

Seafish Insight: fishmeal production and trends

Source: FAO SOFIA 2018

November 2018

Taken from the UN FAO State of World Fisheries and Aquaculture (SOFIA) report 2018. This flagship publication, issued every two years, provides a comprehensive, objective and global view of capture fisheries and aquaculture.

Fishmeal is a proteinaceous flour-type material obtained after milling and drying of fish or fish parts, while fish oil is obtained through the pressing of the cooked fish and subsequent centrifugation and separation.

These products can be produced from whole fish, fish trimmings or other fish by-products resulting from processing. Many different species are used for fishmeal and fish oil production, small pelagic species predominating. Many of the species used, such as anchoveta (*Engraulis ringens*), have comparatively high oil yields but are rarely used for direct human consumption.

Fishmeal and fish-oil production fluctuate according to changes in the catches of these species. Anchoveta catches, for example, are dominated by the El Niño phenomenon, which affects stock abundance. Over time, adoption of good management practices and the implementation of certification schemes have decreased the volumes of catches of species targeted for reduction to fishmeal.

To download a copy of the UN FAO State of World Fisheries and Aquaculture (SOFIA) report 2018 see <http://www.fao.org/3/i9540en/I9540EN.pdf>

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This is a summary of the content of the FAO Report. It is not necessarily the view of Seafish. It is an information service provided by Seafish for industry and key stakeholders.

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Overall highlights

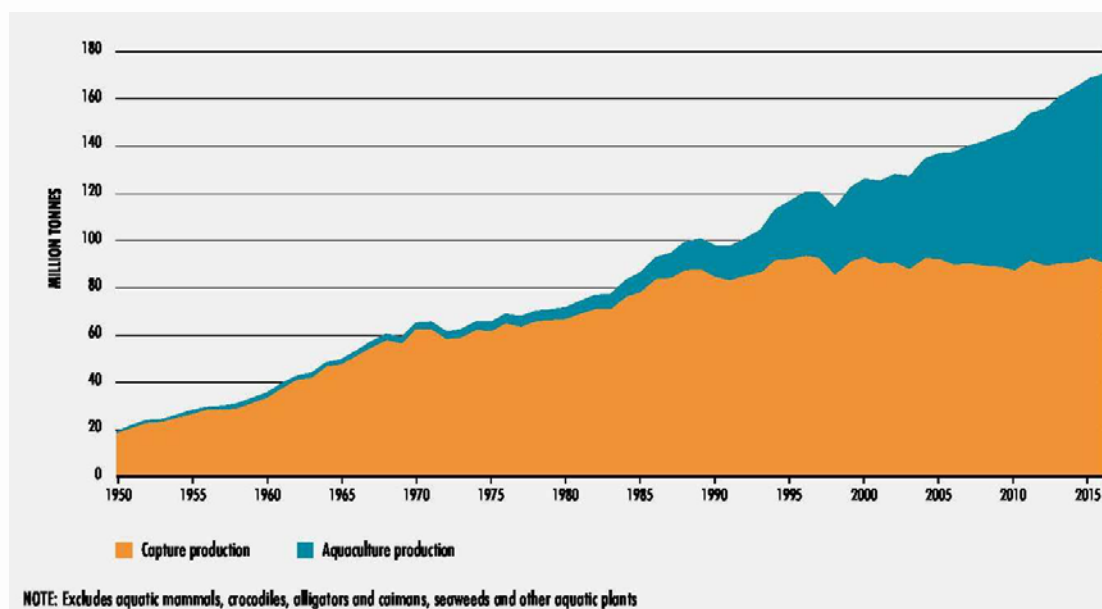
Total capture

- Global total capture fisheries production, as derived from the FAO capture database, was 90.9 million tonnes in 2016, a small decrease in comparison to the two previous years.
- World total marine catch was 81.2 million tonnes in 2015 and 79.3 million tonnes in 2016.
- Catches of anchoveta (*Engraulis ringens*) by Peru and Chile, which are often substantial yet highly variable because of the influence of El Niño, accounted for 1.1 million tonnes of this decrease.
- Decreasing catches affected 64% of the 25 top producer countries, but only 37% of the remaining 170 countries.
- With capture fishery production relatively static since the late 1980s, aquaculture has been responsible for the continuing impressive growth in the supply of fish for human consumption.

