

Peculiarities of the chemical composition of juveniles of rainbow trout during cultivation in a plant with a closed cycle of water supply

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Keywords: aquaculture, biotechnology, closed water supply installations, rainbow trout, chemical composition, spring water.

Abstract

In the Middle Volga region, the development of farming hatcheries is promising and corresponds to the main trends in the development of regional aquaculture. The creation of integrated innovative biotechnological complexes will allow not only to restore the qualitative state of the region's aquatic biological resources through the production of valuable fish species and the directed formation of ichthyofauna of natural reservoirs but also to create modern commodity fish farms. Among the most promising species of aquaculture cultivation are rainbow trout and its species. When choosing the objects of cultivation, it is necessary to take into account the features of water sources. In a number of regions of the Republic of Tatarstan, for example, in the Bugulma district, numerous spring waters that extend to the surface along rivers and gully systems can contribute to the development of trout farming. They can be used as cascade pond systems. The article presents the results of a study of the features of the composition of spring water in the Bugulma district of the Republic of Tatarstan in the region of the small river Bugulminka. The temperature of the spring water was 7.9-8.4 °C. The dissolved oxygen content in spring water was 5.86-5.94 mg/l, the pH of the spring water was 7.3-7.68, the redox potential (ORP) of spring water was from -18 to -40 mV. These characteristics affect the water masses of water bodies, changing the quality of surface water.

Taking into account the possibility of using water from various sources in trout farming, the chemical composition of juveniles of rainbow trout was studied under conditions of growing in installations with a closed cycle of water supply working on different water. It is shown that the chemical composition of trout when grown in aquaculture depends on the composition of water. Trout contained on the same feed, but on different water has significant differences in the chemical composition, for example, the Volga water is characterized by high concentrations of copper, respectively, copper concentration in trout increased compared to the initial, grown on artesian water in the Moscow region. Data on the composition of macronutrients in dry matter of rainbow trout indicate a relative decrease in the concentration of calcium with age, the level of phosphorus and potassium content persist high. In the samples of young trout studied, the concentration of lead was 0.054-0.57 mg / kg, arsenic, cadmium and mercury were absent, the elements dangerous for health did not exceed the permissible level.

References

- [1] M.L. Kalayda. Aquaculture as a basis for improving water quality in the Republic of Tatarstan. *Bulletin of SC SVA*. 2016. No.3(29). P.115-122. (russian)
- [2] M.L. Kalayda. The current state and tasks of aquaculture development in the Republic of Tatarstan. Status and development of aquaculture in the Russian Federation in the light of import substitution and ensuring the country's food security: materials of the National Scientific and Practical Conference, Saratov, 4-5 October 2016 Saratov pub. «Science book». 2016. P.38-45. (russian)

- [3] M.L. Kalayda, N.N. Khazipov, R.R. Safiullin, R.G. Nabiullin, L.T. Akhmetova, A.A. Kalayda, D.S. Dementiev. Development of fodder production is the most important task of development of aquaculture in the Republic of Tatarstan at the present stage. Status and development of aquaculture in the Russian Federation in the light of import substitution and ensuring the country's food security: materials of the II National Scientific and Practical Conference, St. Petersburg, 13-15 September 2017 under edition of A.A. Vasiliev. *Saratov: «CSAin» Open Company*. **2017**. P.48-55. (russian)
- [4] M.L. Kalayda, and D.S. Dementiev. The quality of water as important section of trout fish farming development in Middle Volga region. *Butlerov Communications*. **2017**. Vol.49. No.1. P.145-152. ROI: jbc-02/17-49-1-145
- [5] M.L. Kalayda. History and prospects of development of the fish industry of Tatarstan. *Kazan: publ. Comp. «Matbugat Yorty»*. **2001**. 96p. (russian)
- [6] Raw materials and food products. Sample preparation. Mineralization to determine the content of toxic elements: GOST 26929 – 94. Approved 21.02.95. *Moscow*. **1994**. 12p. (russian)
- [7] M.L. Kalayda, and M.F. Khamitova. The possibilities of application of eichornia in the purification of the waters of pulp and paper mill. Part 1. The specificity of chemical composition of the water in the Volga reach of the Kuibyshev reservoir. *Butlerov Communications*. **2015**. Vol.44. No.11. P.97-103. ROI: jbc-02/15-44-11-97
- [8] M.L. Kalayda, and Al-BachryWaleed Sami Jawad. Comparative characteristics of the chemical composition of water in the Tigris River in Iraq and the Volga River in the Republic of Tatarstan. *Butlerov Communications*. **2016**. Vol.46. No.4. P.47-53. ROI: jbc-02/16-46-4-47
- [9] B.B. Lavrovsky. Recommendations for the use of systems with recycled water supply for industrial production of young rainbow trout. *Moscow: TAA*. **1980**. 29p. (russian)
- [10] Norms of physiological needs in energy and nutrients for various groups of the population of the Russian Federation. Methodical recommendations. MR 2.3.1.2432—08. *Official publication Moscow*. **2009**. 37p. (russian)
- [11] Nutritional value, chemical composition and calorie content. Trout, rainbow, bred, fish, raw. Intelmeal. [Electronic resource]. Access mode: <http://www.intelmeal.ru/nutrition/foodinfo-fish-trout-rainbow-farmed-raw.php>