OPINION

on dissertation work for awarding the educational and scientific degree **'doctor'** in higher education field **6. Agricultural Sciences and Veterinary Medicine**, professional field **6.3 Animal Husbandry**, scientific specialty **Breeding of Farm Animals, Biology and Reproduction Biotechnology**

Author of the dissertation work: **Georgi Kirilov Georgiev**, a part-time PhD student at the department of Animal Science, Agricultural University, Plovdiv
Dissertation Theme: 'Morpho-physiological and biochemical characteristics of fish from the Acipenseridae family

Reviewer: Prof. Dr. Plamen Pavlov Petrov, faculty of Agronomy at Agricultural University- Plovdiv, higher education field 6. Agricultural Sciences and Veterinary Medicine, professional field 6.3 Animal Husbandry, scientific specialty 'Special branches (bees)', designated as a member of the scientific jury in accordance with order No. RD-16-613/14.05.2025 from the AU Rector.

1. Relevance of the problem.

The sturgeon farming in Bulgaria has been experiencing a marked development in the recent decades. This has been especially true for fish which are cultivated in industrial super-intensive farms. The development and implementation of technologies which meet the modern requirements for sustainable aquaculture necessitate the acquisition of knowledge about the specifics of the development of the different sturgeon fish and the quality of the production obtained from them. Such studies are scarce in Bulgaria which makes the present study an extremely relevant work with significant scientific and practical importance. The relevance of the problem is also substantiated by the fact that the study, which is based on an integrated approach, is aimed at the analysis of morpho-physiological and biochemical characteristics of fish of the Acipenseridae family- Siberian sturgeon *(Acipenser baerii)*, Russian Sturgeon *(Acipenser gueldenstaedtii)*, hybrid of Siberian sturgeon x Russian sturgeon (F_1 *A. baerii* x *A. Gueldenstaedtii)*, with different live weight, cultivated in an industrial cage farm.

2. Purpose, tasks, hypotheses and research methods.

Both the purpose and the tasks set for its achievement are clearly formulated. The working hypothesis involved the performance of comparative analysis of morpho-physiological and slaughter parameters based on the chemical composition and energy content of the meat, amino-acid and protein profile of the meat of Siberian sturgeon *(Acipenser baerii)*, Russian Sturgeon *(Acipenser gueldenstaedtii)*, and the hybrid of Siberian sturgeon x Russian sturgeon (F_1 *A. baerii* x *A. Gueldenstaedtii)*, reared in an industrial super-intensive cage technology.

Appropriate research methods were used for the implementation of the tasks set. The three-year studies were performed on sufficient number of samples of fish at different age. The liquid chromatography used was highly effective. The statistical processing of the results obtained as well as their analysis were performed with an appropriate specialised software product.

3. Visualisation and presentation of the obtained results.

The obtained results are in the volume of 105 pages which is 63% of the entire dissertation work. It is noticeable how well the dissertation work is visualized, and the original photographic material provided is impressive- the dissertation includes 39 tables and 41 figures, which are all accurately labelled and entitled.

4. Discussion of the results and the reference works.

The PhD student has thoroughly familiarized himself with the sturgeon studies. The references are presented on 36 pages and include 277 sources, of which 77 are in Cyrillic script. The obtained results are divided into several subsections and comply with the tasks set for the achievement of the purpose of the dissertation.

The main conclusions of the studies performed- a total of 9, derive from the results obtained. There were 3 valuable practical recommendations made with reference to the increase of the protein value and the identification of the sturgeon species and the hybrids in the sturgeon farms.

5. Dissertation Contributions.

The relatively large samples of sturgeon fish of different genetic origin and age analyzed in the dissertation of Georgi Georgiev as well as the authentic photographic material provided clear any doubts about his personal involvement and the reliability of the material on which the dissertation contributions are based.

Scientific contributions

1. It was ascertained that in the conditions examined, the weight group had influence on the morphological and slaughter parameters, as well as on the chemical and amino acid composition of the fish meat. The influence in the separate genotypes was specific with reference to a range of parameters. **Original scientific contribution.**
2. It was ascertained that the proteins are biologically most sufficient in the meat of the Russian sturgeon and the hybrid from the lower weight group, and the essential amino acids were respectively 67.2% and 55.5% of the total quantity. The Russian sturgeon from the greater weight group came close second with 47.9% essential amino acids. The essential amino acid content in the other groups was from 31.2% to 36.2%. The differences were mostly attributed to the high isoleucine, lysine and phenylalanine content in the lower weight group of the Russian sturgeon, and that of the lysine in the same weight group of the hybrid. The lysine was the amino acid with the highest

content in the meat of the other groups. **Original scientific contribution.**
3. It was confirmed that the protein electrophoretic models can be used for the differentiation of the different sturgeon species. **Confirmatory scientific contribution.**

