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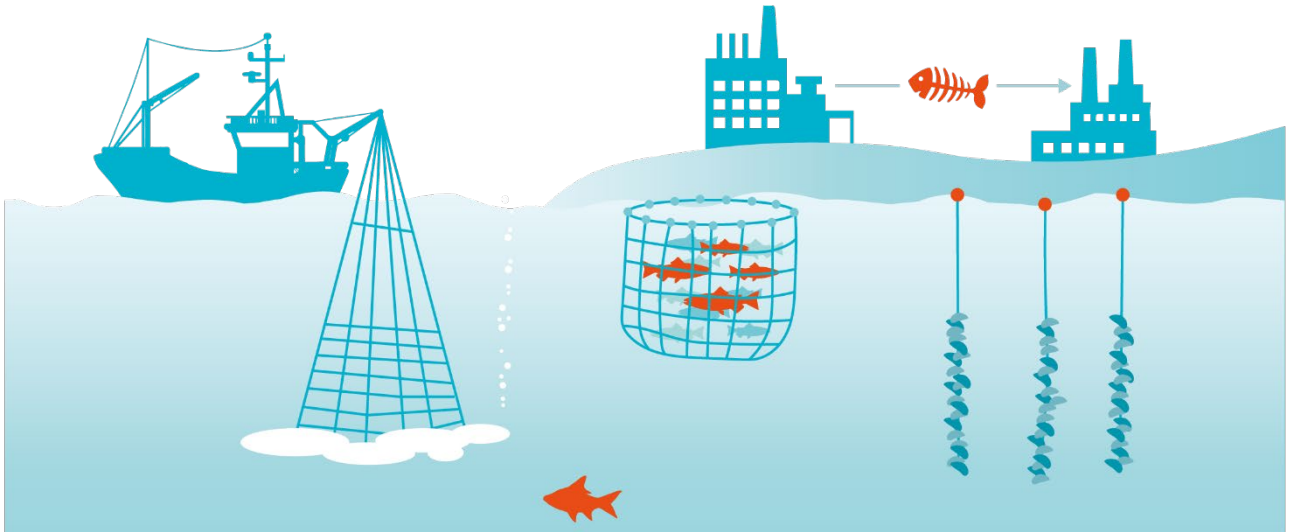
Optimal utilization of seafood side-streams through the design of new holistic process lines

D3.5 Production of mineral based product from fish bones



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Author(s): Carlos Bald, Bruno Iñarra, Jone Ibarruri, Ann-Dorit Moltke Sørensen, Jette Jakobsen, Charlotte Jacobsen.

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1 Executive Summary

The objective of the WaSeaBi project is to solve challenges that prevents more sound exploitation of the aquatic resources. This will be obtained by developing, sorting technologies, storage solutions and decision tools that will secure an efficient, sustainable supply system for by-catches, as well as for solid and liquid side-streams from aquaculture, fisheries and the aquatic processing industries to biorefining operations. This will result in valorisation of these raw materials into marketable products.

By addressing side-streams from different raw materials emerging from typical aquaculture, fisheries and aquatic processing industries in Europe, WaSeaBi will take a whole chain perspective to succeed with high quality production of: i) bioactive peptides for nutraceutical, food and feed applications, ii) protein-based food ingredients, iii) savoury ingredients and mineral supplements for food and feed. WaSeaBi will also construct biorefining approaches and validate selected solutions in pilot scale at the premises of participating companies. The commercial potential of the produced ingredients will be evaluated and specific environmental, economic and social impacts of the proposed solutions will be quantified. Several of the developed technologies will be transferable across seafood companies.

This deliverable reports the main important results on Task 3.5 Mineral products obtained from fish bones from fish processing by chemical and enzymatic hydrolysis of the Work Package 3: Developing and testing (bio) technological processes on lab scale.

Fish bones resulting as a co-product of the hydrolysis process of fish processing side-streams to produce bioactive peptides and flavouring agents were analysed for proximal composition and mineral content. Raw materials used were salmon and cod frames and undersized hake.

For salmon backbones and hake, resulting composition and yield is not affected by the hydrolysis process as long as meat (non-collagenous protein) is properly removed during the process. Bone powders are a rich source of calcium and phosphorus with a significant content in protein from which collagen constitutes the major protein type. Also, other nutrients present in significant quantities. Heavy metals did not exceed the maximum levels in samples of fish bones of salmon and hake analysed. Only cadmium and lead values were found in some samples slightly above recommended levels.

Dried precipitates obtained after enzymatic hydrolysis to generate savoury compounds from cod frames contained higher levels of minerals and were also more bioaccessible compared to the other precipitates isolated from hydrolysis of cod frames.

The bioaccessibility of minerals in the different powders obtained from production of savoury ingredients were similar independent of fish species. In addition, the bioaccessibility of the minerals were neither concentration nor matrix dependent based on the evaluation performed on the cod powder. For comparison to other marketed calcium rich product the bioaccessibility of calcium from the mineral powder was compared to a dietary supplement, which showed that calcium from the mineral powder was significantly less bioaccessible than from dietary supplement. Nevertheless, considering the findings that the powders obtained from enzyme hydrolysis contain high concentrations of Ca and P, the mineral powder is a promising source of Ca and P for human consumption.