REVIEW

regarding the competition for "Professor" in the scientific specialty "Aquaculture, fish farming and industrial fishing", announced in SG, no. 62 of 21.07.2023, with candidate Assoc. Dr. Lyudmila Nikolaevna Nikolova, from the AGRICULTURAL UNIVERSITY, PLOVDIV, appointed according to Order No. RD 16/897 of 25.09.2023 of the Rector of the Agricultural University - Plovdiv as a member of the scientific jury

Reviewer: prof. Dr. Vasil Kostadinov Atanasov, DSc; Faculty of Agriculture at Trakia University, Stara Zagora; Registered at the National Centre for Information and Documentation with scientific rank „Doctor of agricultural sciences", Professional field 6.3. „Animal Husbandry" and "Professor" in Professional field 4.3. "Biological sciences" Scientific specialty "Biochemistry" appointed as a member of the scientific jury by order No. RD 16/897 of 25.09.2023 of the Rector of the Agricultural University.

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

One candidate participated in the competition - Assoc. prof. Ph.D. Lyudmila Nikolaevna Nikolova. Assoc. prof. Nikolova was born on 05.11. 1965 in the city of Kharkov. He graduated from the Zoo Veterinary Institute. Borisenko / Zooveterinary Academy - Kharkov/, Ukraine in 1988. In 1995, he completed his master's degree at Sofia University "St. Kliment Ohridski", Faculty of Biology, specialty "Biology and Chemistry" - Pedagogical qualification. In the period 1995-1998, he was a Zooengineer in the Department of Animal Husbandry at the Agricultural University - Plovdiv. In the period 1998-2011, he worked at the Institute of Fisheries and Aquaculture - Plovdiv, SSA successively as Research Associate III degree - 1998; Research associate II degree – 2000; Research associate I degree - 2004. In 2003, he successfully defended his doctoral dissertation on the topic "Study of some technological elements of ecological and biocompatible technology of integrated fish and duck farming in fish breeding ponds", after completing his doctoral studies at the University of Thrace. In 2011, he qualified as an associate professor in the field of "Fish farming, fish farming and industrial fishing". In the period 2011-2014, he participated in the Scientific Council of IRA-Plovdiv and Agricultural Institute - Stara Zagora at the SSA. In 2013 - 2014, she was the Director of VID at IRA-Plovdiv, after which she moved to work at the Agricultural University - Plovdiv, Faculty of Agronomy, Department of "Livestock Sciences" as an associate professor, where she has been working until now.3. Fulfillment of the requirements for holding the academic position "Professor".

2. General description of the presented materials.

In the competition for "Professor" Associate Professor Lyudmila Nikolaevna Nikolova participated with a total output of 40 papers, grouped as follows:

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

- Publications related to the doctoral dissertation - 1 number, which are not subject to consideration;

- Group B*. 4. Habilitation thesis - scientific publications in publications that are referenced and indexed in world-famous databases with scientific information - 12 issues*

Group D*. 7. Articles and reports published in scientific publications, referenced and indexed in world-famous databases with scientific information - 17 items.*

D.8. Articles and reports published in non-refereed peer-reviewed journals or published in edited collective volumes - 10 nos.

Group E*. Published university textbook – 1 pc. /Organic animal husbandry/*

Published university textbook - 1 pc. / Manual for laboratory-practical classes on the reproduction of farm animals/

Other works *on the nomenclature specialty, outside the above-mentioned sections - 36 items. + 5 pcs. Almanacs and resources related to aquaculture in Bulgaria.*

Assoc. prof. Dr. Lyudmila Nikolova has repeatedly exceeded the Minimum required points by groups of indicators for the academic position "professor" regulated by the National Centre for Information and Documentation. With the required 550 points, the candidate submits 1,533.9 points, which is evident from table 1.

Table 1. Minimum national required points by groups of indicators

Group of indicators	***Contents***	***Professor***	***Lyudmila Nikolova***
А	Indicator 1	50	**50**
Б	Indicator 2	-	**-**
В	Indicator 3 or 4	100	**267**
Г	Sum of indicators from 5 to 12	200	**249.97**
Д	Sum of indicators from 13 to 15	100	**550**

E	Sum of indicators from 16 to the end	100	**416.93**
Total number of points in the main criteria		550	**1 533.9**

Its total number of points on the main criteria exceeds three times the minimum national requirements.

