ANNOTATION

of the dissertation work of Bulegenova Madina entitled «Effectiveness of the using of probiotic «Antakon SN» for the safety and productivity of farm birds», submitted for the degree of Doctor of Philosophy (PhD) in the specialty 6D120100 – «Veterinary Medicine»

Relevance of the Study. In the context of the intensification of poultry farming and the growing needs of the population for safe and biologically complete products, the prevention of gastrointestinal diseases of young poultry is of particular relevance. Disruption of intestinal biocenosis, decreased colonization resistance, and widespread use of antibiotics lead to increased morbidity, mortality, and the formation of antibiotic-resistant strains of microorganisms.

Modern requirements for the biological safety of livestock products and international trends in the restriction of the use of antibiotics necessitate the introduction of alternative, environmentally friendly means of prevention and correction of intestinal disorders. In this regard, probiotics created on the basis of representatives of normal microflora are considered as a promising area of veterinary biotechnology.

The use of probiotic drugs helps to restore the microbial balance of the intestine, increase the nonspecific resistance of the body, improve metabolic processes and productive performance of poultry. The development and scientific substantiation of the effectiveness of domestic probiotics is an urgent task of the veterinary science of the Republic of Kazakhstan.

Aim of the Study.

Study of the biological, probiotic, and therapeutic-prophylactic properties of the probiotic preparation “Antacon SN” in relation to the survival and productivity of poultry.

Objectives of the Study:

1. To study the prevalence of intestinal diseases of young poultry in farms of the Republic of Kazakhstan;
2. To investigate the biological properties of the probiotic strain *E. coli 39-SN;*
3. To study the therapeutic and prophylactic efficacy of a probiotic drug in laboratory animals;
4. To study the effectiveness of the use of the probiotic "Antacon SN" in the production conditions of farms.

Objects and Methods of Research.

The research was carried out on the basis of the Department of Microbiology, Virology and Immunology of the Kazakh National Agrarian Research University, as well as in poultry farms in Aktobe and Kyzylorda regions.

The objects of the study were young poultry (chickens, ducklings, goslings), laboratory animals and the probiotic strain *Escherichia coli 39-SN*. The work uses a complex of bacteriological, biochemical, serological, experimental and statistical research methods.

The dissertation uses a complex of microbiological, bacteriological, biochemical, serological, experimental and statistical research methods. Isolation and identification of pathogens of intestinal diseases of poultry using cultural and biochemical tests has been carried out. The biological properties of the probiotic strain *Escherichia coli 39-SN* have been studied in terms of resistance to bile and hydrochloric acid, antagonistic activity, adhesive properties, harmlessness, colonization ability and persistence in animals.

The therapeutic and prophylactic efficacy of the probiotic drug "Antacon SN" was evaluated in laboratory and industrial experiments on young poultry.

Statistical analysis of the results was performed using the GraphPad Prism software.

Main Provisions Submitted for Defense:

– etiology of gastrointestinal diseases of young poultry;

– biological and probiotic properties of *E. coli 39-SN* strain;

– the probiotic preparation «Antakon SN» used for the treatment and prevention of gastrointestinal diseases in chicks.

Description of the main results of the study:

It was established that in poultry farms of the Aktobe and Kyzylorda regions, the main causative agents of gastrointestinal diseases in young poultry were bacteria of the genera *Salmonella* and *Escherichia coli*. In the structure of the isolated microflora, the proportion of *Salmonella spp.* was 47.4%, *Escherichia coli* — 34.0%, *Klebsiella spp.* — 8.4%, *Streptococcus spp.* — 5.2%, and *Staphylococcus spp.* — 4.8%.

The biological and probiotic properties of the *Escherichia coli* 39-SN strain, a representative of the normal microflora of the gastrointestinal tract of healthy animals, were studied. It was established that the strain is non-pathogenic and harmless, resistant to the action of bile and hydrochloric acid, and exhibits antagonistic activity against pathogenic and opportunistic microorganisms, including *Salmonella spp.*, *Escherichia coli* (pathogenic serovars), *Klebsiella spp.*, *Staphylococcus spp.*, and *Streptococcus spp.*. The presence of a stable genetic marker allows reliable differentiation of this strain from natural isolates.

