the widespread use of antibiotics, drug-resistant bacteria are emerging and spreading faster and are ultimately transferred from animals to people through the food chain. Salmonella and Campylobacter infections can have serious direct effects, such as higher mortality, protracted illnesses, and extended hospital admissions [9,10]. Recent studies recommended using an alternative treatment in poultry such as probiotics. As we know poultry meat has been identified as the main source for humans throughout the world, the major source of transmission of Salmonella and Campylobacter to humans by eating undercooked poultry meat, and the potential source of spread of antibiotic resistance to humans, because antibiotic resistance is considered the significant public health issues [11]. Therefore, the use of probiotics in poultry can enhance the poultry immune system against these pathogenic pathogens and prevent food borne zoonotic infections [12]. This review aimed to prove that using probiotics in poultry instead of antibiotics can fight the spread of antibiotic resistance to humans

## 2. Probiotics

Probiotics are friendly live microorganisms like normal flora, when consumed in a sufficient dose which produces positive effects on the host [13,14]. Probiotics are regarded as one of the safe and alternatives for both people and animals. They are considered as one of the greatest alternatives due to several beneficial characteristics that benefit both people and animals. They are frequently used to eliminate unwanted microorganisms and boost animal development and productivity by enhancing digestion and nutrient absorption [15]. Probiotics are microorganisms that originate from various pathogens including bacteria, yeast, and fungi. Examples of probiotics of bacterial sources are *Bacillus subtilis*, *Bifidobacterium*, *Lactobacillus*, and *Streptococcus* [16].

## 3. Characteristics of Ideal Probiotics

It should be not pathogenic, have no dangerous nature, have a beneficial impact on the host animal, be able to live in the intestinal environment, be viable, and have the ability to withstand different feed processing situations [17-19]. Probiotics usually may be given to poultry as one strain or given in the form of a mixture of combination of many strains and mixed with feed supplements or with drinking water and this form is more potent due to having synergistic impacts [20,21]. The most common probiotics used in poultry are *Bacillus*, *Bifidobacterium*, *Lactococcus*, *Lactobacillus*, *Pediococcus*, and *Streptococcus* [22].

## 4. Uses of Probiotics in the Broiler to Prevent Antibiotic Resistance

There are several studies have been done and discovered that using probiotics in poultry feed stimulated the immune response in poultry and decreased their susceptibility to infectious disease and in turn reduced both food borne infectious diseases and the spread of antibiotic resistance in humans. A study done by Al-Khalaifah, [1], recorded that the uses of the above-mentioned probiotics are effective on poultry (broiler), which perform the feed intake and feed conversion ratio and enhance the immune system against pathogenic Microorganisms [1]. Also, Mountzouris et al. [23]. made a combined probiotic by isolation of microorganisms (*Bifidobacterium*, *Enterococcus*, *Lactobacillus*, and *Pediococcus*) from the intestine of the health broiler and given to the broiler and showed that this probiotic stimulate the immune response, enhance the feed intake and increase the body weight [24]. A similar study done by Cakır et al. [25], reported that there was significant performance of feed intake compared with broilers without probiotics. Several studies suggested using probiotics and mixing with feed in the broiler, because they found a critical increase in the rate of feed conversion, increase body weight, and rate of survival [25-28].

In 2012, another study was done and reported that the use of probiotics made from the *Lactobacillus* was highly effective against species of *Salmonella* [29] and they recommended using in broiler. Similar results were found by [30,31]. These results disagreed with the result of a study done by Chegeni, [32], who concluded that mixing of feed with probiotics had less effect on the microbes than prebiotics. Patterson and Burkholder recommended using probiotics in a feed of poultry, mainly in

harsh weather, because they act as an anti-inflammatory agent, immune- promoter and antibacterial agent [33]. Research done by [34], who used probiotics in the broiler in different ways, inject the probiotics into the eggs of chicken at day 12 of incubation and they found it improved the immune response, increased the body performance, performed the feed conversion, and supply protection against coccidiosis. In contrast to this study, Pruszyńska-Oszmolek et al. [35], reported that using probiotics on the eggs of chicken can increase the body weight, but does not affect the rate of feed conversion. Maintaining the use of antibiotics and using of probiotic will reduce the emergence of antibiotic-resistant bacteria [36,37]. Therefore, according to all researchers mentioned above, they recommended to use of probiotics in the poultry instead of antibiotics in case of infectious diseases, which will stimulate the immune system of poultry, decrease their susceptibility to infectious zoonotic diseases, and prevent the spread of antibiotic resistance to humans.

### Conclusion

The widespread and excessive use of antibiotics in poultry sector has led to the creation of infections that are resistant to antibiotics through the dissemination of antibiotic-resistance genes. The use of probiotics instead of antibiotics to treat certain conditions in poultry may help to solve the fast growth and spread of antibiotic resistance. This review concluded that probiotics play a potential role in the spread of antibiotic-resistance genes in our natural environments, even though they are currently generally regarded as safe, we believe it is crucial to implement proper regulation on their use in both livestock and human applications globally.

### Recommendation

The banning of antibiotics from feed for poultry has prompted the demand for substitutes that will result in improvements in the health and production qualities of hens as well as the safety of poultry products for human consumption. Alternative techniques have become important in the management of infections as a result of the decline in antibiotic use brought on by issues like the rise of antibiotic-resistant bacteria. Recent research discovered several potential replacement medicines. Finding an alternative to treat bacterial infections that can severely harm flock health is the main research goal.

### Disclosures

The author declares no conflicts of interest with respect to the research and/or publication of this review article.

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