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Extraction of Protein from Hoki and Barracouta Fish Heads for Utilisation as Functional Ingredients

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Abstract

Fish heads contain a good amount of protein which can be extracted and used as a functional ingredient in fish products. Like other muscle proteins, fish head protein is composed of the myofibrillar proteins of myosin, actin, tropomyosin and others. Under favourable conditions these proteins, mostly myosin, form a gel network, which is important for a product texture. Hoki and barracouta are abundant in New Zealand. Hoki has great commercial value, but barracouta has a limited use as a fish product due its undesirable dark muscle and bony structure. Both fish muscles are consumed fresh or processed, but the heads are converted to fertiliser. There is no technology currently available which can extract the protein from fish heads for use in a consumer product.

It was not possible to make surimi from the fish heads as surimi is mainly produced from fresh white fish muscle. An alternative was to extract the protein from fish heads by a pH shifting process.

After a review of literature in order to study the protein extraction process by the pH shifting method, a series of initial trials were carried out with hoki head mince. On the basis of the initial trials, further improvements were made in the process in order to increase the protein yield. It was found that the usual pH shifting process extracted only a small proportion of the protein from the fish heads. To increase the yield the process was modified by introducing a high temperature extraction at 80° C for one hour step. Once a desirable amount of protein was recovered the same processes were used to extract protein from barracouta.

The extracted protein was dried and stored for further experiments. Gels were prepared from the dried protein powder and the properties of the gels were evaluated by texture profile analysis and cooking loss. It was found that the alkali process resulted in a significantly higher yield and the extracted protein gave stronger gels with a decreased cooking loss compared to the acid process and control hoki fillet protein powders.

The extracted protein can be added to other fish mince in order to make consumer products and a complete sensory study needs to be done in order to investigate the consumer acceptability. However the extracted protein itself cannot make a complete fish product.

This modified extraction process can potentially be used with other fish or animal byproducts.

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