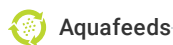




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Aquaculture Exchange: Andrew Jackson, IFFO

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By James Wright

Marine ingredients expert discusses fishmeal, big reduction fisheries management and tiny krill



Andrew Jackson, technical director, IFFO.

Despite great advances in aquafeed formulations aimed at lowering aquaculture's dependence on wild-capture fishery resources, there is little doubt that fishmeal and fish oil still play a crucial role in the global seafood supply. The highly nutritious marine ingredients are chief components in the production of the world's animal protein supply – some 20 percent of the global fishmeal supply goes to pig farmers, while high-quality fish oil remains in strong demand for direct human consumption as well.

The shape of the world's reduction fisheries, therefore, has never been more important. Andrew Jackson, technical director at IFFO (The Marine Ingredients Organisation), recently spoke with the *Advocate* about the latest in reduction fisheries, the ever-increasing part that processing byproducts has to play and why fishmeal is so hard to replace, even for fish considered to be largely herbivorous.

Jackson announced earlier this year that he would step down from his post as technical director at the end of 2015, after nearly a decade of service. He will, however, take up the reins as chairman of the IFFO RS (Responsible Supply Certification Program) independent standards board. "It is my hope and intention to keep serving," he said of his upcoming two-

year appointment.

What is the difference between "mining" a resource like a forage or reduction fishery and "cropping" it?

People often associate fishing with removing a resource as you would with mining. Like with coal, once it's taken out of the ground, that's it, unless you've got several million years to wait. You're not going to get anything back; it's a one-use resource. You can look at fisheries as, we've got this valuable thing, not in the ground but swimming around in the sea, and we can go out there, and we can take it out and we can sell it all and it's worth this much. You can look at it like that.

But how much better to crop it, as you would a sustainably managed forest. You take it out at a rate at which it can be replenished by nature. That's what the best management does. And that is when you become truly sustainable. In my book, sustainable means you can keep doing the same thing over and over again, year after year, and it's always there. That's what we should be looking to do, in any fishery, whether we're taking it out for direct or indirect human consumption.

How close are we to using that approach?

I think the world in general, and the world of fishmeal specifically, has made huge strides since I joined IFFO some 10 years ago. Then there was definitely concern that some fisheries were being hit too hard. I have seen a huge improvement in fishery management since then, and that goes for Europe, Central and South America and the United States. Always room for improvement, always room for discussion, whether you're looking at the ecosystem, the style of the fish being pulled out or the impacts on sea birds. That all has to be considered if you're looking at best practices. Not just maximum sustainable yield but some other ecosystem approaches.

When considering global seafood production, both wild and farmed, is fishmeal and fish oil the most precious resource we have because it's used by so many sectors, both aquatic and terrestrial?

Certainly, it is at the base of an awful lot of food production around the world. Although a lot of effort is being made in reducing the levels of fishmeal and fish oil in aquaculture and agriculture diets, the amount of fishmeal that is produced globally is still right around 5 million metric tons (MT) and that has remained relatively constant in recent years.

Aquaculture has managed to keep growing though. A lot of people predicted that it would be held back because there isn't enough fishmeal in the world. And I've always said that I don't think that's true. It used to go – all the fishmeal, back in 1960s, when production was 7 million MT – it all went to pigs and poultry. And a lot of people could have said back in those days that the pig and poultry industries would be held back because there's no more fishmeal to be had, it's all being used, how are we going to grow these two industries? And we all know that they have grown enormously over the last 50 years.



Jackson says fishmeal "is at the base of an awful lot of food production around the world."

I always felt that aquaculture would be the same, that it would not be held back. It might add some costs but ultimately people would find a way to reduce the amount of fishmeal and fish oil per ton of diet. The amount of fishmeal going to aquaculture has remained between 3 and 3.5 million MT for last decade or more, but aquaculture has continued to grow! In that sense, it hasn't held aquaculture back, but if someone turned around and said, "Right, we don't need fishmeal anymore, let's make it illegal to produce fishmeal," I think that would have serious consequences for aquaculture and agriculture. That's because it is increasingly used not so much in grower diets, where levels are going down and down and down and totally taken out of all diets for pigs in the U.S., but where it is used is in hatchery diets, for fry and fingerlings in aquaculture and in little weaner pigs in places like China. If you took that away, overnight as it were, it would have serious consequences. At the moment, fishmeal and fish oil are difficult to be taken out of the diet. Aquaculture is going to keep growing, but it is going to need fishmeal as a specialist ingredient for some considerable time to come.

