

REVIEW

official reviewer Dolbanosova R.V. Doctor of Veterinary Medicine , associate professor

for dissertation work of graduate student Xueqin Zhao on the topic:
"Advances in research on mechanism and function of antimicrobial peptides",
which is presented for obtaining a doctor of philosophy in specialty 211
"Veterinary medicine", branch of knowledge 21 - veterinary medicine.

1. The degree of relevance of the dissertation topic and its connection with scientific programs, topics, plans

Due to long-term unjustified use of antibiotics, bacterial resistance has increased, and antibiotic treatment disrupts the normal homeostasis of the body and intestinal flora. The problems caused by long-term, large-scale use of antibiotics are becoming more and more serious, and the development of effective and safe substitutes for antibiotics is inevitable and urgent. Therefore, there is a need to urgently search for an alternative to antibiotics. Antimicrobial peptides deserve attention, to which, due to their broad-spectrum antimicrobial activity, there is no resistance and they have broad biological functions.

Antimicrobial peptides are a class of low molecular weight peptides that are produced by the body against pathogenic infections. They are an important part of the body's innate immune system and perform many biological functions, such as antibacterial, anti-inflammatory, immune regulation and maintenance of the intestinal tract.

Xueqin Zhao 's dissertation is dedicated to the study of the bactericidal effect of MPX on *A. pleuropneumoniae* and *E. coli* , the anti-inflammatory activity of pneumonia and intestinal inflammation caused by *A. pleuropneumoniae* and *E. coli*, as well as its effect on the homeostasis of the intestinal flora, which is a reference for the clinical replacement of antibiotics with antibacterial and anti-inflammatory ones drugs.

The dissertation is a fragment of the scientific research programs of the National Natural Science Foundation of China (№ 31702259 and 31520103917), the Project for the Development of Young Talents in Henan Province (2020HYTP041), the Key Research Projects of Colleges and Universities of Henan Province (21A230004), the Project of Youth College Teachers and of Universities of Henan Province (2020GGJS162), Climbing Project of Henan Institute of Science and Technology (2018JY02) and Program for Innovative Research Groups (in Science and Technology) in Henan Province University (20IRTSTHN025). The materials of the candidate's dissertation are part of comprehensive scientific research of the department of veterinary expertise, microbiology, animal hygiene and safety and quality of animal husbandry products of the Sumy National Agrarian University according to the following thematic plans of research works: «System of monitoring control methods and Veterinary-sanitary measures regarding the quality and safety of animal husbandry products in diseases of infectious etiology» (state registration number 0114U005551, 2014-2019).

2. The degree of validity and reliability of scientific statements, conclusions and recommendations formulated in the dissertation

Evaluating the main results of the dissertation work submitted for defense, there is a need to emphasize their theoretical validity and the applicant's orientation to a clear formulation of his own position.

Confirmation of the scientific argumentation and validity of the provisions, conclusions and recommendations of the dissertation work is a logical sequence in the setting and execution of tasks according to the purpose of the research. The dissertation contains the necessary theoretical, methodological, methodical and analytical studies, properly covered in the relevant sections.

The scientific validity and reliability of the results presented in the dissertation work is ensured by the creative use of scientific approaches, systematic study and generalization of the results of scientific developments by scientists.

The theoretical and methodological basis of the scientific work is the study of the mechanism of the antimicrobial peptide mastoparan X in the destruction of gram-negative bacteria in vitro, its anti-inflammatory and barrier recovery function in pneumonia and enteritis diseases in vivo, as well as to further study the relationship between anti-inflammatory and gut microbes MPX .

The methodological basis of the scientific work was system approaches with the use of modern methods and research methods for studying the mechanism of anti-inflammatory and barrier functions of MPX repair in intestinal epithelial cells, laying the foundation for reducing the use of antibiotics in livestock and poultry farming, this will help provide a certain theoretical and practical value for future use in animal husbandry and birds.

3. Scientific novelty of scientific provisions, conclusions and recommendations formulated in the dissertation

Acquaintance with the content of the graduate student's dissertation and her main scientific works made it possible to determine the most important main points of provisions, conclusions and recommendations that prove scientific novelty. The results of the work are formulated by the recipient independently and fully reflect her scientific contribution.

The scientific novelty is that for the first time the antibacterial mechanism, anti- pneumonia and enteritis function were studied in detail, anti-inflammatory and protective barrier mechanisms of protection at the cellular level were investigated, and the relationship between the anti-inflammatory function and the intestinal flora of MPX was further studied.

