ЛЕСОТЕХНИЧЕСКИ УНИВЕРСИТЕТ
ФАКУЛТЕТ „ВЕТЕРИНАРНА МЕДИЦИНА"
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ACADEMIC STATEMENT

Assoc. Prof. PhD. Georgi Malinov Stoimenov

Department „Infectious pathology and hygiene, technology and control of food from animal origin", Faculty of Veterinary Medicine, University of Forestry

Scientific specialty: "Epizootiology, infectious diseases and prevention of the infectious diseases of animals", professional field: 6.4. Veterinary Medicine

Regarding: PhD thesis for obtaining of PhD degree in scientific specialty „Epizootiology, infectious diseases and prevention of the infectious diseases of animals", professional field: 6.4. Veterinary Medicine

Author of the PhD thesis: Toshka Evgenieva Petrova

Title of the PhD thesis: „Antimicrobial action and biological effects of electrochemically activated water solutions"

Scientific consultant: Prof. Teodora Petrova Popova

Grounds for presenting the opinion: member of the scientific jury for the defense of the PhD thesis according to Order № ЗПС-370/5.07.2023 of the Rector of University of Forestry

1. Information about the PhD student

The PhD student Toshka Evgenieva Petrova, studied in a PhD program in the scientific specialty „Epizootiology, infectious diseases and prevention of the infectious diseases of animals" to the Department of " Infectious pathology and hygiene, technology and control of food from animal origin " of the Faculty of Veterinary Medicine at the University of Forestry. The training was carried out in an „full-time education" during the period 24.01.2020 - 24.04.2023.

2. General characteristics of the presented dissertation (PhD thesis)

Relevance of the topic: One of the biggest problems in modern medicine is the growing acquired resistance of pathogenic bacteria to antibiotics. The rapidly developing resistance to commonly used disinfectants, as well as the particularly disturbing genetically determined indifference of microorganisms to all applied doses of the drug. Studies related to antimicrobial resistance unequivocally show the dependence between the percentage of resistant and polyresistant bacterial strains and the degree of application of antibiotics, chemotherapeutics and disinfectants, which invariably reflect on the strategic orientation and measures for the prevention, control and therapy of infectious diseases. All this is a proposal to search for new effective antimicrobial agents, which are not dangerous for patients and the environment, as well as not to provoke the development of resistance to them. One of the promising modern approaches in this aspect is the treatment of water with an electricity, in which electroactivated water solutions (catholytes and anolytes) with specific physicochemical properties are obtained by changing the electrochemical characteristics of water. These activated water solutions can be used in medicine to treat various bacterial and viral diseases, as well as to disinfect water and various surfaces. They are an efficient alternatives because, in addition to being non-toxic, they are also an environmentally friendly and affordable means of disinfection to which (due to their nature of action) microorganisms do not develop resistance.

Therefore, the topic of the PhD thesis is up to date and more detailed study and research of the effect of electroactivated water solutions will be beneficial for veterinary science and practice.

Structure and volume: The PhD thesis is written on 209 pages and is well balanced in terms of volume of individual parts: Contents – 3 pages; Abbreviations - 1 page; Introduction - 2 pages, Literature review - 47; Purpose and tasks - 1 page; Materials and methods - 18 pages; Results - 65 pages; Discussion – 23 pages; Conclusions - 2 pages. Recommendations for practice - 1 page; Contributions - 2 pages; Publications in connection with the PhD thesis - 1 page; Acknowledgments-1 page; Summary in Bulgarian and English 2 pages; Literature index – 36 pages;

In writing the PhD thesis, 348 literary sources were used, of which 34 were in Cyrillic and 314 in Latin, and about 44% (153/348) of the literary sources were after 2013.

