REVIEW

regarding the competition for "professor" in the field of higher education 6. Agricultural sciences and veterinary medicine, in professional direction 6.3. Animal husbandry, in the scientific specialty „Aquaculture, fish farming, fish farming and industrial fishing", announced in SG no. 62 of 21.07.2023 with candidate Assoc. prof. Lyudmila Nikolaevna Nikolova from the Agricultural University, Plovdiv

Reviewer: Prof. Dsc. Katya Naneva Velichkova from Trakia University, PN 4.3 Biological Sciences, scientific specialty Ecology and Ecosystem Protection,
appointed as a member of the scientific jury by order No. RD-16897/25.09.2023 of the Rector of the Agricultural University.

Only one candidate participated in the competition for the academic position of "Professor" announced for the needs of the Department of "Animal Science" at the Agricultural University - Plovdiv. The documents for the competition have been prepared according to the requirements of the law on the development of the academic staff in the Republic of Bulgaria and the regulations for the application of the law in AU - Plovdiv.

1. General data on the candidate's career and thematic development;

Lyudmila Nikolaevna Nikolova was born on November 5, 1965. in Harkov, Ukraine. She graduated from the Zoo Veterinary Institute, Borisenko / Harkov Zoo Veterinary Academy, Ukraine in 1988 as a Master of Science in Animal Engineering. In 1995 obtained a master's degree in Biology and Chemistry (pedagogical qualification) at Sofia University "St. Kliment Ohridski", Faculty of Biology. In 2003 is defending her doctoral studies at Trakia University - Stara Zagora, Faculty of Agriculture, department of "Animal Husbandry - non-ruminant and other animals", doctoral studies, specialty 04.02.12. "Fish farming, fish farming and industrial fishing. From 1995 to 1998 she worked as a zoo engineer in the Department of Animal Husbandry at the Agricultural University - Plovdiv. Then until 2011 she was a research assistant (I, II and III degrees) at the Institute of Fisheries and aquaculture - Plovdiv, and since 2014 she has been an Associate Professor at the institute. In 2005 and 2014, she was a part-time assistant and associate professor at the Department of Animal Husbandry, Faculty of Agronomy at AU-Plovdiv, respectively. From 2014 to now she holds the academic position of Associate Professor at the Department of Animal Husbandry, Faculty of Agronomy at AU-Plovdiv. Delivers lectures and exercises in disciplines of aquaculture, fish farming, maritime affairs and fisheries in various specialties of bachelor's and master's courses. In 2019 she gave lectures at the Russian State Agrarian University MSHA named after KA Timiryazev (Timiryazevskaya Academy) - Moscow in Aquaculture in the undergraduate course of students majoring in Animal Engineering (Zootechnics) (Erasmus+). Her scientific work is in the field of aquaculture and aquatic ecology. Administrative positions held: VID Director (2013-2014) Institute of Fisheries and Aquaculture - Plovdiv; from 2020 until now she is the Head of the Department of "Animal Breeding Sciences" at AU-Plovdiv. Prof. Nikolova has conducted specializations abroad - France (2021) - "Association Agricole

Franco-Bulgare", Spain (2022) - "Universitat Politecnica De Valencia" - Valencia. It is a member of two scientific organizations: Scientific and Technical Union - Bulgaria and an international scientific organization in the field of aquaculture NACEE - Network of Aquaculture Centers in Central-Eastern Europe. He speaks several languages - Russian, Ukrainian, English. She is a member of the Faculty Council at the Faculty of Agronomy of AU-Plovdiv, as well as a member of the quality committee of the Faculty of Agronomy, secretary of the committee for attestation of teachers of the Faculty of Agronomy, member of the committee for the protection of pre-graduate internships of FA students and FA Student State Examinations Committee.

2. General description of the presented materials.

Assoc. Prof. Nikolova participated in the competition for "Professor" with a total output of 39 scientific papers, grouped as follows:

- Scientific publications on the nomenclature specialty - 40 issues, of which:

- Publications related to the doctoral dissertation - 1 issue, which is not subject to consideration;
- Publications with an impact factor/impact rank – 10 items
- Publications in peer-reviewed and refereed scientific journals – 27 issues;
- Publications in conference proceedings – 2 issues;

Associate Professor Nikolova's personal involvement in the mentioned 39 works is illustrated by the fact that 7 are independent, in 12 she is the first, in 8 she is the second, and in the remaining 12 she is the third and subsequent author. Of the publications presented, 6 are in Bulgarian, two in Ukrainian, and the remaining 31 publications are in English.

