

Microbes as feed components influence the intestinal microbiome in fish

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Aquaculture is the fastest growing food production system in the world, heavily dependent on industrial manufactured feed. A great challenge in aquaculture is to find nutrient sources not competing with human foods and without challenging ecological sustainability. Single cell proteins, such as microfungi and yeast have excellent nutrient profiles with regards to amino acids and lipids, they grow fast under the right conditions and contain high amounts of protein which makes them an attractive candidate as protein source for feed production to farmed fish. In addition, beside the nutritional components, the cell walls of yeasts and microfungi contain mannans, β -glucans and chitin, which have been shown to possess bioactive properties and positively affect the intestinal health of fish, potentially mediated via the intestinal microbiome. The objective of this study was to determine how a partial replacement of fish meal with the yeast *Wickerhamomyces anomalus*, *Saccharomyces cerevisiae* (the latter included both intact and extracted cells) and the microfungi *Rhizopus oryzae*, influenced the composition of the gut microbiota of rainbow trout (*Oncorhynchus mykiss*) and Arctic charr (*Salvelinus alpinus*). Amplicons of the 16S rRNA genes were generated from intestinal content and sequenced using Illumina MiSeq. Analysis of the sequence data showed that the gut microbiota was dominated by *Leuconostocaceae*, *Lactobacillaceae* and *Photobacterium* which represented between 40 to 60% of the OTU's in all diets. Principal coordinate analysis of the data revealed that replacement of fish meal with yeast and microfungi had a clear impact on the microbiota composition. However, this effect was influenced by the proportion of the replacement. In conclusion, supplement of single cell proteins as replacement to fish meal can induce a change in composition of the intestinal microbiota but this effect is dependent on the proportion of the replacement.