REVIEW

of the foreign scientific consultant, on the dissertation work of Abenova Asem Zhandarbekkyzy titled «Molecular genetic analysis of the rabies virus circulating in the Republic of Kazakhstan», submitted for the degree of Doctor of Philosophy

Doctoral student Abenova A. Zh. has successfully completed a planned foreign scientific internship in Harbin Veterinary Research Institute, Chinese Academy of Agricultural Sciences (Harbin 150069, Heilongjiang Province, P.R. China), on the topic of her dissertation «Molecular genetic analysis of the rabies virus circulating in the Republic of Kazakhstan». Throughout her internship, Abenova A. Zh. has demonstrated her responsibility, independence, and proactivity as a doctoral student.

The dissertation by Abenova A. Zh. focuses on exploring the antigenic diversity of the rabies virus in circulation in Kazakhstan. The study provides comprehensive information on the occurrence of animal rabies among infected animals, its geographical distribution, nucleotide sequences, rabies isolates, and genetic diversity in Kazakhstan between 2020 and 2022. Furthermore, it sheds light on the phylogenetic relationship between Kazakhstan and neighboring countries. This approach could improve the epidemiological surveillance of rabies infection, enhance our understanding of the dynamics of rabies virus spread, and ultimately lead to the improvement of animal rabies control programs.

The study had yielded several findings, as follows:

1. The pathological materials (the brains of suspected rabies animals) from different regions of Kazakhstan were collected and confirmed to have rabies.

2. The cDNA samples from suspensions of rabies animal brains were formed by reverse transcription reaction.

3. The genome-wide sequences from 31 different rabies virus isolates were obtained, and a database of rabies virus isolates found in Kazakhstan was established.
4. Through phylogenetic analysis, all 31 strains belonged to the Cosmopolitan clade, of which 30 strains belonged to steppe-type subclade, and 1 dog strain belonged to Other subclade.
5. The 31 strains did not diverge from rabies virus strains in Kazakhstan and neighboring countries based on the maximum clade credibility tree mapping.
6. The genetic distance of fox- and dog-originated strains were very close to that of rabies outbreak cattle-originated strains respectively, indicating that fox- and dog-transmitted strains may be the main crux of cattle rabies.
7. The preventive measures to control animal rabies in Kazakhstan were formulated based on the molecular genetic analysis of the rabies virus.

The primary findings have been published in *Journal of Integrative Agriculture* (https://doi.org/10.1016/j.jia.2022.11.011). The study demonstrates that Abenova A. Zh. has adequate knowledge of scientific analysis methods and is well-prepared for conducting contemporary scientific experiments.

Therefore, I recommend approving the dissertation of Abenova Asem Zhandarbekkyzy for defense of the doctoral degree in the specialty "8D09101 Veterinary animal welfare," as it fulfills all requirements for a doctoral dissertation.

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