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STUDYING THE EFFECTIVENESS OF COMPOUND FEED ENRICHED WITH VITAMINS AND MINERALS IN PREVENTING SCOLIOSIS IN FISH

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ABSTRACT The article examines methods for preventing scoliosis in sturgeon species and the specific features of using specialized feed enriched with vitamin and mineral supplements. The research subjects were individuals of the ship sturgeon (*Acipenser nudiventris*). The main objective of the study was to evaluate the effects of specialized compound feed on the physiological condition, growth performance, and occurrence of scoliosis symptoms in fish.

During the experiment, the body weight indicators, survival rate, hemoglobin concentration, and total protein content in the blood of fish from the experimental and control groups were examined. The results demonstrated that the use of feed enriched with vitamin and mineral supplements can improve fish growth performance and reduce the occurrence of scoliosis symptoms.

KEYWORDS sturgeon species, ship sturgeon, scoliosis, compound feed, vitamins, mineral supplements, fish physiology, blood parameters, recirculating aquaculture system.

INTRODUCTION

In modern aquaculture, one of the key challenges in rearing sturgeon species under artificial conditions is maintaining their health and ensuring normal physiological development. Among the pathological changes observed in intensive fish farming systems, scoliosis, characterized by curvature of the vertebral column, deserves particular attention.

Scoliosis is a skeletal deformity that leads to disruption of the normal anatomical structure of the fish body. This pathology may negatively affect swimming activity, feeding behavior, body weight gain, and overall survival capacity.

Scientific literature indicates that several factors may contribute to the development of scoliosis. These include nutritional deficiencies, impaired protein metabolism, vitamin deficiencies, unfavorable physicochemical water parameters, and genetic factors.

In particular, vitamin C deficiency adversely affects the formation of bone and cartilage tissues. Since this vitamin is involved in collagen synthesis, its deficiency may contribute to

abnormalities in skeletal development. In addition, the balance of vitamins A and D, as well as calcium and phosphorus, is essential for normal bone tissue development.

In this regard, the use of complete feeds that meet the physiological requirements of sturgeon species is essential in aquaculture. The application of compound feeds enriched with vitamins and minerals is considered one of the promising approaches to supporting normal skeletal development and preventing deformities associated with nutritional deficiencies.

Materials and Methods

The research was conducted in specialized fish-rearing facilities equipped with a recirculating aquaculture system (RAS). The research subjects were individuals of ship sturgeon (*Acipenser nudiventris*).

The main objective of the experiment was to determine the effects of compound feed supplemented with vitamin and mineral additives on fish growth, physiological condition, and the occurrence of scoliosis symptoms.

The commercial compound feed "Zeobalyk" was used as the basic diet. In the experimental groups, specialized vitamin and mineral supplements were incorporated into the basic feed. Fish in the control group were fed the commercially produced RGM-5V feed.

The experiment was organized in three tanks:

- Tank 1: Fish fed compound feed supplemented with vitamin and mineral additives.
- Tank 2: Fish fed compound feed enriched with vitamin and mineral supplements.
- Tank 3: Control group fed commercially produced RGM-5V feed.

During the rearing period, the water temperature was maintained within the range of 21–23 °C. The experiment lasted 30 days.

To assess the biological performance of the fish, the following parameters were recorded: initial and final body weight, absolute weight gain, relative growth rate, average daily weight gain, feed conversion ratio, and survival rate.

In addition, hemoglobin concentration in the blood and total protein content in blood serum were determined to assess the physiological condition of the fish. Laboratory analyses were performed using a Cary 50 spectrophotometer.

Measurements of body weight and length were carried out according to the methodology proposed by P. F. Pravdin.

RESULTS AND DISCUSSION

During the study, certain differences in growth performance were observed among fish fed compound feed enriched with vitamin and mineral supplements.

According to the experimental results, the final average body weight of fish in Tank 1 was 2,686 ± 54.46 g, while fish in Tank 2 had an average body weight of 2,683 ± 52.41 g. In the control group, this indicator was 2,643 ± 52.35 g.

