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NEW SUSTAINABLE PROTEIN SOURCES IN RAINBOW TROUT PLANT-BASED DIETS: CONSEQUENCES ON GROWTH PERFORMANCES, FATTY ACID CONTENT AND IMMUNE-STATUS

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The aquaculture sector has been subjected to a huge and sustained development during the last decades. The production of aquafeeds based on fishmeal and fish oils has been a key element in this development. However, the stability of the fishmeal and fish oil production is compromising the sustainable development of aquaculture. To face the decreasing availability of fishmeal and fish oil, the development of the aquaculture sector implied a search for new ingredient sources. As such, plant ingredients are nowadays being commonly incorporated in fish feed, allowing to spare consequent amount of fish meal and fish oil. However, the total replacement of fishmeal and fish oil has not been reached due to negative impacts on feed intake, metabolic and health status, flesh quality and growth performance slowdown.

Single cell protein sources such as yeast protein products could be an alternative solution to complement and mitigate detrimental effects of plant proteins. This was tested in a trial in which rainbow trout juveniles were fed with a plant-based diet (devoid of fishmeal and fish oil), containing 0, 5, 10 or 15% of a yeast protein product (from Phileo Lesaffre Animal Care) for 12 weeks. In addition to yeast, microalgae containing high level of docosahexaenoic acid (DHA, 22:6 n-3) were added to each diet to cover n-3 long chain highly unsaturated fatty acids requirement of the fish.

Mean bodyweight of fish was determined every 3 weeks and at the end of the feeding trial, whole body composition and fatty profiles were determined. Results indicated that yeast protein supplementation may upgrade growth performance of trout fed plant-based diets totally devoid of fishmeal and fish oil by improving feed efficiency and nitrogen retention. Surprisingly, it seems that yeast protein may also improve flesh quality by increasing DHA retention. Studies of cellular and molecular mechanisms are in progress to clarify the role of yeast protein on long chain highly unsaturated fatty acid biosynthesis. Immune status and gut health of the fish were also assessed through histological analyses of distal intestine and mRNA expression level measurements of immune-related genes in distal intestine. Those analyses were complemented by measurement of some plasma immune-related parameters. Results of this study revealed that inclusion of yeast proteins in a plant-based diet enables to improve rainbow trout gut health and global immune status.

In conclusion, the present study highlights the potential benefits of adding yeast protein products in rainbow trout diet devoid of fishmeal and fish oil.

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