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INTRODUCTION OF TORULA YEAST IN RAINBOW TROUT DIET IMPROVED THE EFFICIENCY OF PLANT-BASED DIET AND INFLUENCED IMMUNITY.

Sandrine Skiba-Cassy¹, Elisabeth Plagnes-Juan¹, Frédéric Terrier¹, Anne Surget¹ and Ricardo Ekmay²

¹ Nutrition, Métabolisme et Aquaculture, Univ. Pau & Pays Adour, E2S UPPA, NUMEA, Saint Pée-sur-Nivelle, France

² Arbiom Inc., Durham, North Carolina, USA

Corresponding author: sandrine.skiba@inrae.fr

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The sustainable development of aquaculture is threatened by climate change, which not only affects the availability of raw materials used in fish feed but also the farming conditions, which are becoming increasingly stressful. Nutrition is one of the levers that can be activated to mitigate the consequences of climate change on farmed fish. Yeast extracts not only contain molecules with immunostimulant properties such as beta-glucans and nucleotides, but they are also rich in proteins, which make them interesting as an alternative to fishmeal and to increase fish robustness. Among the yeasts, torula (*Cyberlindnera jadinii*, a teleomorph of *Candida utilis*) is particularly attractive because it can be grown on hydrolysates of lignocellulosic materials, a by-product of the forestry industry and thus do not compete with human food.

In the present project, we evaluated whether the addition of 10% or 20% torula yeast could improve the efficiency of a plant-based diet devoid of fishmeal and compete with 20% fishmeal diet in rainbow trout. The digestibility of torula yeast was measured, and a growth trial was conducted for 12 weeks, after which blood and intestinal samples were collected to analyze immune parameters and intestinal gene expression.

The results indicated that torula yeast had a protein digestibility for trout (93.8%) very similar to that of fishmeal and plant protein concentrates with similar protein content, which make it suitable for trout feeding. Adding 10 or 20% yeast to a plant-based diet significantly improved growth, which seems to be related to a restoration of feed intake. Moreover, the addition of 10% yeast achieved a level of growth comparable to that observed with a diet containing 20% fishmeal. The introduction of yeast also induces an innate immune response in fish, as evidenced by the upregulation of immune genes encoding *tlr2*, *mcsfr*, and *tnfa* and plasma level of lysozyme in a dose-dependent manner.

In conclusion, torula yeast appears to have the potential to enable plant-based diets to compete with fishmeal diets and, in addition, to improve the robustness of rainbow trout by increasing the fish's ability to detect unknown molecules, eliminate pathogens and prepare the fish for an eventual pathogen or inflammatory challenge.

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