REVIEW

on a dissertation for acquiring the educational and scientific degree "PhD" in the field of higher education: 6 "Agricultural Sciences and Veterinary Medicine", professional direction: 6.3. "Livestock Breeding" and scientific specialty: "Breeding of Farm Animals, Biology and Biotechnology of Reproduction".

Author of the dissertation: **Zornitsa Boykova Petkova**, part-time PhD student at the Department of Animal Sciences at the Agricultural University - Plovdiv.

Dissertation topic: "Modern trends in creating a high milk yielding sheep population in Bulgaria and opportunities for using the Pleven Black-headed sheep in the selection process".

Reviewer: Prof. Radoslav Ivanov Slavov DSc, from the Faculty of Agriculture at the Trakia University, Stara Zagora - retired, field of higher education: 6. "Agricultural Sciences and Veterinary Medicine", professional direction: 6.3. "Livestock Breeding" and scientific specialty: "Breeding of Farm Animals, Biology and Biotechnology of Reproduction". Nominated as a member of the Scientific Jury by Order No РД-16-612 dated 14.05. 2025 of the Rector of the Agricultural University - Plovdiv.

1. Brief introduction of the PhD student

The doctoral student was born on 28.06.1984 in the town of Pleven. In 2003, she graduated from the Vocational High School of Veterinary Medicine "Prof. Dr. Dimitar Dimitrov" in the town of Lovech with the specialty "Veterinary Technician". In 2007, she graduated from the Agricultural University in the town of Plovdiv, and was awarded the educational and qualification degree "Bachelor", with a professional qualification "Agronomist-Livestock Breeder". In 2008, she completed her studies at the Faculty of Agriculture at the Trakia University in the Master's program, and was awarded the educational and qualification degree "Master", with an acquired professional qualification in "Animal Husbandry - Equestrian Sport".

Since 2008 to 2012, she worked at the National Horse Breeding Association - Sofia as a regional specialist - "Zoo Engineer". From 2012 to the present, she is a regional specialist - "Zoo Engineer" at the Association of Horse Breeders in Bulgaria. Since 2017 to 2021, she is holding the academic position of "Assistant"

at the Institute of Forage Crops - Pleven. From 2023 to 2024, she works at "Bonmix" LTD - Pleven as a "Zoo Engineer".

On 18.12.2018, she was enrolled in part-time doctoral studies in the scientific specialty "Breeding of farm animals, biology and biotechnology of reproduction" in the Department of "Animal Sciences" at the Agricultural University - Plovdiv, with Prof. Vasil Nikolov PhD as her scientific supervisor. On 09.03.2023, she was withdrawn from doctoral studies, with the right to defend a dissertation.

2. Relevance of the studied problem

Through the development of this dissertation, the doctoral candidate provides answers to a number of important questions related to the creation and current status of part of the controlled Bulgarian Dairy Synthetic Population, the status and trends in the development of the Pleven Black-headed sheep breed, as well as the possibilities for its use in the selection process. The results of crossing ewes of the Pleven Black-headed breed with rams of the East Friesian and Assaf breeds were studied.

Given the issues under consideration, the goals and tasks that the doctoral candidate sets, the large volume of research, the applied modern methods of processing the results obtained, the analyses performed, the conclusions drawn and the recommendations made to sheep breeding science and practice, I believe that the dissertation developed by Zornitsa Petkova has a high degree of relevance.

3. Aim, tasks, hypotheses and research methods.

The aim and tasks are correctly formulated and implemented, and the summaries, conclusions and recommendations made fully reflect the results obtained.

The working hypotheses of the dissertation are related to the study and establishment of the dynamics in the development, the level of productivity and the current state of the Synthetic Population "Bulgarian Dairy", controlled by ARMPO, the study of the current state of the controlled part of the Pleven Black-headed breed, the dynamics and trends in its development, as well as the possibilities for its use as a basis for creating a highly productive dairy sheep population in our country. Deep studies have been conducted regarding the results of crossing ewes of the Pleven Blackhead breed with rams of the East Friesian and Assaf breeds. Controls of milk productivity, chemical and biochemical

studies were carried out, including the fatty acid composition of milk and dairy products, hematological indicators in sheep of the Pleven Black-headed breed and high-blooded crosses with the participation of the Assaf breed. The possibilities for using the latter for year-round milk production and the related milk yield and lactation stability during different lambing seasons and with the corresponding intensification of the breeding process have been studied.

I believe that through the development of the current dissertation, the doctoral candidate has acquired the necessary theoretical training, knowledge and skills for planning and conducting experiments, for professional analysis and interpretation of the results obtained, for the use of modern methodologies and equipment for conducting research, as well as modern software products and models for data processing, skills for formulating conclusions, inferences and recommendations for practice.

4. Visualization and presentation of the obtained results.

The dissertation is written on 185 pages, including abbreviations used - 3 pages, table of contents - 1 page, introduction - 2 pages, literature review - 25 pages, aim and objectives - 2 pages, material and methods - 9 pages, results and discussion - 106 pages /including a summary of 6 pages/, conclusions and recommendations - 3 pages, reference list - 25 pages, contributions 2 pages and publications related to the dissertation - 1 page. The structure and ratio of the sections of the dissertation is developed according to the requirements. The results obtained are presented very well - textually /analytically/, through 53 tables, 30 figures and 12 photos. It is written in a very good style and language.

