



Responding to our critics

IFFO has faced down the critics on the supposed unsustainability of feed, forage or industrial fishing to produce fishmeal and fish oil for aquaculture. Now the critics have switched their attack and are claiming that it is unethical.



The critics say the fish used to produce fishmeal and oil could, and should, be consumed directly by mankind. They believe industrial fishing and feeding fishmeal and oil to farmed fish should be stopped and that this would result in a greater quantity of fish being available for human consumption, notably by the poor and starving. The critics' unease is exacerbated by concern about overexploitation of fisheries and the assertion that it takes several kilograms of feed fish to produce one kilogram of farmed fish by the fishmeal and aquaculture route.

Former FAO staff member and economist Ulf N. Wijkström has addressed this and related issues since the 1980s. He and Dr. Michael New wrote about the use of fishmeal and oil in aquaculture for FAO. Recently this organisation asked Mr. Wijkström to address the controversy about the use of fish to produce fishmeal and oil. He found that the critics' argument was neither valid, nor balanced. He has agreed to summarise his findings and views in Update in a question and answer format.

Q. Does the use of forage fish and fish feed reduce the amount of fish available and purchased for human consumption, on a continuous and consistent basis?

A. No it does not. The reverse happens. Humankind has consistently access to more fish as food because aquaculturists have access to feeds incorporating industrially produced fishmeal and fish oil. In my view the additional amount is of the order of 7 to 8 million tonnes of fish/crustaceans per year. This is without considering that fishmeal and oil is also produced from fish processing waste and that some of this produce will be used by aquaculturists.

Q. Your answer is contrary to conventional wisdom. In your paper you estimate that some 13 million tonnes of raw fish is used. This is certainly more than the 7 to 8 million tonnes additional fish/crustaceans. Could you elaborate?

A. The fundamental reason is that most of the fish now used in industrial manufacture of fishmeal and oil has no other market. It is either not wanted as human food where it is landed (e.g. sandeels in Scandinavia; menhaden in the USA) or those willing to purchase the fish (e.g. Peruvian anchoveta) as food are so far away, maybe on another continent, that they cannot pay for the costs associated with preserving and transporting the fish to them. So industrial fisheries for forage species soon would only be at a fraction of their present effort if the fishmeal and oil industries were to disappear. Also, please note that the figure of 7 to 8 million tonnes assumes that some 40 % of the fishmeal and oil obtained from 13 million tonnes of raw fish was not available to aquaculture but were used for other purposes.

Q. In your paper you focus on the fish harvested to produce fishmeal and oil in the Atlantic, Caribbean and Eastern Pacific (Peru and Chile). The industries and the fisheries in these regions are not homogenous. How did you handle this in your analysis?

A. Whether or not fish has alternative uses is central to whether or not it can be considered unethical to use it to produce fish meal. So I decided to divide the species into groups using their degree of "marketability" as food as the criterion. From Peron *et al* I borrowed the following three groups: (i) Industrial Grade Forage Fish (mainly sand eels and menhaden); (ii) Food Grade Forage Fish (main species being the Peruvian anchoveta), and (iii) Prime Food Fish (mainly sardines, mackerels, herring).

Q. How much fish from these groups was made into fishmeal and fish oil because it could not be sold into human food markets?

A. Here I have to be somewhat vague. I do not have all the data I need to provide an exhaustive reply. However, it is clear that during the period 2000 to 2006, annually some 1.2 million tonnes of



“industrial grade forage fish” were converted into fishmeal. The corresponding amount for “food grade forage fish” is likely to have been about 12 million tonnes, but this is no more than an estimate and needs to be refined. I have no solid data for showing the proportion of “Prime food fish” that ends up as fishmeal. So I have not included any fish of this category in my estimate of the fish that for lack of a market ends up as fishmeal and oil. Let me add though, that in my view, because of the seasonality and unpredictability linked to the fisheries for pelagic prime food fish – a kind of fish that often deteriorates rapidly in ambient temperatures - there will always be days when landings are so large that they cannot all be preserved or processed as human food and therefore are well used as raw material for fishmeal and oil.

Q. You also considered the employment lost, or gained, in the process of catching industrial fish and using them in aquafeed. What was your finding?

A. Relatively little employment is generated by modern, industrial production of fishmeal and oil. This reflects the high labour productivity generally found in industrial fisheries and the capital intensity of the shore based fishmeal and oil factories. The total numbers are likely to be of the order of 0.1 million man-years of employment/year. The reverse is true in Asian aquaculture where most of the fishmeal and oil absorbed by the aquaculture industry is used. Here fishmeal and oil contributes to the employment of some 3 to 4 million man-years, and a high percentage is women.

Q. What about the use of by-catch or trash fish for feed? Does this reduce the fish available for human consumption? What is the effect on employment?