My general impression is that Assoc. prof. Dr. Nikolova's documentation is arranged with skill and competence, and her assets exceed many times the reference values.

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

According to the stated research interest and method of exposure, scientific production of Assoc. prof. Dr. Lyudmila Nikolova covers research in the field of sustainable aquaculture, with particular emphasis on ecological and biocompatible technologies in warm water fish farming. In my opinion, it is in the following directions:

I. Study of the possibilities of applying ecologically and biocompatible technologies in polycultural and monocultural fish farming and the possibilities of introducing biological production. In this direction, within the scientific project led by the candidate ("Study of the possibilities of introducing biological production in warm water fish farming under the conditions of Bulgaria"), scientific project and other tasks ("Study of the structure of the total fish productivity at different stocking densities of carp, for the needs of organic fish farming.", "Study of the productive qualities of juvenile carp under conditions of low production intensification.", "Growing of carp species in polyculture in a warm water dam"), and the co-management of doctoral dissertation, complex studies of various technological solutions for raising carp fish in polyculture and monoculture were carried out.

II. Integrated breeding of fish and ducks, as an innovative approach to increase the ecological and biocompatibility of carp farming. In this direction, it has been established that a number of tasks for sustainable ecological and biocompatible warm water fish farming are solved through the integration. For the first time in Bulgaria, at the Institute of Fisheries and Aquaculture-Plovdiv, a complex scientific study was carried out on integrated fish and duck farming in carp pools (G7-1; G7-2; G7-3; G7-5;

G7-9; D7-10; D8-4; D8-5).

III. Innovative studies of sturgeon fish cultured under conditions of super-intensive industrial cage technologies. In this direction, under the direction of the candidate, a large-scale complex scientific project in the field of sturgeon farming was developed for the first time in Bulgaria "Productive and functional qualities of species and hybrids of the family Acipenseridae when reared for meat under the conditions of super-intensive technology in Bulgaria."

IV. Innovative approaches in feeding cultured fish. In connection with the apogee reached in sea catches and a global shortage of fishmeal, work has been done on this current scientific direction to reduce the use of fishmeal in aquaculture. Emphasis is placed on using affordable, locally sourced, high-protein plant feeds;

V. Diversification of species in Bulgarian aquaculture. In this scientific direction, the researches are directed at promising species for aquaculture - white fish (G7-14) and paddlefish (G7-17). The two species are suitable for applying innovative approaches in the formation of polyculture, and there is interest in the white fish in the development of super-intensive technologies;

VI. Innovative approaches in establishing genetic variability in local, spatially distant natural fish populations. In this scientific direction, a section of mtDNA with a length of 1141 bp was analyzed, containing a sequence encoding cytochrome b in white fish from the Caspian (53 individuals - sea, 57 - Volga, 6 - Kura and Arax), Baltic (36 - Chudsko Lake), Azov (9 - Don), Aral (5 - Sardary) and Aegean (31 - Kardzhali, Pyaschnik, Zhrebchevo dams) basins;

VII. Innovative approaches in processing fish into healthy quality products. In this direction, the effect of incorporating dry distilled rose petal extract (*Rosa damascene* Mill.) (DDRPE) into an edible alginate coating of paddlefish (*Polyodon spathula)* meat was elucidated (G7-17).

The above-mentioned scientific directions have been the object of development by Associate Professor Dr. Nikolova in a number of scientific projects. According to the applicant's attached reference, a total of 370 points are received for leadership and participation in scientific and educational projects. Participation in 10 national and 3 international projects, as well as management of 4 national and 1 international project are presented. This fact demonstrates the candidate's ability to organize and lead the work of research teams, which is a very good certificate for her as a researcher and university teacher.

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

The presented five-year report on the candidate's classroom employment shows the high workload of Associate Professor Dr. Nikolova, who taught between 568 and 841 teaching hours during the specified period. In my opinion, this is the reason for the certain delay in the career growth of the candidate. On the other hand, it is proof that Prof. Nikolova is a highly valued teacher, established pedagogue and respected colleague in the scientific circles of the Agricultural University - Plovdiv. Proof of this is the number of graduated graduates / 10 nos. bachelors and 10 masters/ and doctoral students /2 pcs./, which also shows her affinity for working with young people and caring for their scientific growth. In my opinion, Associate Professor Nikolova has a highly professional pedagogical training and academic culture and is the preferred supervisor for graduates and doctoral students. She is a valuable consultant and reviewer with her professional expertise not only at the Agricultural University, but also outside the borders of the university and the country.