5. Discussion of the results and literature used.

The discussion and analysis of the many systematic and in-depth studies are aimed at achieving the main goal of the dissertation. The obtained results have a high degree of significance, given the relevance and role of the Synthetic Population "Bulgarian Dairy" and the Pleven Black-Headed Breed for Bulgarian Dairy Sheep Breeding. They are convincing and are based on methodologically correctly set experiments, research and analyses, carried out with a large number of animals and biological samples, modern equipment and processing methods. The interpretation of the obtained results was carried out professionally, which is indicative of the very good scientific preparation of the doctoral candidate.

I also highly appreciate the summary presented after the section "Results and Discussion". The 13 conclusions and 4 recommendations derive from the results obtained and are of interest to sheep breeding science and practice.

A total of 302 literary sources are cited in the dissertation, of which 57 are in Cyrillic and 245 in Latin. The dissertation candidate's very good literary awareness, excellent knowledge and handling of literary sources on the researched topic, both in the development of the literature review and in the analysis of the obtained results, is impressive.

6. Dissertation Contribution.

Based on the results of the developed dissertation, the doctoral student presents a list of the contributions. Contributions of an original scientific and scientifically applied character have been formulated. I express my agreement with the contributions presented in this way. I would like to emphasize some of the results of the scientific work, which are of particular importance in the field of sheep breeding science and practice.

6.1. An analysis of the condition and trends in the development of some of the sheep bred in our country from the Synthetic Population "Bulgarian Dairy" has been carried out. Stabilization of the population has been established in terms of the number of herds and animals under selection control (24.6%), but the milk yield of the nucleous herds is relatively low - 163.9 l for a 135-day milking period and 149 l for a 120-day lactation. ***Scientific and applied contribution.***

6.2. An analysis of the state and trends in the development of the Pleven Black-headed sheep breed has been carried out. It has been found, unfortunately, that over the past 7 years the controlled part has been decreasing, and since 2022 the breed has been in the group of those threatened with extinction. The sheep have an average milk yield for the first lactation of 119.5 l, and for the second - 122.1 l. The conclusion was made that the breed has the potential for higher milk production. ***Scientific and applied contribution.***

6.3. An analysis was performed and it was concluded that the crossing of ewes of the Pleven Black-headed breed with rams of the East Friesian breed does not lead to an increase in milk yield. For a 120-day milking period, the crosses (F1) in the first lactation had a milk yield of 115.1 l, and in the second - 135.9 l. It has been established that the milk yield of crossbreds is strongly influenced by

the conditions of the farm year, while in purebred animals it is relatively stable. ***Scientific and applied contribution.***

6.4. Based on the study, it was established that the crossing of ewes of the Pleven Black-headed breed with rams of the Assaf breed has a positive effect - the milk yield of the F4 PCHO x Assaf crosses in the first and second lactation is over 250 l, and the milk yield for a 120-day milking period is 207.6 and 192.7 l. It has been established that high-blooded crosses under intensive breeding technology can be successfully used for year-round milk production in our country. A higher sensitivity of the crosses to unfavorable environmental factors has been established. ***Scientific and applied contribution.***

6.5. It has been established that the milk of ewes of the Pleven Black-headed breed, raised on pasture, compared to crosses with Assaf (F4), raised in stables and fed a standardized ration, has a lower content of unsaturated fatty acids, a higher content of branched-chain fatty acids, and a lower content of trans-fatty acids. The milk of the crossbreds contains a higher amount of ω-3 fatty acids but the ratio ω-6/ω-3 is almost identical - 2.51 and 2.53. The milk of the Pleven Black-headed sheep breed increases its biological completeness when processed into white brine cheese, and of the crossbreds with Assaf - when producing yogurt. ***An original contribution with scientific and practical significance.***

7. Critical notes and questions.

I have one question and one note about the dissertation.

7.1. What meaning does the PhD candidate put into her statement that high-blood herds of imported breeds have higher milk yield, but lower milk "concentration"?

7.2. The animal in Fig. 12 is not of the "small type" of the Pleven black-headed breed, but of the "large type". The criterion for this is the ears - large, long and wide, often curled outward at the lower end, as described on p. 71.

The question and note asked do not diminish the quality of the dissertation.

8. Published articles and citations:

In relation to the dissertation, the doctoral student presents four scientific publications in Bulgarian refereed scientific journals - in the Journal of Mountain Agriculture on the Balkans - 1 issue, in the Bulgarian Journal of Animal

Husbandry - 1 issue and in the Bulgarian Journal of Agricultural Sciences - 2 Bulgarian Journal of Animal Husbandry issues.

In three of them she is the first author and in one she is the third author. The total number of points formed by the publications is 45, with requirements according to the scientometric indicators of 30 points. I give a high positive assessment for the quality of the scientific publications reflecting the results of the dissertation of the doctoral candidate Zornitsa Petkova.

The submitted Abstract meets the requirements and objectively reflects the structure and content of the dissertation.

Conclusion:

Based on the research methods learned and applied by the doctoral student, the correctly conducted experiments, the summaries and conclusions made, I believe that the presented dissertation meets the requirements of the LDASRB and the Regulations of the Agricultural University for its application, which gives me reason to evaluate it POSITIVELY.

I would like to propose to the honoured Scientific Jury to also vote positively and award Zornitsa Boykova Petkova the educational and scientific degree "PhD" in the field of higher education "Agricultural Sciences and Veterinary Medicine", professional field "Livestock Breeding" and scientific specialty "Breeding of Farm Animals, Biology and Biotechnology of Reproduction".

11.06. 2025

Stara Zagora