In addition, Prof. Nikolova is a co-author of:

- Textbooks – 1 item.
- Study guides – 1 item.

Associate Prof. Nikolova presents as a habilitation thesis - 12 scientific publications in publications that are referenced and indexed in world-famous databases with scientific information. Of these, 7 publications are in journals with an impact factor/rank and have quartiles Q3 and Q4. All scientific publications that are indicated are in the nomenclature specialty and are related thematically.

From the presented report-declaration on the fulfillment of the minimum national requirements, it can be seen that Prof. Nikolova over-fulfills the same indicators in all groups. Out of the required 550 points, the candidate presents 1533.9 points.

According to *indicator A* – 50p. Defended dissertation on the topic: "Study of some technological elements of ecological and biocompatible technology for integrated fish and duck farming in fish ponds"

Indicator B – 267p. collects from 12 scientific publications in publications that are referenced and indexed in world-renowned databases of scientific information, which she presents instead of a habilitation thesis.

Indicator G – 249.97p. – presents 17 articles published in refereed and indexed world-renowned databases of scientific information (Scopus and Web of science), as well as 10 articles and reports published in non-refereed peer-reviewed journals.

Indicator D – 550p. – presents 36 citations in scientific publications that are referenced and indexed in world-renowned databases with scientific information, as well as 14 citations in non-refereed journals with scientific review.

Indicator E – 416.93p. - presents successfully defended two doctoral students, one textbook, published textbooks and manuals and participation in national and international

projects.

3. **Main directions in the candidate's research work. Demonstrated skills or aptitude for leading scientific research (project management, attracted external funding, etc.).**

The main directions of the research activity of Prof. Nikolova are in the field of sustainable aquaculture, with special attention being paid to ecological and biocompatible technologies in warm water fish farming in polyculture and monoculture fish farming. Conducts research related to sturgeon fish cultivated under conditions of super-intensive industrial cage technologies, as well as integrated fish and duck farming as an innovative approach to increase the ecological and biocompatibility of carp farming. An important emphasis in the candidate's research work are also innovative approaches in establishing genetic variability in local, spatially distant natural fish populations. This is also evident from the numerous projects related to her scientific and teaching work. Assoc. Prof. Nikolova is the head of 4 national projects and 1 international project under Erasmus + KA, participant in 3 international projects, two of which under COST Action and 10 national projects. Her participation in a total of 18 national and international projects shows the candidate's high scientific competence. Assoc. Prof. Nikolova's organizational skills are manifested in the coordination, management and administration of the participants and the budget of the projects, through which she contributes not only to her professional development, but also supports the growth of young scientists.

4. **Evaluation of the pedagogical preparation and activity of the candidate. Its role in the training of young scientific personnel.**

The teaching activity of the candidate is excellent. Assoc. prof. Ludmila Nikolova has more than 13 years of teaching experience and teaches an average of 665 hours of bachelor's and master's courses per year. She participated in the preparation of 41 study programs in the disciplines: "Aquaculture", "Biological foundations of aquaculture", "Aquaculture technology", "Fish farming and fishing", "Fish farming", "Marine work and fisheries", "Biological aquaculture". , "Recreational aquaculture and fisheries" for OCS "Bachelor", as well as "Production of safe and quality food from hydrobionts. Good fish farming practices», «Fundamentals of aquaculture», «Genetic resources and features of selection in fish farming», «Fish reproduction», «Technologies for integrated breeding of hydrobionts and birds», «Integrated breeding of waterfowl and aquaculture», «Biotechnology of reproduction in fish farming», «Breeding programs in fish farming», «Management of genetic resources in fish farming», «Digitalization in aquaculture», «Integrated breeding of waterfowl and fish» for OKS "Master". As a result of his pedagogical and scientific activity, the candidate participated in the writing and publishing of 1 textbook and 1 manual.

