

# Effect of functional ingredients obtained from fermented fish by-product or fish wastewater on safety and shelf-life of amberjack fish balls

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Fish industry already produces a huge amount of wastes and by-products which can represent up to 70 % of the total fish weight. Although most of them are disposed of as waste, these materials are still rich in proteins, lipids and polysaccharides that can be extracted or valorized through technological and biotechnological processes to get functional ingredients applicable in the food industry. Within the framework of the EU project NewTechAqua, and to pursue the goals of a circular economy, two main ingredients, a protein concentrate obtained from fish washing wastewater (PCFW) using pH-shift processing and a fish by-product hydrolysate (FBPH) produced with *Yarrowia lipolytica*, were applied in fish ball formulations made with amberjack minced meat mechanically separated from fish filleting by-products. The aim of the study was to assess the impact of these ingredients on the safety and shelf-life of the new formulated fish balls. In particular, physicochemical parameters (pH and aw), microbial counts (mesophilic bacteria, Enterobacteriaceae, *Escherichia coli*, coagulase-positive Staphylococci, *Pseudomonas* sp., Lactic Acid Bacteria, yeasts, psychrophilic bacteria), safety (presence/absence of *Listeria monocytogenes* and *Salmonella* sp. and biogenic amine content), and volatile molecule profile of the samples were evaluated over time during 20 days of storage at 4 °C in modified atmosphere. While PCFW had a lower impact on

the microbiological characteristics of the product, the addition of FBPH improved the acceptability of the new formulation. In fact, total mesophilic bacteria, Enterobacteriaceae, and *E. coli* reached levels above 7, 4 and 2 Log CFU/g, respectively, after 12 days instead of 8 days, as observed in the control. Moreover, addition of FBPH determined a lower accumulation of biogenic amines and release of off flavors. Overall, this approach that combines different strategies can increase the sustainability of the seafood industry by reducing the amount of waste.