A. It depends. In densely populated coastal regions of Asia it seems most likely that using by-catch as aquaculture feed reduces the quantities of fish available for human consumption, while the practice has only a marginal effect on employment.

Q. What has led the critics to their mistaken view that the use of fishmeal and fish oil in aquaculture reduces the availability of fish for human consumption?

A. The critics differ in their knowledge and understanding of the problem. In my view there are those who, at times from academic positions, address the issue with a tunnel vision within which they employ a surprisingly simplistic and short-sighted analysis concentrating on the input-output ratios in aquaculture. This seems to me to be much politicking and little science. What leads them to adopt this narrow view of the problem I do not know.

A second category of critics appear to be driven by a genuine concern for the poor. Amongst them many I believe are blinded by the fact that in some aquaculture systems you use more fish as feed than is produced in the form of farmed seafood. They ignore –and are seldom told – the fact that that the fish used as feed, when landed, had no market as food. Once that fact is established it should be clear that the net supply of fish as food is increased irrespective of the input-output ratios of the particular aquaculture involved. That is, even if you would need as much as 10kg of forage fish to produce one kg of food fish in a fish pond, this is a positive result.

Q. The critics often say that all industrial/feed/forage species should be “left in the water as they are prey for other fish which consumers will want to eat and which will be caught”. How do you reply to this point?

A. If the concern, or objective, is to maximize the volume of food fish on the market then this argument is wrong. In the wild carnivorous fish eat anything from 5 to 20kg of forage fish to increase one kg in weight. But much less than 5kg of wild fish is used to produce the fishmeal and oil inputs in the feed needed to produce one kg of farmed shrimp or fish. So even if subsequently each and every one of the carnivorous fish were caught – which of course is highly unlikely - society will have more food fish to choose from if forage fish is harvested, and converted into fishmeal and oil, than if it is not.



Q. There is also an ethical or moral argument that the world should not be feeding fish to fish while people are starving or have an inadequate diet. What is your view on giving the fish away free or subsidising the price?

A. During the past forty years I have been to many poor communities in many different parts of the world. No doubt inhabitants in most of them would have been better off if they had obtained cheap, or free, fish. But that would not have extracted them for good from starvation and poverty. Rural development experts now agree that, for this to happen, the poor and starving need a source of stable income. And this is something that aquaculture can provide. Also, any attempt to subsidise production of small pelagic (or other species) for local or export markets, no matter how well intentioned, most likely will be contested under WTO trade rules. So, except when people experience famine or natural disasters, I am not in favour of giving fish away free or selling fish at subsidised prices.

Q. What is your overall conclusion on the future for the use of fishmeal and fish oil in aquaculture?

A. Following the recent increase in the international price of fishmeal I see two issues on the horizon that may affect the sustainability of fish meal and oil supplies for aquaculture. First the sustainability of forage fish stocks may become endangered as fishers try to take advantage of increased earning possibilities. So, it would seem imperative that the industry contribute to increased management vigilance and certifies that the raw material it uses comes from sustainable fisheries. Second, the economics of fishmeal and oil production are such that producers will be tempted to source raw material from stocks which previously were too costly. It would probably be wise if the industry refrained from competing directly with the food fish market for fish supplies.

In the longer term there would seem to be amazing possibilities for the industry. One of them is that aquaculture offals provide raw material for fishmeal production. This may sound paradoxical given today's debate, but I see it as a clear possibility.

KEY POINT

Including fishmeal and fish oil in feeds given to farmed fish/crustaceans increases the effective supply of fish/crustaceans for human consumption by 7-8 Mt per year.

References:

Wijkström, U.N. & New, M.B. 1989. Fish for feed: a help or a hindrance to aquaculture in 2000? *INFOFISH International*, 6/89:48-52.; M. B. New & U.N. Wijkström 2002: Use of fishmeal and fish oil in aquafeeds: further thoughts on the fishmeal trap. FAO Fisheries Circular no 975. Rome, 61 pp.

Ulf N. Wijkström 2009. The use of wild fish as aquaculture feed and its effects on income and food for the poor and the undernourished. In M.R.Hasan and M. Halwart (Eds). *Fish as feed inputs for aquaculture: practices, sustainability and implications*. Fisheries and Aquaculture Technical Paper. No. 518. Rome, FAO. pp. 371–407.

Wijkström, U.N. 2011. Is feeding fish with fish a viable practice? In Subasinghe R.P., De Silva S.S., Bartley D.M., Halwart M., Hishamunda N., Mohan C.V. and Sorgeloos P. eds. *Farming the Waters for People and Food*. Technical Proceedings of the Global Conference on Aquaculture 2010, Phuket, Thailand. 22-25 September 2010.

Peron G, *et al* 210 "Where to fishmeal and fish oil products come from? An analysis of the conversion ratios in the global fishmeal industry. Marine Policy, 2010