Assoc. Prof. Nikolova was the academic supervisor of 20 successfully defended diploma students (10 from OKS Bachelor and 10 from OKS Master), and the topics of their diploma theses are very current and completely related to freshwater aquaculture. A certificate of the candidate's scientific professionalism is provided by both PhD students who successfully defended under her supervision at the Agrarian University - Plovdiv and the Kazakh National Agrarian Research University. The guidance of a foreign doctoral student is another certificate for the international recognition of assoc. prof. Nikolova in the field of aquaculture.

The candidate reported the scientific results of his experimental work at 35 international scientific forums (Russia, Germany, Czech Republic, Slovakia, Albania, Ukraine, Serbia), where he presented 67 reports. She also took part in 3 national

scientific forums in Plovdiv and Sofia, where she presented five reports.

5. **Significance of the obtained results, proven by citations, publications in prestigious journals, awards, membership in international and national scientific bodies, etc.;**

The significance of the results obtained from the scientific research in which the candidate participated is evident from the citations of researchers from Bulgaria and abroad. Assoc. prof. Nikolova has presented 50 citations in international and Bulgarian journals, most of which are referenced in Scopus and Web of science. The high number of citations indicates the importance and relevance of the candidate's experimental results. Assoc. prof. Nikolova's membership in the prestigious international scientific organization in the field of aquaculture NACEE - Network of Aquaculture Centers in Central-Eastern Europe and Scientific and Technical Union - Bulgaria is also impressive.

The publication of the scientific results of the experiments conducted by the candidate in prestigious journals with an impact factor/rank, with quartiles Q3 and Q4 - Turkish Journal of Fisheries and Aquatic Sciences, Bulgarian Journal of Agricultural Science, Journal of Central European Agriculture, Archives of Razi Institute is more a testament to the significant research carried out in the field of modern aquaculture.

6. **Significance of contributions for science and practice. A motivated answer to the question to what extent the candidate has a clearly defined profile of research work;**

Assoc. prof. Lyudmila Nikolova's scientific and research experience is 24 years. The main directions of her scientific activity are in the field of sustainable aquaculture, with special attention being paid to ecological and biocompatible technologies in warm water fish farming. In order to increase the consumption of hydrobionts, it is important that consumers perceive aquatic products as a useful and healthy food. It is the production of fish under the conditions of ecologically and biologically compatible thermal water technologies that allows the provision of such production to the market. An important element for the sustainable development of aquaculture is the diversification of farmed fish species. Assoc. prof. Nikolova conducts research related to warm water fish farming, which is a very important sector in world aquaculture, as fish farming in inland (freshwater) reservoirs is 56.9% of total production. From the presented habilitation certificate of the candidate, I accept all the attached contributions, which I would group as follows:

1. **Original contributions**

- *Innovative approaches in establishing genetic variability in local, spatially distant natural fish populations.*

A 1141 bp stretch of mtDNA containing the cytochrome b coding sequence of whitefish from the Caspian, Baltic, Azov, Aral and Aegean basins was analyzed. It was established that all identified haplotypes belong to haplogroup A. A significant scientific contribution was the discovery of new haplotypes of haplotype group A - three new haplotypes were found in fish from the Caspian Sea, one - in the Srdarya River sample. Another, so far undescribed haplotype was found in one individual from the Don and in all examined individuals from the White Sea Basin (Bulgaria).

- *Innovative approaches in processing fish into healthy quality products.*

The effect of incorporating dry distilled rose (*Rosa damascene* Mill.) petal extract

(DDRPE) into an edible alginate coating of paddlefish (Polyodon spathula) meat was elucidated (G7-17). As a result, it was found that the use of alginate coating with 2% DDRPE solution preserves the freshness of paddlefish meat for up to 7 days at 0 - 4°C.

- *Integrated breeding of fish and ducks - an innovative approach to increase the ecological and biocompatibility of carp farming.*

The main elements of integrated technology - fish and ducks subject to optimization - are highlighted. For the first time in Bulgaria, at the Institute of Fisheries and Aquaculture - Plovdiv, a complex scientific study was carried out for the integrated breeding of fish and ducks in carp pools. It was found that in integrated farming, the influence of ducks on the growth of annual carp is closely related to the area of the fish breeding ponds. The influence of integrated fish and duck farming on the biogenic elements in the fish breeding ponds has been established. Integration was found to have a positive effect on slaughter performance in fish, and original data were obtained on the relationship between the carrying capacity and egg weight of Peking ducks from a local population reared under environmentally friendly and biocompatible fish-integrated technology.

