

POPULAR SCIENCE ABSTRACT

The undoubted advantage of aquaculture is the ability to provide the right amount of animal protein to consumers. One of the easier digestible by the human is the protein derived from fish. In addition, the production of fish fat does not require large amounts of fodder per kilogram of weight gain. Consumption of complete fattening feed in fish ranges from 0.9-1.0 kg of feed per kg of weight gain, while for comparison, in chickens (broilers) the consumption is approx. 1.7 kg of feed / kg of weight gain, in turkeys 2, 3 - 2.4 kg feed / kg weight gain, and in pigs 2.3 - 2.7 kg feed / kg weight gain. At the same time, the steady increase in the consumption of fish and seafood, reaching 20.3 kg per capita in 2016 (FAO, 2018), contributes to the rapid development of the world's aquaculture, where its production from approx. 1 million tonnes in 1950 increased to 80 million tonnes (animal organisms only) in 2016 (FAO, 2018). However, as with any breeding, also in aquaculture there are certain limitations, one of them is the reduction of resistance to infections as a result of many stressors. Due to the simple immune system, fish are more likely to be infected with pathogens than other farm animals. Infectious diseases are one of the causes of losses in modern aquaculture, while the use of antibiotics gives only temporary good results, in the long run it causes an increase in the number of antibiotic-resistant bacteria. Also, the residues of these substances in meat and water significantly limit the possibility of their use, which is why other solutions for modulating resistance to infections are being sought. It is also important to induce a much more efficient and effective use of nutrients, increase survival and the accelerate growth rate. Therefore, it is reasonable to introduce supplementation in the feed in the form of immunostimulants, vitamins and other nutrients supporting the functioning of the immune system and improving the general physiological condition of this group of animals.

The scientific purpose of the project is to demonstrate the positive effect of selected active substances on the growth, development and resistance of fish on the example of African catfish (*Clarias gariepinus*). Based on the literature data, several active compounds were selected, such as β -glucan, butyrate salts and vitamins: C, A, D3, E and K, which are characterized by the desired properties. In addition, the essence of the project is the appropriate and most beneficial composition of the above-mentioned substances in terms of growth and development parameters, survival and immunity of the African catfish.

The project includes a series of studies to identify changes in the intestinal microbiome after fortified feeding of experimental animals. It is assumed that supplementation will cause significant changes in the microbiome towards increasing the number of probiotic bacteria. In addition, expression analyzes of immunity-related genes such as HSP70, IL-1 β and TNF α are also planned. The expected effect of supplementation with selected substances is an increase in the expression of these genes due to the increase in the level of immunity caused by an appropriate composition of immunostimulants. In addition, it is also planned to determine the level of the stress hormone - cortisol in the blood of the fish using the ELISA method. It is assumed that this level will be much lower after the supplementation period due to the presence of substances lowering it. All the tested parameters will probably translate into an acceleration of the growth rate of the tested animal and an increase in resistance to pathogen infections, thus reducing the mortality of the tested fish.