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

The candidate for professor has achieved significant scientific results, highly valued by the collegium at home and abroad. Associate Professor Nikolova has published in: Prestigious scientific journals, referenced and indexed in world-famous databases with scientific information - 12 issues; Articles and reports published in scientific publications, referenced and indexed in world-famous databases with scientific information - 17 items; Articles and reports published in non-refereed peer-reviewed journals or published in edited collective volumes - 10 nos.

In addition, Associate Prof. Nikolova has implemented the following activity:

- Participation in international scientific forums - 35 conferences; 67 reports.
- Participation in national scientific forums in Bulgaria - 3 conferences; 5 reports.

The total impact factor of the presented works of Assoc. prof. Dr. Lyudmila Nikolova is **1.632**, and the **total impact rank** is **1.688**.

With the required 100 points out of the ones cited under indicator D, Associate Professor Nikolova submitted 550 points, which many times exceeds the minimum national requirements.

The citation index (h-index, according to SCOPUS) of the candidate in the competition for the academic position "Professor" is: **4.00**

In addition to the fact that Assoc. Dr. Lyudmila Nikolova exceeds several times the minimum national requirements of NACID for the competition, she also achieved a good Hirsch index. In my opinion, this is a solid certificate proving the wide popularity and importance of the scientific results achieved and the contributions made in them.

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;

Despite the diversity of her research work, Assoc.prof. Dr. Lyudmila Nikolova has a clearly defined profile and direction of her research activity to find innovative solutions in the field of sustainable aquaculture, with particular emphasis on ecological and biocompatible technologies in warm water fish farming. As a result of his long-term research work, the candidate has achieved significant results in the following scientific areas:

I. ORIGINAL CONTRIBUTIONS

□ **Study of the possibilities of applying ecologically and biocompatible technologies in polycultural and monocultural fish farming and the possibilities of introducing biological production**. Original data of a scientific and scientific-applied nature were obtained on the growth of the individual species forming the polyculture, on the influence of individual factors of the water ecosystem on fish productivity, and a number of issues related to the complex interaction of individual factors with each other in warm water basins were clarified. us (B1; B2; B3; B4; B5; D7-6; D7-7; D7-8; D7-12; D7-13); with the cultivation and propagation of main types of carp fish in warm water reservoirs in Kazakhstan (G7-15, G7-16);

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

A complex scientific study was carried out for the integrated breeding of fish and ducks in carp pools (G7-1; G7-2; G7-3; G7-5; G7-9; G7-10; G8-4; G8-5). By evaluating and analyzing the results, the optimal parameters of a number of technological elements (area of the pools, overgrowth, number and genotype of birds, etc.) have been established, for different options and technological schemes (planting structure, age of the fish, number turnovers, etc.) of the integrated production.

□ **Innovative approaches in feeding cultured fish. In this current scientific direction, valuable applied results have been achieved in reducing the use of fishmeal in aquaculture**. Emphasis is placed on using locally available, high protein plant forages. In comparative studies, original data were obtained on the use of protein

feeds distributed in Bulgaria when feeding carp (G8-6);

 Diversification of species in Bulgarian aquaculture. In this scientific direction, original scientific and applied results were achieved in relation to two promising species for aquaculture - white fish (G7-14) and paddlefish (G7-17). The genetic structure and genetic variability in spatially distant, isolated populations have been studied, which provides information on the ana- and cladogenesis of species - an important part of research in modern ichthyology. The genetic variability in local, spatially distant natural populations of whitefish has been established, which enables a scientifically based approach in the formation and management of parent stocks intended for aquaculture farms with different levels of intensity. 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.

