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TITLE - A yeast product improves the efficiency of a processed animal protein diet in rainbow trout by modulating the gut response.

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The total replacement of fishmeal (FM) in fish feeds is a major issue for the development of aquaculture. Research efforts have focused on alternative proteins such as plant proteins and processed animal proteins (PAP). However, fishmeal-free diets have not yet proven their efficiency. The use of new functional ingredients such as yeast products appears to be an interesting solution to improve the performance of these diets.

In this study, we compared a PAP-based diet (PAP, 17%) supplemented or not with a yeast extract (YE, 3%) to a fishmeal-based control diet (FM, 19%) in rainbow trout through a digestibility assay and a 12 weeks-growth trial. Growth performances, intestinal histology, immune and inflammatory parameters were analyzed, and mRNA expression on intestine and liver was determined by high throughput sequencing technology.

The diets differed only slightly in terms of nutrient digestibility coefficients which were overall high. Growth performances with PAP diets were lower compared to that obtained with a fishmeal-based diet. However, feeding trout a PAP diet with YE supplementation (PAP+YE) statistically allowed an improvement of animal growth. Moreover, feed intake appeared as the main driver of growth. In the intestine, dietary yeast extract supplementation increased villi size in the proximal part. Plasma immune parameters, including peroxidase and immunoglobulin levels, were significantly higher in fish fed the PAP+YE diet. We also observed that the diets affected the expression of a small number of genes in the gut and liver, mostly related to inflammation, iron transport, or oxidative stress.

In conclusion, the present study demonstrates the ability of yeast extract to improve the performance of fishmeal-free PAP diets in rainbow trout by potentially enhancing nutrient absorption capacity and modulating mechanisms related to gut health.