- *Studies of sturgeon fish cultivated under conditions of super-intensive industrial cage technologies.*

As a result of the studies, original data were obtained for species and hybrids that are important for the world sturgeon breeding, in particular for: the technological qualities of the meat; the dynamics of gonadal development in male and female individuals; the peculiarities of morphometric indicators in male and female individuals; sperm characteristic. Original data were obtained on the seasonal dynamics and age characteristics of testicular development in 5- and 7-year-old Russian sturgeons and 7-year-old hybrids (F1 *Acipenser baerii* x *Acipenser gueldenstaedtii*) reared in industrial cage farms. Original data were obtained on ejaculate volume, sperm concentration, total sperm motility, motility and motility characteristics, essential enzyme levels, in the seminal fluid of a hybrid (F1 *Acipenser baerii* x *Acipenser gueldenstaedtii*) at seven-, eight- and nine- year old, when grown in cages.

2. Methodological contributions

- *Innovative approaches in feeding cultured fish.*

In connection with reducing the use of fishmeal in aquaculture, indigenous plant feeds with a high protein content are being tested. Thus, original data were obtained on the use of protein feeds distributed in Bulgaria when feeding carp.

3. Applied Contributions

- *Diversification of species in Bulgarian aquaculture.*

Prospective species for aquaculture were studied - white fish and paddlefish in the formation of polyculture. The study of genetic structure and genetic variability in spatially distant, isolated populations provides information on the ana- and cladogenesis of species. The possibility of applying edible coatings, which are used to reduce moisture loss and inhibit oxidative processes in muscle tissue, and in combination with antioxidants to extend the shelf life of the meat, has been studied in the paddlefish.

- *Strategic planning in Bulgarian aquaculture.*

An in-depth scientific analysis of the state of aquaculture in Bulgaria, including the processing and marketing of the products, was made by a team of scientists and practitioners in our country. A strategy has been developed for the development of the

sector with detailed approaches.

- Study of opportunities for applying ecologically and biocompatible technologies in monocultural and polycultural fish farming, as well as opportunities for introducing organic production.

A complex study of fish farming in polyculture and monoculture was conducted and original data were obtained on the growth of fish forming the polyculture and the influence of individual factors of the aquatic ecosystem on fish productivity, as well as a number of issues related to the complex interaction of individual factors between them The productive qualities of juvenile carp during its cultivation in conditions of a low degree of production intensification have been studied. A structure of autochthonous biological polyculture has been developed, including carp fish, which are essential for Bulgaria and providing good conditions for all species, components of the polyculture. Original data were obtained on the dynamics of the development of bacteriop-lankton in fish breeding ponds, when using autochthonous carp poly-culture. Original data on hematological indicators of different carp fish species cultured in polyculture were obtained.

7. Critical notes and recommendations

I have no critical remarks about the candidate. My recommendation to Associate Professor Nikolova is to write and defend a large doctoral dissertation, because she has the necessary qualities and merits for this scientific degree.

8. Personal impressions and opinion of the reviewer

My personal impressions of Associate Professor Lyudmila Nikolova are that she is a well-established scientist in the field of aquaculture, an erudite teacher and a good person.

CONCLUSION

Based on the analysis of the pedagogical, scientific and scientific-applied activities of the candidate, I believe that Assoc. prof. Lyudmila Nikolova meets the requirements of the ŽRASRB, PPZRASRB and the Regulations of the Agrarian University for its application. Proof of this is her purposeful research work with original scientific and applied contributions, as well as her teaching commitment.

All this gives me reason to positively evaluate her overall activity.

I take the liberty of proposing to the honorable Scientific Jury to also vote positively, and the Faculty Council of the Faculty of Agronomy at the Agrarian University - Plovdiv to elect Assoc. prof. Lyudmila Nikolova as "Professor" in the scientific specialty Aquaculture, Fish Farming, Fish Farming and Industrial Fishing .

Date: 18.10.2023

Plovdiv

REVIEWER:.....

(prof. K. Velichkova)