II. METHODOLOGICAL CONTRIBUTIONS

 Innovative studies of sturgeon fish cultivated under conditions of super-intensive industrial cage technologies. In this direction, under the leadership of the candidate, for the first time in Bulgaria, a large-scale complex scientific project was developed for the introduction of new breeding methods in the field of sturgeon breeding. As a result of the studies, for the main species and hybrids for the world sturgeon breeding, original data were obtained, in particular on the influence of the cultivation technology on: the technological qualities of the meat (B6); the dynamics of gonadal development in male and female individuals (B7; B8); the peculiarities of morphometric indicators in male and female individuals (B9; B10); sperm characteristic (B11; B12). In this field, under the supervision of the candidate, a doctoral dissertation was developed and defended, preparing for a second defense;

 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 for the development of the sector has been developed with detailed approaches for solving the tasks (D8-1).

III. SCIENTIFIC CONTRIBUTIONS

 Innovative approaches in establishing genetic variability in local, spatially distant natural fish populations. In this scientific direction, original scientific contributions were achieved by analyzing a section of mtDNA with a length of 1141 bp

containing a sequence encoding cytochrome b in whitefish from different populations. All identified haplotypes were found to belong to haplogroup A. Haplotype A (Slucb2) dominated in all samples except the Aegean. Haplotype A1 (differing from A by one substitution), distributed in water basins of Central Europe, was found only in Lake Chudskoye. The less common A2 (Slucb1), differing by 3 substitutions from haplotype A (Slucb2), is found in most of the Ponto-Caspian samples. A significant scientific contribution is the discovery of new haplotypes of haplotype group A. They differ by single substitutions from the main A and A2 haplotypes: 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). This haplotype is transitional between haplogroups A and B. In this way, the absence of haplotypes dominant in other parts of the range makes whitefish from the studied dams in Bulgaria genetically unique (G7-14).

IV. APPLIED CONTRIBUTIONS

□ **Innovative approaches in processing fish into healthy quality products.** In this scientific-applied direction, the effect of including dry distilled rose petal extract (Rosa damascene Mill.) (DDRPE) in an edible alginate coating of paddlefish (Polyodon spathula) meat has been elucidated (G7-17). By studying changes in pH; acid number; peroxide number; TBARS, color characteristics and microbial changes in fish, it was found that the use of alginate coating with 2% DDRPE solution preserved the freshness of paddlefish meat for up to 7 days at 0 - 4°C.

7. Critical notes and recommendations

With the exception of some grammatical inaccuracies, I have no significant comments on the contest materials.

I recommend the continuation of research in the field of sturgeon farming.

8. Personal impressions and opinion of the reviewer

I have known Ass.Prof. Dr. Lyudmila Nikolova from the very beginning of her scientific career, as she completed her doctoral studies at Thrace University. She is a highly ethical colleague with an academic demeanor, an established educator and a sought-after specialist in the field of aquaculture. She is known by colleagues in the industry not only in our country, but also abroad. I believe that the candidate already has the personal characteristics of a professor worthy of the college of the Agricultural University, Plovdiv.

9. Conclusion

The scientific production presented by Assoc. prof. Dr. Lyudmila Nikolaevna Nikolova fully covers the requirements for a professor, referred to in the Law on the Development of the Academic Staff in the Republic of Bulgaria /ZRASRB/, PPZRASRB and the Regulations of the Agrarian University for its application and the minimum national requirements of the NACID in accordance with Art. 2b, para. 2 and 3 of ZRASRB. In my opinion, the candidate's research activity makes a number of significant contributions in the field of fish farming, as well as aquatic biochemistry, sturgeon farming, poultry farming and biological aquaculture. New technological solutions for the multitrophic cultivation of aquatic organisms were developed, original production systems in the field of aquaculture were proposed, the productivity and meat quality of hydrobionts grown under different production conditions were studied. As a result of interesting ecological-biochemical and physiological studies, important solutions for ecologically and biocompatible warm water fish farming have been proposed.

All this gives me reason to positively evaluate her overall activity. Based on the analysis of the pedagogical, scientific and scientific-applied activities of the candidate, I recommend to the respected members of the Scientific Jury and the Faculty Council at the Faculty of Agriculture at the Agricultural University - Plovdiv to award the academic position to Assoc. prof. Dr. Lyudmila Nikolaevna Nikolova "PROFESSOR" in the field of higher education 6. Agricultural sciences and veterinary medicine, in a professional direction 6.3. “Animal husbandry”, scientific specialty "Aquaculture, fish farming, fish farming and industrial fishing".

30.10.2023. Signature: .....

Stara Zagora /Prof. DSc Vasil Atanasov/