

SALMON BY-PRODUCT PROTEINS



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SALMON BY-PRODUCT PROTEINS

by

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PREPARATION OF THIS DOCUMENT

This report was prepared as part of the Regular Programme activities of the Fish Utilization and Marketing Service of FAO's Fish Products and Industry Division with the aim to generate and disseminate information, knowledge and experience regarding by-products of salmon.

A responsible and sustainable use of fish resources, whether from capture fisheries or from aquaculture, foresees an efficient utilization of the whole fish including the use of the various by-products generated throughout the processing stage and an extraction of proteins where this is possible. As shown in the report, provided the adequate technology is used, this can have positive effects both from a commercial and a nutritional point of view; and from the world's salmon production from aquaculture expected to grow in the future, the relevance and potential of by-products as a source of protein will only increase.

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ABSTRACT

This Circular describes the potential of by-products from salmon as a source of protein. It lists the main geographic sources of raw material and by-products from salmon aquaculture, namely Canada, Chile, Norway and the United Kingdom of Great Britain and Northern Ireland. It provides an overview of available technologies for preserving the nutritional value of proteins and how to obtain value from their functional properties. A detailed description is provided on the various uses and functions of the proteins deriving from salmon by-products with various cost estimates given for a number of products: hamburger patties, pet food, silage, salmon meal and hydrolysates.

The Circular describes the various markets for protein and the particularities related to the use of salmon by-products as raw material for protein production. It concludes that with adequate and cost-effective technology, by-products from salmon can provide important quantities of protein for the world's protein markets.

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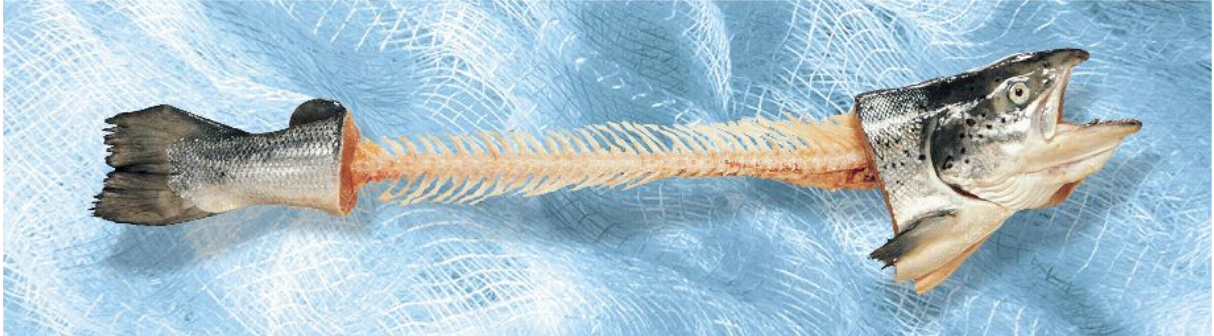
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1. INTRODUCTION

By-products are parts of the fish that are removed before the fish reaches the final consumer in order to improve their keeping qualities, reduce the shipping weight or increase the value of the main fish product. They include blood, viscera, heads, bones, skin, trimmings and fins.

Figure 1: Solid salmon by-product



Source: Alfa Laval

Salmon processors do not really produce by-products; they obtain them after other more valuable products have been separated from the whole fish that they have captured or harvested. Although this is a rather obvious statement, it means that the processor only thinks of by-products as something to get rid of. Depending on volumes and logistics, there are plants willing to pay for them or to provide a disposal service for them.

From a nutritional or food safety point of view, there are important quantities of fats and proteins, which could be used for human nutrition, but are not because of logistical or technological barriers. Therefore, they are mainly used in animal feeds.

Disposal implies a low value for the material being handled, and this is especially the case with mortalities in aquaculture, where the fish have not been prepared to serve as food raw material, i.e. they have not been controlled for illnesses, residual antibiotics or fasting. Furthermore, this resource is very difficult to gather fresh in significant quantities because the farms are located over vast and distant geographical areas. The solutions devised for the disposal of mortalities, therefore, involve technologies that can cope with these restrictions: silage, land filling, specially allocated fishmeal plants, incineration and composting.

When the fish is properly handled and sent to the processing plants to obtain all the range of salmon products – whole gutted fish, headed and gutted weight of fish in kilograms (HG), fillets, steaks, loins, etc. and after that all the possibilities of value addition – a number of by-products remain that could be handled in order to get more value out of them. This is where the plant should continue the processing line following all the requirements for a food product because normally after the most valuable product is obtained, the rest continues along a downgraded path becoming suitable only for feed purposes.

The simplest way of classifying the by-products is through the anatomy of the animal – heads, viscera, bones, skin, tail and fins – which somewhat represents the disassembly line used for processing. Another valuable product, in terms of its components, is the blood from the slaughtered fish, which usually undergoes water treatment at the end of the process, with only a few industries having developed methods to collect it. But from the point of view of

demand, the composition of the by-products could give a better selection on their handling systems in order to keep their nutritional or functional value.

Salmon feed producers were the first to look at oil composition in an effort to find economical sources with the right fatty acid distribution. This is still under discussion, but for the moment it means a high quantity of omega 3 is available in all salmon flesh products. Its human health benefits have been widely promoted, and the industry has been able to extract it. By maintaining its quality, a value-added price premium may be obtained. Nevertheless, the omega 3 content of salmon is lower than in other traditional species, such as sardines and anchovies, whose oil is already being used as nutritional supplements. Oil content in salmon by-products is especially high in the viscera and heads.

Protein composition is more complex because of its chemical structure and functions within the fish itself. The type of tissue involved, its modification possibilities, the amino acid (AA) composition and the bonds to other components make them difficult to separate and use in different applications. The traditional approach has been to use the valuable nutritional properties of the AA balance and produce salmon meal or silage for feed formulations.

Calcium, phosphorous and other bone components are worth considering and are already used in feed preparations, but they could be removed for human consumption, although there is stiff competition from other traditional sources.

2. BY-PRODUCT AVAILABILITY

2.1 Description

The distance that separates producers from markets and the types of markets are the main drivers for by-product generation. There are some market restrictions, such as the European Union protection of its canning and smoking plants, and the higher import duties for Norwegian smoked and canned salmon that encourage fillets, HG or only G salmon exports from Norway, thus reducing the amount left at the processing site. Meanwhile, the high air freight cost for fresh salmon from Chile going to the United States of America forces the exports to concentrate on direct edible parts, leaving large amounts in the country of origin.

Since by-products have always been of secondary importance, there are few statistics available for them and each country has its own approach for calculating them, considering them to be an indirect calculation.