The therapeutic and prophylactic efficacy of the probiotic preparation “Antacon SN”, based on the *Escherichia coli 39-SN* strain, was determined in experiments on laboratory animals as well as on chicks, ducklings, and goslings. The use of the preparation contributed to a reduction in morbidity caused by *Salmonella spp.* and *Escherichia coli* and to an increase in the survival rate of young poultry.

It was established that in the experimental groups, the average live body weight of poultry at 30 days of age exceeded that of the control groups. The obtained data indicate a positive effect of the “Antacon SN” preparation on the physiological state of poultry due to normalization of the intestinal microbiocenosis and enhancement of non-specific resistance of the organism.

Substantiation of Novelty and Significance of the Results. The effectiveness of the use of the probiotic "Antacon SN", created on the basis of the *E. coli 39-SN* strain with pronounced probiotic properties, has been experimentally

substantiated. It has been established that the strain is non-pathogenic, resistant to the action of bile and hydrochloric acid, and has high adhesive and antagonistic activity against pathogenic and opportunistic microflora. Due to these characteristics, *E. coli 39 – SN* represents a promising basis for the development of probiotic drugs that promote the normalization of intestinal microflora and the prevention of infectious diseases.

A patent was obtained for the utility model "*Escherichia coli 39-SN* bacterial strain used to produce a probiotic" (No. 4145 dated 08.04.2019).

Compliance with Scientific Development Directions or State Programs.

The dissertation work was carried out in accordance with the priority directions of the development of the agro-industrial complex of the Republic of Kazakhstan and the state policy in the field of biological and food security. The research is aimed at developing and scientifically substantiating the use of probiotic drugs in veterinary medicine and poultry farming as an environmentally safe alternative to antibiotics.

The scientific research was carried out taking into account the results obtained by the author within the framework of a scientific project funded by the Ministry of Science and Higher Education of the Republic of Kazakhstan (grant funding), entitled “Development of a technology for the production of the probiotic preparation ‘Enterokol’ and creation of its pilot-scale prototype” (2018–2020). The project was implemented at the Kazakh National Agrarian University, where the doctoral candidate served as a project executor. The data obtained during this project served as a scientific foundation for further research aimed at the development and implementation of probiotic drugs to improve the safety and productivity of poultry.

Practical significance.

The causes of the death of young birds in a number of farms in Kazakhstan have been established. The probiotic «Antacon SN» has been developed and tested, the use of which makes it possible to reduce the incidence and death of young animals, increase the safety and productivity of poultry, as well as reduce labor and economic costs for preventive measures.

The results of the research can be used in the practical activities of poultry farms in the Republic of Kazakhstan and in the educational process of veterinary specialties.

Description of the Doctoral Candidate’s Contribution to Publications.

The doctoral student was directly involved in all stages of her dissertation research, including the formation of a scientific concept, planning and conducting laboratory and industrial experiments, collecting and analyzing experimental data, statistical processing of results, interpretation of the data obtained, as well as the preparation and design of scientific publications.

In all published works on the topic of the dissertation, the contribution of the doctoral student was the main one.

7 scientific papers have been published on the topic of the dissertation, of which 2 articles are in an international publication indexed in the Scopus database, 2 in international conferences and 3 three articles in journals recommended by the

Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan. Received 1 patent for a utility model of the Ministry of Justice of the Republic of Kazakhstan, on the topic of the dissertation.

Scope and Structure of the Dissertation.

The dissertation is presented on 112 pages of computer text, consists of an introduction, a review of the literature, materials and research methods, the results of his own research, conclusions, practical suggestions, a list of references and appendices. The work contains 32 tables and 15 figures, the list of references includes 126 sources.