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Usage of yeast as a protein source for fish feeds

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DESCRIPTION

It has been common practise to use yeasts as aquafeed resources for years. Recent years have seen a rise in the use of yeast and the parts of its cell wall as immunostimulants in aquaculture. Different fish species have had their immunological responses, health, and growth performance improved by yeast derived glucans and Mannan Oligosaccharides (MOS). When used in fish feed at modest quantities, yeast can potentially act as an alternate protein source. Yeasts have a favourable Amino Acid (AA) profile and a crude protein concentration that ranges from 40% to 60% (on a dry basis). The exception is methionine, which contains sulphur and is frequently limited when employed as the main protein component in fish feeds. These characteristics make yeasts viable providers of high quality aquaculture protein. However, there are fewer reports in the literature about the use of yeasts as significant sources of protein in fish feeds. According to studies, practical fish feeds with a moderate amount (up to 20%) of yeast support the growth of fish species such Atlantic salmon, rainbow trout, Arctic char, and European sea bass.

Despite the wealth of information on yeast nutrition, there is little information on how fish assimilate yeast nutrients. As diets are designed primarily on digestible nutrients rather than chemical makeup of materials, digestibility values are essential for establishing appropriate matrix values for various constituents in feed formulation. Therefore, determining yeasts' digestibility levels in various fish species is the first step in promoting them as key elements in fish meals. Only a small number of researches, to the authors' knowledge, have shown that yeasts in fish can be digested by nutrients. With the exception of a few researches where the ADC values for yeasts were published, the majority of these studies reported the digestibility values at the diet level.

Although research on the nutritional digestibility of fish yeasts is scant, there are many studies on the nutritional digestibility of other microbial components such microalgae and bacterial meal. These studies generally concluded that fish's reduced digestibility and nutritional bioavailability are mostly caused by the stiff cell wall. This is significant because yeasts, like other microbial components, have hard cell walls that may prevent fish from digesting them. In Atlantic salmon, when treated by autolysis (at 50 °C for 16 h) and microfluidizer (mechanical homogenization), respectively, the protein digestibility of yeasts rose by 60% and 45%. However, the literature currently lacks significant information about the effects of different processing techniques on the nutrient digestibility of non-Saccharomyces yeasts.

The goal of this study was to ascertain how species and DSP affected the ability of yeasts to absorb nutrients in Atlantic salmon. In this experiment, three non-Saccharomyces yeast species were used: *C. jadinii* (CJ), *Blastobotrys adeninivorans* (BA), and *Wickerhamomyces anomalus* (WA). The study also examined the idea that the viscosity and thickness of yeast cell walls are two characteristics that restrict yeast's ability to be digested by fish for its nutrients. Nitrogen solubility, flow cytometry, and viscosity tests were used to verify this. The study also tested the validity of predicting yeast protein digestibility in Atlantic salmon using the *in vitro* digestibility method.