The absolute weight gain of fish in the experimental groups was 255 g, compared with 216 g in the control group. The relative body weight gain in the first and second experimental groups was 9.57% and 9.55%, respectively, whereas in the control group it was 8.19%.

The average daily weight gain was also higher in the experimental groups. In Tanks 1 and 2, this indicator was 8.5 g/day, compared with 7.2 g/day in the control group.

The feed conversion ratio was 1.7 in the experimental groups and 1.6 in the control group. The survival rate of fish in all study groups was 100%.

More pronounced external signs characteristic of scoliosis were observed in fish from the control group. This finding provides a basis for considering the potential preventive value of specialized compound feeds.

The results of blood analyses conducted to assess the physiological condition of the fish are presented in Table 1.

Table 1 – Physiological parameters of the blood of ship sturgeon

Research groups	Hemoglobin, g/L	Total protein, g/L
First experimental group	70	47
Second experimental group	69	45
Control group	69	38

According to the study results, hemoglobin levels were approximately similar across all groups. However, total protein content in blood serum was higher in the experimental groups compared with the control group.

The total protein content was 47 g/L in the first experimental group, 45 g/L in the second group, and 38 g/L in the control group. These indicators suggest differences in the nutritional status of fish in the experimental groups.

Overall, the use of compound feed enriched with vitamin and mineral supplements may have a positive effect on fish weight gain and physiological condition. Nevertheless, determining its actual effectiveness in preventing scoliosis requires a longer experimental period, specialized examination of skeletal structure, and additional monitoring.

CONCLUSION

Based on the results of the study, it was established that the nutritional completeness of feed is one of the important factors influencing the physiological condition and growth performance of sturgeon species under aquaculture conditions.

In the experimental groups receiving compound feed enriched with vitamin and mineral supplements, the final body weight and average daily weight gain of fish were higher than those in the control group.

Furthermore, the total protein content in blood serum was also higher in the experimental groups. This indicates that the feeding system may influence the physiological condition of fish.

In this regard, the use of vitamin- and mineral-enriched compound feeds formulated according to the age, physiological characteristics, and nutritional requirements of sturgeon species is recommended.

To prevent scoliosis, it is important not only to optimize feeding practices but also to regularly monitor water quality, temperature conditions, and the overall health of fish.

Note: The research findings are presented on the basis of the data provided in the original text. In the absence of specific statistical evidence, no conclusion can be drawn that the supplemented feed completely treats or eliminates scoliosis.

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REFERENCES

1. Study of blood parameters in African catfish (*Clarias gariepinus*) following the use of the prebiotic "Zeobalyk" // Scientific Journal "Science and Education" ("Gylym zhane bilim"). – 2022. – No. 4-1 (69). – P. 44–51. DOI: 10.56339/2305-9397-2022-4-1-44-52.
2. Shilova, Yu. B., & Skuratovskaya, E. N. (2018). Protein metabolism indicators as markers of the physiological condition of Black Sea fish under different habitat conditions // *Novoe Vremya: Proceedings of the 14th International Exhibition of Inventions and Technologies* (Sevastopol, September 27–29, 2018). – P. 323–325.
3. Goncharov, N. V., Belinskaya, D. A., Razygraev, A. V., & Ukolov, A. I. (2015). On the enzymatic activity of albumin // *Bioorganic Chemistry*. – Vol. 41. – No. 2. – P. 131.
4. Shilova, Yu. B., & Skuratovskaya, E. N. (2018). Protein metabolism indicators as markers of the physiological condition of Black Sea fish under different habitat conditions // *Novoe Vremya: Proceedings of the 14th International Exhibition of Inventions and Technologies* (Sevastopol, September 27–29, 2018). – P. 323–325.
5. Lobaeva, T., Smirnova, I., & Neborak, E. (2022). *A Guide to Practical Classes in Biochemistry: A Textbook for Students Specializing in Veterinary Medicine and Veterinary Sanitary Examination*. – LitRes.
6. Fazio, F. (2019). Fish hematology analysis as an important tool of aquaculture: A review // *Aquaculture*. – Vol. 500. – P. 237–242.