

# Extracting 'gold' from fish and plant waste

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Normally, heat is used to extract oil from fish, but proteins are lost by this process. As part of this project SINTEF researchers have developed a new "two-step" system by which both high-quality oil and proteins can be extracted. Credit: Thor Nielsen/SINTEF

New industrial processing techniques are enabling us to obtain valuable proteins, antioxidants and oils from salmon and rapeseed waste. These extracts can be used in health foods, nutritional supplements and skin care products.

The EU project APROPOS has had as its aim to demonstrate the value inherent in waste food resources which are currently used mostly for animal feed.

Researchers and industrial partnerships around the world have been developing new, industrial processing techniques. Using rapeseed and fish as their basic raw materials, they have succeeded in producing entirely pure fractions, free of organic solvents or additives. Such processes will ensure that valuable proteins, antioxidants and oils contained in waste fish and rapeseed raw materials are not discarded.

## **Valuable raw materials "thrown away"**

Norway produces farmed salmon worth several billions every year. But much of this raw material is discarded during production. Only 50 per cent of the fish mass remains once off-cuts such as heads, dorsal fins and offal are removed.

Industrial rapeseed is produced across huge, bright yellow fields. But only the black seeds are used to produce oil, and large volumes of chemicals are used in the oil extraction process. The remains of the seeds are used for animal feed and as a source of bioenergy.

SINTEF has headed one of the project's seven work packages with the aim of developing a so-called "environmentally-friendly process technology for the exploitation of waste raw materials from fish filleting for human nutrition and [skin care](#) applications."

"We have carried out two processes involving salmon and Nile perch. We have analysed both the oil and proteins from the fish waste raw materials, as well as waste from rape and mustard seeds," says Rasa Slizyte at SINTEF Fisheries and Aquaculture.

In their work, the researchers have employed advanced NMR (nuclear magnetic resonance) techniques, which enable them to monitor the freshness of the fish raw materials in storage. Meanwhile, research partners in Spain have developed a technique for incorporating and stabilising fish proteins in cosmetic creams.

## **Two-step hydrolysis**

The Norwegian researchers have also been working to identify improved methods of extracting high-quality oils. Conventional oil extraction from fish uses high-temperature techniques. However, the heat causes proteins to be lost due to coagulation.

The SINTEF researchers have combined two established approaches. First, the oil is separated at low temperatures, and then a hydrolysis is used to extract the proteins.

"This leaves us with two high-quality products. And the process is very profitable," says Slizyte.

## **Industry interest**

Ten partners from the industrial sector have participated in the APROPOS project. The Norwegian company Nutrimar AS, which is working to exploit waste raw materials supplied by the major salmon producer SalMar in Mid-Norway, has participated as one of SINTEF's industrial and research partners.

Sales Manager Tore Remman says that experience obtained during the project has been very useful.

"We've gained a greater insight into the production process, including

the way in which the raw materials are treated during the heating process. Specific knowledge from the project will be applied in our new factory, which is currently being built on Frøya and will be finished next year," says Remman.

He believes that the new techniques will provide the company with oil, protein and bone fractions of better quality and higher nutritional value than previously.

"This will enable us to offer a number of new products, providing greater value to the company and to our customers. Our aim is to produce high-quality oil and protein products which are ideal ingredients for health supplements and as foodstuff additives," he says.

## **Skin creams from fish and rapeseed extracts**

The Polytechnic University of Catalonia in Spain is currently working to develop skin care components containing fish and rapeseed extracts. The extracts are linked to stable nanoparticles that can remove odours from fish [raw materials](#), and the golden-brown colouring from rapeseed extracts. These are vital details if the products are intended for the cosmetics market.

The university researchers have considered possibilities in the field of inflammation suppression and antimicrobial applications, as well as the occurrence of antioxidants. The next step is to incorporate the fish and rape seed extracts into cosmetic products. The Spanish company TrueCosmetics intends to use the extracts as a foundation for one of its creams.

## **Mustn't taste like fish**

Rasa Slizyte tells us that international research collaboration has provided new insights and valuable networks.

"When it comes to food, countries vary so much in their tastes that it's impossible to use the same technology everywhere," she says. "For example, fish proteins taste of fish. But Europeans don't like this, so the taste must be subdued or removed. On the other hand, our African partners don't see this as a problem. They enjoy the fact that fish tastes like [fish](#)," says Slizyte.

It is important for African countries to make the most of all available food resources because large proportions of their populations are suffering from malnutrition.

Provided by SINTEF

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