Abstract

Aquaculture has been the fastest growing branch of agriculture for over 70 years. However, the intensification of production processes poses new challenges for breeders and scientists, one of which is a decrease in resistance to stress and infectious diseases in farmed fish. Reducing the impact of stress factors in aquaculture is an important aspect affecting the efficiency and profitability of farming. The introduction of non-antibiotic active substances with immunomodulatory and anti-immunosuppression properties into the fish diet is the most promising solution, both from the point of view of the breeder and the consumer.

This work was aimed at developing the composition of a supplementary feed mixture that accelerates the growth rate of fish and improves immune parameters. For this purpose, feeding experiments were carried out on three species of aquaculture fish: African catfish (*Clarias gariepinus*), hybrid of Russian sturgeon and Siberian sturgeon (*Acipenser gueldenstaedtii*♀ × *Acipenser baerii*♂), whitefish (*Coregonus maraena*). The feed was enriched with mixtures with various proportions of active substances with proven immunostimulating effects and supporting fish development (sodium butyrate, β-glucan and vitamins A, D3, E, K, C). After a 30-day period of enriched nutrition, breeding indicators, intestinal microbiome profile, cortisol level and lysozyme activity, as well as HSP70 gene expression were determined.

Supplementing the diet of selected fish species with the tested composition causes a significant improvement in growth indicators and also survival rate in whitefish. After a period of enriched nutrition, an increase in species biodiversity was found in the examined microbiomes. Moreover, the increase in the number of probiotic bacteria in relation to potentially pathogenic bacteria in the intestines of the tested fish was determined. Dietary supplementation with a selected composition directly and indirectly improves immune parameters in the tested fish species.

Use of the product in commercial fish farming can help reduce the use of drugs and antibiotics in aquaculture by supporting both the development and immune systems of farmed fish.