Aquaculture

- Global aquaculture production (including aquatic plants) in 2016 was 110.2 million tonnes, with the first-sale value estimated at USD 243.5 billion. The first-sale value, re-estimated with newly available information for some major producing countries, is considerably higher than previous estimates.
- The total production included 80.0 million tonnes of food fish (US\$ 231.6 billion) and 30.1 million tonnes of aquatic plants (US\$ 11.7 billion) as well as 37,900 tonnes of non-food products (US\$ 214.6 million).
- The contribution of aquaculture to the global production of capture fisheries and aquaculture combined has risen continuously, reaching 46.8% in 2016, up from 25.7% in 2000.
- With 5.8% annual growth rate during the period 2001–2016, aquaculture continues to grow faster than other major food production sectors, but it no longer enjoys the high annual growth rates experienced in the 1980s and 1990s.

World capture fisheries and aquaculture production



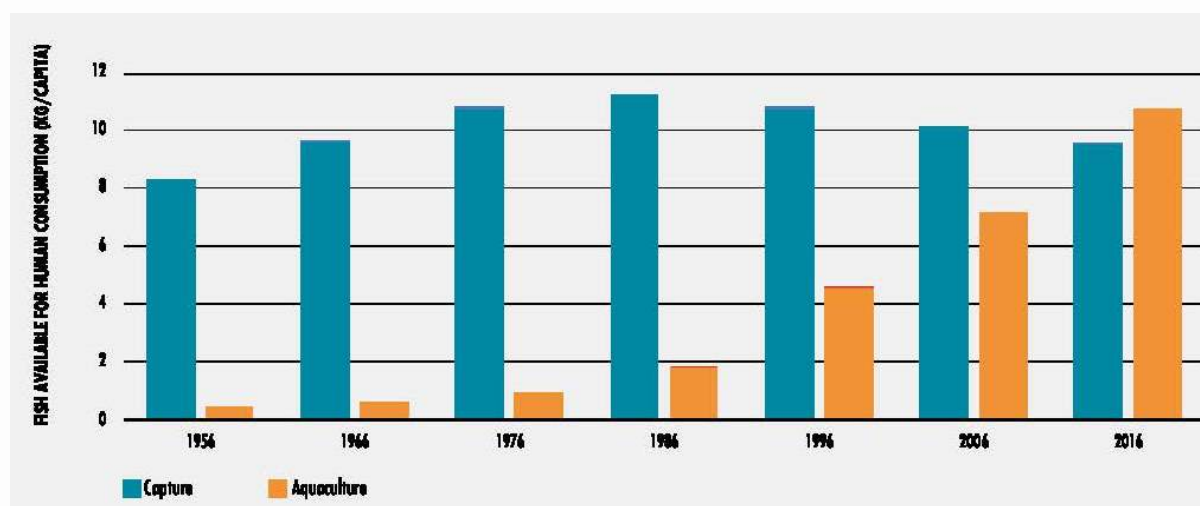
Consumption

- Since 1961, the average annual increase in global apparent food fish consumption (3.2%) has outpaced population growth (1.6%) and exceeded consumption of meat from all terrestrial animals, combined (2.8%) and individually (bovine, ovine, pig, other), except poultry (4.9%).
- In per capita terms, food fish consumption has grown from 9.0 kg in 1961 to 20.2 kg in 2015, at an average rate of about 1.5% per year.
- Preliminary estimates for 2016 and 2017 point to further growth to about 20.3 and 20.5 kg, respectively.
- The expansion in consumption has been driven not only by increased production, but also by a combination of many other factors, including reduced wastage, better utilisation, improved distribution channels and growing demand, linked with population growth, rising incomes and urbanisation.

Outlook

- Based on the assumption of higher demand and technological improvements, total world fish production (capture plus aquaculture, excluding aquatic plants) is expected to continue to expand over the course of the projection period to reach 201 million tonnes in 2030.
- This represents a growth of 18% over 2016, or 30 million tonnes at a lower annual growth rate (1.0%) than observed in the period 2003–2016 (2.3%).
- The major growth in production is expected to originate from aquaculture, which is projected to reach 109 million tonnes in 2030, with growth of 37% over 2016.