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without using fishmeal, otherwise people would be doing it, of course.
It's a question of balance.***

Many people struggle to reconcile with the idea of feeding fish to fish in order to feed people. How can this industry best address this form of skepticism?

When people talk about fishmeal everybody imagines it comes from grinding up little anchovies or pogies or whatever. What a lot of people don't realize is that around one-third of the world's fishmeal is actually recycled. It's coming from heads and tails and frames and guts of fish being processed, which are going for direct human consumption. It's not realized that if you take Alaska pollock, a good deal less than half of what is actually taken out of the sea doesn't actually end up on somebody's plate. Something like 60 percent of it is there and available for recycling into fishmeal and fish oil. So one-third and growing of the world's fishmeal and fish oil is coming from recycling. I'm doing some work with the University of Stirling here in the UK and looking forward we can imagine that by 2025, we'll be looking at something like 50 percent of the world's fishmeal coming from byproducts, and incidentally a growing amount coming from aquaculture byproducts! We've seen that wherever aquaculture grows rapidly, like salmon in Norway, Chile and UK, or pangasius in Vietnam, you quite quickly get the recycling industry growing, for two reasons. One, it's a valuable resource. And two, if you don't do it you've got quite the waste disposal problem. In the old days those sorts of things were just dumped into the sea.

And now producers are getting paid for their byproducts?

Oh, absolutely! That's been happening now for years. I used to be involved in running the largest salmon processing factory in the UK up in Scotland and, yeah, we used to dump the guts at a municipal site but we'd have to pay for that. We then started to pay for it to be taken away to be made into fishmeal and fish oil, but it was better than to put it in a hole in the ground. Then when I left we started to actually get paid for it because it is such a valuable source. Which is great, and more of that is going to happen. There's a lot of pangasius meal out there, there's a lot of shrimp meal – so long as you don't feed it back to the same species that is to be encouraged.

So that then leaves us with the other part that is still going to come from whole fish. There we're increasingly looking not at mackerel or herring, stocks which used to go for the production of fishmeal but now people have found more lucrative markets for these fish for direct human consumption. We are left with those species for which an adequate direct human market cannot be established.

So we are talking about menhaden, and if you remember in New Orleans when we had that discussion where I asked the chef how he'd get on producing a nice dish of menhaden and he had to admit this was quite a challenge! We all like an anchovy sauce or a few on our pizzas, but wow, I wouldn't fancy a half a pound of anchovies on a plate trying to get my way through it, and imagining that I'm going to do that on a weekly basis. Despite the best efforts of the companies in Peru and indeed the government, they're still looking at under 2 percent of their catch going to direct human consumption, in tins for export. It's a real struggle to get locals or indeed anybody else to eat large quantities of these.

So the question is if you can't get people to eat it what do you do? Leave it there? Then, in a way, you are taking away a sustainable resource – assuming that you are cropping it instead of mining it – that provides a raw material that is fantastically useful for growing a hell of a lot of aquaculture products and pigs and poultry as well. It's at the base of – it depends on how you calculate it – hundreds of millions of tons of product.

Would you characterize fishmeal/fish oil as an "essential" component in producing good quality animal proteins?

Yes, if you go to hog farms in the U.S. and asked them if they use fishmeal, they'll say no, we got out of that 15 years ago, even for baby weaners. What you'd find is they're probably using spray-dried milk.

But in China they don't really have a dairy industry for various historical reasons and for lactose intolerance – only a small industry in Asia at all. The result is they don't have large quantities of spray-dried milk. It has to be imported from New Zealand and it's really very expensive. And just as good if not better than spray-dried milk is fishmeal. They probably could get rid of it, but it would require a whole new dairy industry to be grown. That would push up the cost of pig meats in China, which is a huge pig consumer.

And then you'd have millions more cows farting every day.

Exactly! It would all become a little questionable as to whether that's what we should be doing. You can grow salmon on a totally fishmeal-free diet, but how much per kilo would that then cost? You don't see that. A few years ago there was a company that was growing marine worms to make a marine worm meal to be fed to

Fishmeal is being increasingly used in hatchery diets, essential for fingerling fish and wiener pigs.

salmon and they said, "Look, we can produce [salmon] without fishmeal." So I took a look at it and I said, "Well, what are you feeding these marine worms?" And they said, "Oh, we either use fish heads and things like that or sometimes we use old salmon feed," and I went, "Right. So you're feeding them on fish waste, or fishmeal, then using the worms into worm meal, to feed to salmon. This isn't going to work, that's a very inefficient process." Sure enough, six months later the firm went bankrupt. You can grow salmon on a totally fishmeal-free diet – it's possible – but you can't keep up the rate of growth and the cost of production without using fishmeal, otherwise people would be doing it, of course. It's a question of balance.

