

## REVIEW

provided by the official reviewer, **Halyna Rebenko**, Doctor of Veterinary Sciences, Associate Professor, of the dissertation by **Mincheng Liu** entitled "**Experimental Research on the Pathogenesis of *Streptococcus suis* Infection.**" The dissertation is submitted for the attainment of the scientific degree of Doctor of Philosophy in the field of knowledge 21 - Veterinary Medicine, specialty 211 - Veterinary Medicine.

### **The Relevance of the Dissertation Topic.**

Pig farming is one of the most widespread agricultural sectors in the world, allowing the relatively short-term conversion of plant feed raw materials into high-quality food products containing animal protein and lipid. The susceptibility of pigs to pathogens with zoonotic potential, such as *Streptococcus suis*, creates a problem in the in-depth study of the pathogenesis of changes occurring in the presence of the pathogen and its virulence factors within the cells of an infected organism, particularly the mechanism of cell death by pyroptosis. This mechanism has been studied in brain diseases in humans; therefore, clarifying specific stages of pyroptosis during meningitis caused by *Streptococcus suis* in pigs will enhance the understanding of this issue and expedite the search for ways to restrain the destruction of nerve cells and thus prevent the progression of degenerative diseases of the central nervous system. Consequently, the results of the scientific research presented in Mincheng Liu's dissertation titled "Experimental research on pathogenesis of *Streptococcus suis* infection" remain relevant.

### **Connection with Scientific Topics**

The work is related to the research themes of Sumy National Agrarian University (Ukraine) and the Henan Institute of Science and Technology (China). The dissertation materials are part of the research work of Sumy NAU "Optimization of a set of measures to prevent the emergence and spread of

infectious animal diseases in farms of the Northeastern region of Ukraine" (No. 0122U001254).

### **Scientific Novelty and Theoretical Significance of the Dissertation**

The researcher has worked on applying the cell culture of brain endothelium BEND3 under different infection schemes of *Streptococcus suis* Type 2, which is pathogenic for humans as well. This includes selecting a dose for infection to obtain an optimal process regarding speed, RNA expression, and interleukin release. For the first time, the dissertation determined the levels of proteins and genes related to pyroptosis and captured images of cell pyroptosis stages using an electron microscope.

### **Practical Importance of the Dissertation Results**

The study aims to determine the details of the pathogenesis of pyroptosis in cells in infected *Streptococcus suis* live systems and assess the efficacy of pyroptosis inhibitors. Therefore, the results can be used in the development of means to prevent pathological changes in the brain during similar processes.

### **The main results obtained personally by the author**

The author of the dissertation personally conducted an extensive analysis of literary sources on the subject matter and summarized the gathered information. Specifically, potential use of infected *Streptococcus suis* cells from brain microvessel endothelium cultured cells was identified as a model for studying the pathogenesis of pyroptosis in this infection. The candidate acquired the technique of cultivating this culture, determined the doses and methods of infection to achieve an optimal rate for the study of occurring changes. By employing modern methods such as electron microscopy, enzyme-linked immunosorbent assay, western blot, radioimmunoprecipitation, and quantitative PCR, the candidate researched the levels (concentration) of secreted proteins functioning as cytokines in response to the pathogenicity factors of *Streptococcus suis* and the role of the caspase inhibitor Ac-YVAD-cmk in suppressing pyroptosis and the associated inflammation. During the authenticity assessment of the dissertation, an analysis was conducted to verify the

work for plagiarism, checking for text borrowings using the Strike plagiarism program. Based on this analysis, the conclusion was reached that Mincheng Lyu's dissertation on the topic: "Experimental research on pathogenesis of *Streptococcus suis* infection" is the result of independent research by the candidate and does not contain elements of plagiarism or text borrowings, as per the decision of the Cabinet of Ministers of Ukraine dated 12.01.2022, No. 44, para. 9. Ideas, results, and texts of other authors used have proper citations to the respective sources.

### **Quantity of scientific publications**

The research findings presented in the dissertation have been published in 13 scientific works, including 1 article in publications indexed in the international scientometric database Web of Science, 4 articles in scientific professional publications in Ukraine, 7 conference paper abstracts in collections of conference materials, including 1 publication in a periodic scientific publication of EU member states (Estonia) and 1 scientific-practical recommendation. The main points of the dissertation were reported and discussed at the meetings of the academic council at the Faculty of Veterinary Medicine of Sumy National Agrarian University during 2019–2022.

### **Remarks and wishes regarding the content**

The dissertation is formatted according to the requirements. The candidate's research results are presented in English (with a Ukrainian abstract), but the dissertation text contains fragments that are challenging to comprehend. Additionally, there's a desire to further describe in text all the results represented in tables and graphs. The noted remarks mainly concern the presentation format of the materials or have an editorial nature, without affecting the scientific essence of the dissertation. Issues requiring additional clarification during the defense of the dissertation work:

1. Using of mouse tissues for scientific research is generally accepted, but have you considered studying pyroptosis in pig cell culture ?
2. What is the purpose of making the group LPS+ATP infected cells?

3. Is it possible to use the results of your research on the inhibitory role of the caspase inhibitor Ac-YVAD-cmk in the pathogenesis of pyroptosis to prevent the development of meningitis due to swine streptococcosis caused by *Streptococcus suis* type 2?

**Relevance of the dissertation to the specialty and profile of the council:**

The dissertation of Mincheng Lyu on the topic: "Experimental research on pathogenesis of *Streptococcus suis* infection," submitted for defense to the specialized academic council for the doctoral degree in the field of knowledge in Veterinary Medicine under the specialty 211 Veterinary Medicine, in terms of its relevance, scientific-theoretical level, main substantiated results, fundamental provisions, and results published in professional publications, novelty of the statement, and practical significance, meets the requirements of the order of the Ministry of Education and Science of Ukraine No. 40 of January 12, 2017, "On approval of the requirements for dissertation formatting," and the Resolution of the Cabinet of Ministers of Ukraine No. 44 of January 12, 2022, "On approval of the procedure for awarding the degree of Doctor of Philosophy and cancellation of a one-time specialized academic council decision of an institution of higher education, scientific institution on awarding the degree of Doctor of Philosophy," as amended according to the Cabinet of Ministers Resolution No. 341 of March 21, 2022. The dissertation content corresponds to the specialty's passport.

Reviewer,  
Ph.D. in Veterinary Medicine,  
Associate Professor



Halyna REBENKO