Scientific-applied contributions

1. Subject to study were the morphological and slaughter parameters, the chemical, amino acid composition and the protein profile of the meat of different-weight Siberian sturgeon (*Acipenser baerii* Brandt, 1869), Russian sturgeon (*Acipenser gueldenstaedtii* Brandt et Ratzeburg, 1833) and their hybrid (F_1 *A. baerii* x *A. gueldenstaedtii*) cultivated in a super-intensive industrial cage farm in Kardzhali reservoir. **Original scientific-applied contribution.**
2. It was ascertained that, in the conditions during the study, the Russian sturgeon from the lower weight group excelled the lower weight Siberian sturgeon and the hybrid in the three slaughter yields and in relation to the fillet in the whole fish. The Siberian sturgeon from the greater weight group had the highest relative share of the fillet in the whole fish and in the carcass. When compared with the parental forms, the hybrid took a medium position only displaying insignificantly higher values for the fillet share in the carcass with reference to the group of the smaller fish. **Original scientific-applied contribution.**
3. It was ascertained that the the fish of the lower weight group had the highest protein content in the dry matter: hybrid- 84.5%, the Russian- 78.5% and the Siberian- 75.0% sturgeons. The greater weight group had protein content of respectively- 73.5%, 64.0% and 64.1%. The meat of the fish analysed was classified as medium fat. The fat content in the dry matter of the fish from the lower weight group was 12.5%, 15.7% and 17.4% respectively for the hybrid, the Russian sturgeon and the Siberian sturgeon, while in the larger weight group it was respectively 20.6%, 25.4% and 28.3%. The difference between the groups with reference to the water content was insignificant and the protein and fat content in the fresh meat had a similar arrangement. **Original scientific-applied contribution.**
4. It was ascertained that the Sturgeon fish cultivated in a super-industrial cage farm had good slaughter and meat quality. **Confirmatory scientific-applied contribution.**
5. It was ascertained that the Russian sturgeon from the lower weight group exhibited better slaughter qualities. It had higher slaughter (90.4% against 86.7% in the larger weight group, $p<0.01$) and consumable (87.2% against 84.3%, $p<0.05$) yields, and a higher relative share of the fillet in the whole body (49.9% against 48.3%) and in the carcass (77.8% against 75.3%). **Confirmatory scientific-applied contribution.**
6. It was ascertained that both Siberian sturgeon weight groups had similar slaughter qualities, which were insignificantly higher in the heavier fish: slaughter yield- 86.9% against 86.4% for the lighter fish, consumable yield- 84.2% against 83.5%, carcass yield- 61.5% against 58.1%, relative share of the fillet in the whole fish- 50.8% against 45.6% respectively. It was only the difference in the relative share of the fillet in the carcass that was significant (82.5% against 78.4%, $p<0.001$). **Confirmatory scientific- applied contribution.**
7. It was ascertained that the lower weight hybrid group had higher slaughter (89.5% against 86.5%, $p<0.05$) and consumable (86.6 against 83.8%, $p<0.05$) yields. The relative shares of the fillet in the whole fish (50.0% against 48.0%) and in the carcass (81.4%

against 79%) as well as the carcass yield (61.5% against 60.8%) were higher in the greater weight group. **Confirmatory scientific- applied contribution.**

6. Critical remarks and questions.

The critical remarks and the questions raised upon the examination of the dissertation have been taken into account and answered in the dissertation under consideration.

7. Published articles and citations.

The PhD student has indicated 4 publications connected with the dissertation work. He is first author in one of them and a second author in another. All four scientific articles have been published in refereed and indexed journals in the world-renowned databases of scientific information Scopus and Web of Science.

The author's summary of the dissertation objectively reflects the structure and the content of the dissertation.

CONCLUSION:

Based on the different research methods learned and applied by the PhD student as well as on the correctly performed experiments, the generalizations and conclusions made, I believe that the dissertation presented meets the requirements of the Development of the Academic Staff in the Republic of Bulgaria Act and the Regulations of the Agricultural University for its implementation, which gives me the reason to evaluate it **POSITIVELY.**

I allow myself to propose to the honorable Scientific Jury to also vote positively and award **Georgi Kirilov Georgiev** the educational and scientific degree ***'doctor'*** in scientific specialty **Breeding of farm animals, biology and reproduction biotechnology.**

Date: 19.06.2025г.
Plovdiv