Review of the literature: The literature review includes comprehensive information on the evolution in the concepts of electrolyzed aqueous solutions, followed by information on the first devices and attempts to apply the resulting solutions in various areas of life. Electrolyzer devices and different types of ionizers are also discussed in detail. The following is a detailed description of the physical and chemical prerequisites for the activity of the solutions obtained during electrolysis. The classification of solutions according to the ionic composition, electroactivated solutions, according to the composition of salts in the starting salt solution of electrochemically activated waters was considered. An economic analysis aimed at providing information on the benefits of replacing conventional disinfectants with methods using electrolyzed water solutions is also presented in detail. The literature review is competently written in a good literary Bulgarian language with an easy-to-read and easy-to-understand scientific style. It clearly shows the in-depth knowledge and awareness of the doctoral student. I believe that the goal is clearly and concretely formulated, and the 5 tasks in number are set in a logical sequence and are formulated concretely, accurately and are adequate to achieve the set goal.

Materials and methods: The section presents the different types of electrolyzed water solutions, different bacterial strains, on which the effect of the studied anolyte and catholyte was tested. The types of nutrient media and apparatus used are described. The surfaces on which the disinfection effect of the above-mentioned electrochemically activated waters was tested are described in detail. Information on the experimental animals used is also presented and the experimental setup of all tests, studies and experiments is described in detail. Various research methods were used to fulfill the set goal, and all of them are up-to-date and adequate to achieve the set tasks.

Evaluation of the obtained results

The results of the research conducted by the doctoral student are presented on 65 pages, including 58 figures. Most of the figures are photos of test tubes, petri dishes and patients, and a part of them are not of very good quality. Thirty-eight tables are also presented. From the described results, it can be concluded that the PhD student successfully completed the scientific tasks set for him and achieved good results. The obtained data were statistically processed and clearly show that the tested catholyte and anolyte have an "*in vitro*" antimicrobial effect. I consider the results obtained as a result of the laboratory tests to be reliable and the personal work of the PhD student.

3. Evaluation of the discussion, scientific and scientific-applied contributions

The discussion is thorough and competently interprets the results obtained with the data of other authors. This is an indicator of analytical, thoroughness and good preparation of the PhD student. The section clearly shows and outlines her in-depth knowledge of the field. The PhD Thesis contains 12 original contributions and 5 recommendations for practice. I accept them in the form in which they are presented and positively evaluate the recommendations for the practice.

4. Evaluation of the publications associated with the PhD Thesis

In connection with the PhD thesis, 4 scientific articles were prepared and published in English. Three out of four are published in the journal "Tradition and modernity in veterinary medicine", the scientific journal of the Faculty of Veterinary Medicine at the University of Forestry, Sofia, and one in the scientific journal Bulgarian Journal of Soil Science. In three of the published articles, the PhD student is first author, which confirms his personal participation in the implementation of the set scientific tasks. The two journals are included in the NACID list of modern Bulgarian scientific publications, referenced and indexed in world-renowned databases with scientific information. The PhD student has provided an opinion on the fulfillment of the minimum national requirements, issued by the University of Forestry.

5. Evaluation of the abstract of the PhD thesis

I am familiar with the abstract and I find that it reflects fully and adequately the content and achievements of the PhD thesis.

6. Critical remarks, recommendations and questions

I haven't critical remarks about the subject, methods, and results. The large number of photos, some of which are not of good quality, is striking. During the preparation of the PhD thesis, technical and spelling errors were made, and there were abbreviations that are not reflected on page 5. In the bibliographic description, I do not find it acceptable to indicate Internet links (I refer to sources from №118 to №132), some of them are links to YouTube. My recommendations to the PhD student are in the future to publish his research not only in Bulgarian scientific journals, as the topic is „hot" and the results could be published in scientific journals abroad.

7. Conclusion

The PhD thesis of Toshka Evgenieva Petrova outlines her, as a researcher, with independent thinking and solid knowledge in the field of epizootology and the prevention of infectious diseases in animals. The importance of the PhD thesis, the publication activity, the personal contribution of the author and the fulfilled requirements for the necessary quantitative and qualitative criteria give me full reason to give my positive assessment of the presented dissertation work. I propose to the respected scientific jury to award Toshka Evgenieva Petrova the educational and scientific degree "DOCTOR" in the field of higher education 6. Agricultural Sciences and Veterinary Medicine, professional direction: 6.4. Veterinary medicine, scientific specialty "Epizootology, infectious diseases and prevention of infectious diseases in animals"

10.10.2023 г.

Sofia

Signature:

/Assoc Prof. PhD. Georgi Stoimenov/