In July, Sustainable Fisheries Partnership downgraded the Peru anchoveta (http://cmsdevelopment.sustainablefish.org.s3.amazonaws.com/2015/07/25/SFP_Reduction%20Fisheries_Sector_2015_FINAL-9738d30b.pdf) fishery to "reasonably well managed." Did you disagree with the assessment of that crucial fishery?

It is a crucial fishery. And clearly, we were not in total agreement. First of all, they were using some slightly old data. Also, the thing about anchovy is it's short-lived and recovers very quickly. It has a very short life cycle. The SFP report is based on [Marine Stewardship Council] metrics, and some of those are inappropriate for some of these short-lived species, in our opinion. The metrics don't actually correctly monitor and measure the stock.

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The Peruvian government, twice a year, carries out in-depth checks on the status of the stock. Almost by the nature of the SFP report, it's out of date before it's published, because already the Peruvian research organization that monitors the stock will have a new report and will change its recommendations based on how the stock is looking. We're facing now the possibility of an El Niño coming. It is a very dynamic situation. But no longer-term monitoring using the MSC metrics, we feel, can properly be used to evaluate the management measures. And certainly if we look at [IFFO RS, the responsible supply standard](http://www.iffonet.net/iffo-rs-standard) (<http://www.iffonet.net/iffo-rs-standard>), the assessment that's done by third party auditors on this fishery, does not use such rigid metrics as the MSC system, and that SFP used. IFFO RS does not claim to identify sustainable management but what is described as responsible management using the FAO Code of Conduct for Responsible Fishing. The question is: Is the management being responsibly done? And consistently third-party auditors have assessed the Peruvian anchovy fishery and said yes it is being responsibly managed. In short, if you carried out an MSC assessment, on occasion this fishery might have trouble to pass, but I don't think people should interpret that as it's being badly managed or that it is necessarily being overfished. It just doesn't fit very well into that form of metric management given the short-term nature of the fishery and the dynamic fishery management being employed by the Peruvian Government.

The good news from that report is that 2.3 percent of global reduction fisheries were considered "very well managed" or from stocks in "very good condition." That's entirely Antarctic krill. So how would you describe krill and its importance to the industry today, versus what it might be in the future?

The krill fishery is still very new. The amount that's caught is still tiny in comparison to the *huge* biomass out there. I think that's why they think it's being sustainably fished, because it's a tiny amount. Some still feel that tiny amount is too much, that nobody should be taking it out. But what's driving the krill harvest is not the aquaculture industry, it's for the high quality oil. That is what produces by far the greatest value for the companies who are fishing it. The biggest driver for the fishing is the market for the oil for use in capsule form for direct human consumption. The byproduct of that oil production is the krill meal left over with protein in it. That has been shown to be very useful for segments of the aquaculture industry. It's very expensive compared to conventional fishmeal. But it's been shown to be very good, once again, when [the fish are] very small. In hatcheries and early fry diets, a bit of krill meal is very effective. But the actual volumes being used are tiny. A little bit goes a long way. The fishery is clearly being incredibly well managed. But it's a tough place to fish, and expensive in the South Atlantic. Getting them processed, dried, and getting krill from the middle of the South Atlantic Ocean back to Norway, or wherever, to be used in aquaculture – this is not something that's going to happen in large volumes. The cost of krill meal is far too high. It's not the insatiable desire for krill meal from the aquaculture industry that could drive this fishery.

It sounds almost experimental at this stage.

It is pretty experimental and pioneering. The company [Aker BioMarine](http://www.akerbiomarine.com/) (<http://www.akerbiomarine.com/>) has managed to crack it. At the start they towed around their nets only to discover the little krill were falling apart, they were losing much of what they caught – it was turning to mush and falling out the back of the net. They developed a continuous-harvesting system, in which the krill were taken off immediately from the far end, the cod end of the net, and pumped on board and processed really fresh. It's a new development but it has proved successful and now they have three boats. The question is how big is the market for krill for human consumption? The demand for omega-3 has stalled a bit recently; it was growing very fast and everybody said, whoa, this is going to be huge and it's going to take all the world's fish oil. For a number of reasons that market has stalled, particularly in the U.S. There isn't the huge demand yet that many people thought there would be. If you asked me, will we still be taking krill out of the oceans in 10 years time, the answer would be yes, but I am not sure it will be in huge amounts. It's a delicate ecosystem and it would be very controversial to overexploit it and take the food out of the mouths of penguins and whales to the point where they were affected, but we are so far away from that.

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