4. Scientific significance and practical value of the obtained research results.

The research results presented by the dissertation have theoretical and practical significance. The results of this study lay the foundation for the development and use of clinical antibacterial drugs against *A. pleuropneumoniae* and *E. coli*. It also lays the foundation for the choice of anti-inflammatory drugs

and drugs to fight intestinal microflora. In addition, it provides theoretical support for decreased clinical antibiotic resistance against *A. pleuropneumoniae* and *E. coli* infection. The main provisions of the candidate's thesis were included in the Methodological recommendations on the mechanism and function of antimicrobial peptides, approved by the Scientific Council of the SNAU (Protocol No. 9 dated 30.03.2021). The materials of the dissertation are included in the study guide, work program and lecture course on "Veterinary Microbiology" of the Master's level educational and qualification training in areas 211 "Veterinary Medicine" and 212 "Veterinary Hygiene, Sanitation and Expertise" of the Sumy National Agrarian University and are used in distance education of students on the basis of the "Moodle " platform.

5. The completeness of the presentation of scientific provisions, materials, conclusions and recommendations of the dissertation in published scientific works, counted according to the topic of the dissertation

Xueqin Zhao took part in the performance scientific programs based on the candidate's theses; developed schemes and methods of implementation experiments in the laboratory. Setting tasks, discussion results, formation conclusions were made together with teachers. Getter analyzed literature and patent search by dissertation topic; conducted experimental research using modern methods from co-authors scientific works. The winner wrote a thesis and published it articles in which laid out basic material candidate's theses.

Approbation results dissertation work were reported, discussed and approved at the meeting of the department:

- Annual scientific and practical conferences teachers, graduate students and students of Sumy national agricultural University, Sumy, 2018-2021;
- BTRP Ukraine Regional One Health Research Symposium (May 20-24, 2019, Kyiv , Ukraine);
- Chinese company of microbiology and veterinary of microbiology, Academic Forum 2021 (June 19-21, 2021, Zhengzhou, China);

- Student's international conference One Health (November 24 - 27, 2021, Bucharest, Romania)

Based on the results of the dissertation work, the author published 21 scientific works, including: 5 articles in specialized publications of Ukraine, 4 articles in Scopus magazines, 2 articles in scientific specialized publications of China, 8 theses of scientific reports, 1 patent, 1 methodological recommendations.

6. Academic integrity

Violations of academic integrity (academic plagiarism, self-plagiarism, fabrication, falsification) in the dissertation work on scientific papers, which highlight the main scientific results of the applicant's dissertation research, were not detected.

7. Discussion questions and comments to the dissertation work.

Along with the positive evaluation of Xueqin Zhao's dissertation, it can be noted that some statements are debatable and need to be revised:

1. The author investigates the mechanism of action of the antimicrobial peptide mastoparan X in pneumonia, taking into account only the causative agent *A. pleuropneumoniae*, it may be worth conducting a study of the action of this peptide on *M. Hyopneumoniae*.

2. According to the results of the study of the acquirer, it is clear that MPX alleviated intestinal inflammation by changing the diversity of intestinal flora. Doesn't this peptide destroy some beneficial intestinal bacteria?

The stated debatable provisions and certain shortcomings do not significantly affect the overall positive assessment of the dissertation work.

8. Dissertation design

The design of the dissertation in terms of structure, language and presentation style meets the requirements for the design of dissertation works, which are approved by the order of the Ministry of Education and Culture of Ukraine, 12.01.2017 № 40 with changes and additions introduced by the order of

the Ministry of Education and Culture of Ukraine dated 31.05.2019 №759. The materials of the dissertation clearly highlight the scientific and practical results obtained during the research.

9. General conclusion

Xueqin Zhao 's dissertation on the topic: «Advances in research on mechanism and function of antimicrobial peptides», which is presented for obtaining a doctor of philosophy, is the final independent study containing scientifically based results in the field of veterinary medicine.

In terms of content and formal features, the dissertation meets the requirements for the design of dissertations and the Procedure for awarding the degree of Doctor of Philosophy approved by the Resolution of the CMU, 12.01.2022 № 44, which cancels the previous orders of the Ministry of Education and Culture of Ukraine dated January 12, 2017 № 40 and Ministry of Education and Culture of Ukraine dated May 31, 2019 № 759 with changes and additions.

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