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 Aquafeeds

With byproducts, getting more from – and for – fish

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By Hank Hogan

Fishery and aquaculture silage production, collection, logistics all improving



For aquaculture feed manufacturers, fishery and aquaculture byproducts account for about one-third of total raw materials used for fishmeal and fish oil production. Photo courtesy of Cargill Aqua Nutrition.

Increased use of fish trimmings and byproducts in fishmeal and fish oil is an aquaculture win-win-win: a boost to the bottom line, improved sustainability and less – potentially much less – pressure on wild fish stocks. But challenges loom, including logistics and economics.

There is cause for optimism that solutions will be found for these and other issues. In part, this belief arises from improvements already seen.

“Currently about 33 percent of total raw material used annually for fishmeal and fish oil comes from fisheries and aquaculture byproduct. The trend is for increasing utilization,” said Neil Auchterlonie, technical director at **IFFO** (<http://www.iffonet/>), the Marine Ingredients Organisation.

In 2010, IFFO conducted a survey that put byproduct utilization at 25 percent. One reason behind the surge in usage over the last few years is better collection efforts of heads, guts, frames and other filleting waste, Auchterlonie said.

Data from feed suppliers tracks this improvement, although what can ultimately be achieved varies by species. Dave Robb, sustainability manager at **Cargill Aqua Nutrition** (<https://www.cargill.com/animal-nutrition/species/aquaculture>), noted that byproducts contain amino acids, oils, vitamins and minerals – all nutrients fish need. At the same time, byproducts also have a significant portion of bone, as well as higher ash and slightly lower protein than whole fishmeal.

"As a result, for diets with high nutrient densities, such as salmon feeds, we limit the amount of trimmings meal we can use – although the oil can be used freely," Robb said. "For feeds with lower nutrient densities, such as some of the tropical freshwater fish farmed in large numbers, we are able to replace forage fish with marine byproducts completely. This enables us to reduce the pressure on local forage fisheries."



Fish farms like this salmon farm in Scotland are using feeds that include previously underutilized raw materials. Photo courtesy of Cargill Aqua Nutrition.

This decrease on fish stocks can be particularly beneficial in those instances where fisheries are not currently managed sustainably. In the future, byproducts may cut the need for forage fish even further, perhaps significantly.

Michael Tlusty (<https://www.aquaculturealliance.org/advocate/talking-innovation-in-the-cradle-of-aquaculture/?hstc=236403678.d828f5f184efb5d2e792c4be45f08592.1680908168674.1680908168674.1680908168674.1&hssc=236403678.1.1680908168674&hs>) associate professor of sustainability and food solutions at the University of Massachusetts at Boston, is overseeing a prize competition on feeds, the F3 Challenge. He reported innovations that can help ensure non-fish products are available for food.

"These will then be used with trimmings to provide feed without direct harvest of wild fish," Tlusty said.

Progress in this and other byproduct use still faces some significant hurdles, however. Tlusty noted, for instance, there are many restaurants and small processors that cut fish and produce waste. Collecting byproducts from such scattered locations is difficult and likely not a viable business. Until that situation changes by, for example, the development of a small and economical rendering technology, those byproducts will be lost.

What's more, merely collecting byproduct is not enough.

"The main challenge in obtaining these products is securing material which has retained its nutritional value and has not started to oxidize. The ability to do this has limited the total volume available and also resulted in seasonal fluctuations in the supply," said Jeff Kazin, global director of risk management at Cargill Aqua Nutrition.

One consequence in the past is that the byproducts that did show up might not be fit for processing. To help overcome this problem, Cargill made strategic investments with some suppliers to encourage better byproduct capture and processing, Kazin said.

Collection and quality are also a concern also at IFFO. Byproducts must be treated like items intended for human consumption, which means rapid transport, on the spot rendering, cooling or other appropriate actions.

Auchterlonie said that quality byproduct procurement has been helped by such technological innovations as the inclusion of fishmeal plants on fishing or processing vessels for some of the major wild fish species. In the quality department, he added, aquaculture has an edge.

"Aquaculture byproduct tends to be easy to collect, maintained at low temperature and is more straightforward overall than collection of fisheries byproducts," Auchterlonie said.



Freeze-dried salmon tails, like these produced by New Zealand King Salmon, are used to create a line of pet foods. Photo courtesy of New Zealand King Salmon.

Byproduct processing not only improves sustainability but could also help the bottom line, according to Julien Stevens. Now an aquaculture team leader at **New Zealand King Salmon** (<https://www.kingsalmon.co.nz/>), Stevens was part of a team at the **University of Stirling** (<https://www.stir.ac.uk/>), in Scotland that studied the **rising use of aquaculture byproducts** (<https://www.sciencedirect.com/science/article/pii/S0308597X17305328>). The investigators found that recognizing the value in what had been considered waste lead to better results – especially when this consideration was integral from the beginning.

“What we found in the research is companies that really designed their processing flow with full use of the byproduct in mind tended to make the most money off those byproducts,” Stevens said.

Stevens noted that some companies paid to get rid of their waste while others made money off these byproducts. Eventually, those firms that get more value out of their product could prove more successful in the marketplace, he said.

There is a final possible benefit: improved employee satisfaction from working for an eco-friendly company. Stevens, for instance, is passionate about not wasting resources, and that is one reason why after completing his studies at the University of Stirling that he chose to work at New Zealand King Salmon.

“They really recognize the value of using the whole fish,” he said.

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Author



HANK HOGAN

Hank Hogan is a freelance writer based in Reno, Nevada, who covers science and technology. His work has appeared in publications ranging from *Boy's Life* to *New Scientist*.

hank@hankhogan.com (<mailto:hank@hankhogan.com>)

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