



Mini Review

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Development and Application of Biological Preparations against Infectious Diseases of Cattle and Poultry



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The main problems that may emerge in the cattle and poultry industry are antibiotic resistant microorganisms on the one hand and the control of treatment of intestinal infections without antibiotic use. In order to improve the health of animals and birds need to regularly monitor immune status of organism usage of antimicrobial agents with caution and, at the same time to exclude ineffective application of antibiotics. A course of antibiotics affects all bacteria, not just those that are the cause of disease. It is therefore important to use antibiotics in the correct way and only when necessary. This will minimize the problem of resistance, so that the antibiotics available still work when they are needed and also in order to maintain a healthy gut microbiota [1]. Poultry birds have frequently been incriminated as a mean of *Salmonella* contamination and consequently act as major source of the pathogen in humans. This organism has been isolated from a range of foods in almost every country.

This *Salmonella* and *Campylobacter* are the most common causes of zoonotic food borne infections. Antimicrobial resistance was detected commonly in isolates from human cases as well as from food-producing animals and food in the European Union (EU). Almost half of the isolates from clinical cases were resistant to at least one antimicrobial and 28.9% were multidrug-resistant. Multidrug resistance exhibited by *Salmonella* strains has proved to be a big hurdle in the development of an effective anti-*Salmonella* therapy [2]. The multidrug-resistant (MDR) phenotypes of *Salmonella enterica* may carry their resistance determinants on chromosomal locations, on resistance plasmids, or on both [3]. *Salmonella enteritidis* are important food-borne pathogens noted for causing millions of cases of food-borne illness, diarrhea, small

intestinal inflammation in the United States, European countries. The major source of infection is food, poultry meat, eggs. Recent studies have found that in certain *Enterobacteriaceae*, including *Salmonella*, virulence genes may be co localizing on transferable resistance plasmids, a phenomenon that would lend credence to studies that have shown that antimicrobial-resistant *Salmonella* strains may be more invasive than *Salmonella* strains that are susceptible to antimicrobials.

The food supply, including poultry products, may transmit antimicrobial drug-resistant *Escherichia coli* to humans. Acquired resistance to first-line antimicrobial agents increasingly complicates the management of extra-intestinal infections due to *Escherichia coli*, which are a major source of illness, death, and increased healthcare costs [4]. One suspected source of drug-resistant *E. coli* in humans is use of antimicrobial drugs in agriculture. This use presumably selects for drug-resistant *E. coli*, which may be transmitted to humans through the food supply. Supporting this hypothesis is the high prevalence of antimicrobial drug-resistant *E. coli* in retail meat products, especially poultry, and the similar molecular characteristics of fluoroquinolone-resistant *E. coli* from chicken carcasses and from colonized and infected persons, in contrast to the marked differences between drug-susceptible and drug-resistant source isolates from humans.

In recent years, the frequency of food poisoning in Armenia, caused by dairy and meat products, has increased dramatically. According to the National Bureau of Expertise (Yerevan, RA) data, the main pathogens are *Escherichia coli*, *Staphylococcus aureus* species. The growing problem of the prevalence of pathogenic bacteria resistant to antibiotics, motivated to search alternative

natural microbial preparations, including on the basis of probiotic lactic acid bacteria and its bacteriocins. The obtaining and investigation of biological properties of proteinaceous antibiotics, on the basis of probiotic lactic acid bacteria (LAB), shown, that bacteriocins, metabiotics and peptides of LAB represent bactericides have a broad range of activity and are excellent candidates for development of new prophylactic and therapeutic substances to complement or replace conventional antibiotics [5]. Thus, the increasing interest in these compounds has stimulated the isolation of new strains of probiotic LAB-bacteriocin producers and the characterization of novel peptides [6].

Bacteriocins are an interesting group of biomolecules with broad spectrum of antimicrobial activity. Some of their properties (significant potency, high stability, low toxicity, broad spectrum of activity) make them suitable compounds for using them as a basis for development of antimicrobial agents of new generation [3]. At the same time, bacteriocins were found to be safe for human consumption by the Food and Drug Administration. So, the continue development of new classes of natural antimicrobial agents, possessing antibacterial activity, has become of increasing importance for medicine and veterinary. In SPC "Arm biotechnology" the new strains of lactic acid bacteria were isolated and investigated. Their antimicrobial activity against antibiotic-resistant pathogenic bacteria, especially dangerous infections and pathogenic microorganisms, isolated from organs of infected animals and birds, was shown [7,8]. It was shown, that antimicrobial preparations, obtained from *Lactobacillus rhamnosus* 20-12 and *Lactobacillus acidophilus* 1991 LAB strains, during *in vitro* studies possesses bactericidal activity against pathogens isolated from the internal organs of animals. It was shown that the investigated lactic acid bacteria during growing synthesized

bacteriocins (peptides) having different molecular weight Using of antimicrobial preparation, obtained after growth of *L. acidophilus* 1991 in the poultry farms for treatment of the birds infected with Salmonellosis shown, that it can be successfully implemented for the prophylaxis of animal infections instead of antibiotics. It was shown overweight of animals, absence of mortality [9].

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