

## BELGIAN BYCATCH FISH SILAGE AS FISH MEAL SUBSTITUTE IN SHRIMP FEED: FISH SILAGE CHARACTERIZATION AND VARIATION

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As of 2015, the EU is gradually implementing a landing obligation for all European fisheries, banning the practice of discarding undersized fish species. Fisheries will be prohibited from selling the undersized fish for human consumption. Therefore, together with the underutilized fish processing byproducts, a market needs to be found to valorize these raw materials. In Belgium, fishery byproducts currently end up as waste or biogas, resulting in the demise of valuable proteinaceous resources. Therefore, a scope determination was conducted to explore the prospects of utilizing byproducts from Belgian fisheries. During this project the production of fish silage for the aquafeed industry will be investigated in the form of a case study – locally produced fish silage as fish meal substitute in shrimp feed. A characterization was made of the quality and stability of fish silage produced from undersized Belgian bycatch. Also, the effect of species variation on fish silage characteristics was determined. Four types of fish silage were produced in triplicate using different combinations of commonly discarded species: plaice, sole, flounder and whiting. Species inclusion levels

were based on estimated discard ratios and variations thereof. Fish silage was produced using formic acid and stored for 3 months with periodic sampling. The low pH (4.1-4.5) created an antimicrobial environment and initiated enzymatic hydrolysis by endogenous enzymes. Initial results suggested that the produced fish silage was comparable to good quality fish meal, consisting of 68.2% ( $\pm 2.5$ ) protein (%DM). However, loss of organic nitrogen due to the hydrolysis process indicates a slight decrease in nutritional value over time, dropping to 60.7% ( $\pm 2.5$ ) protein (%DM). This is also reflected in the increase of total volatile nitrogen (37.4-128.4 mg/100g). Thus, subsequent experiments will focus on processing optimization to increase the stability and quality of the fish silage, followed by substituting fish meal with fish silage at several inclusion levels in *Litopenaeus vannamei* diets. This research is part of the GeNeSys project which incorporates system innovations along the complete value chain. The project strongly encourages transdisciplinary research and close stakeholder participation, allowing for a faster and realistic idea-to-market strategy.