Relative contribution of aquaculture and capture fisheries to fish for human consumption

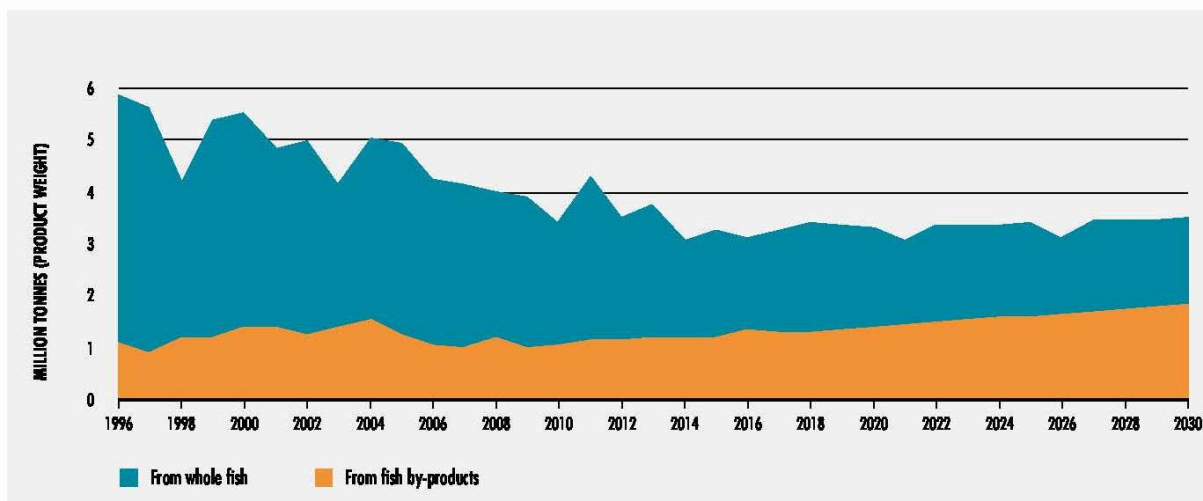


Trends in world fishmeal and fish oil production and use

A significant, but declining, proportion of world fisheries production is processed into fishmeal and fish oil. This portion contributes indirectly to human food production and consumption when these ingredients are used as feed in aquaculture and livestock raising.

- Fishmeal production peaked in 1994 at 30 million tonnes (live weight equivalent) and has followed a fluctuating but overall declining trend since then.
- Of the 171 million tonnes of total fish production in 2016, about 88% (over 151 million tonnes) was utilized for direct human consumption. This share has increased significantly in recent decades, as it was 67% percent in the 1960s.
- In 2016 the greatest part of the 12% used for non-food purposes (about 20 million tonnes) was reduced to fishmeal and fish oil (74% or 15 million tonnes live weight equivalent). This figure is down due to reduced catches of anchoveta. The rest (5 million tonnes) was largely utilized as material for direct feeding in aquaculture and raising of livestock and fur animals, in culture (e.g. fry, fingerlings or small adults for ongrowing), as bait, in pharmaceutical uses and for ornamental purposes.

World fishmeal production 1996 - 2030



- Owing to the growing demand for fishmeal and fish oil, in particular from the aquaculture industry, and coupled with high prices, a growing share of fishmeal is being produced from fish by-products, which previously were often wasted. It is estimated that by-products account for about 25 to 35% of the total volume of fishmeal and fish oil produced, but there are also regional differences. For example, by-product use in Europe is comparatively high at 54%. With no additional raw material expected to come from whole fish caught by reduction-dedicated fisheries (in particular, small pelagics), any increase in fishmeal production will need to come from the use of by-products, which can, however, have a negative impact on its nutritional value as feed.
- Fish oil represents the richest available source of long-chain polyunsaturated fatty acids (PUFAs), important in human diets for a wide range of critical functions. However, the Marine Ingredients Organisation (IFFO) estimates that approximately 75% of annual fish oil production still goes into aquaculture feeds. Because of the

variable supply of fishmeal and fish oil production and associated price variation, many researchers are seeking alternative sources of PUFAs, including large marine zooplankton stocks such as Antarctic krill (*Euphausia superba*) and the copepod *Calanus finmarchicus*, although concerns remain over the impacts for marine food webs.

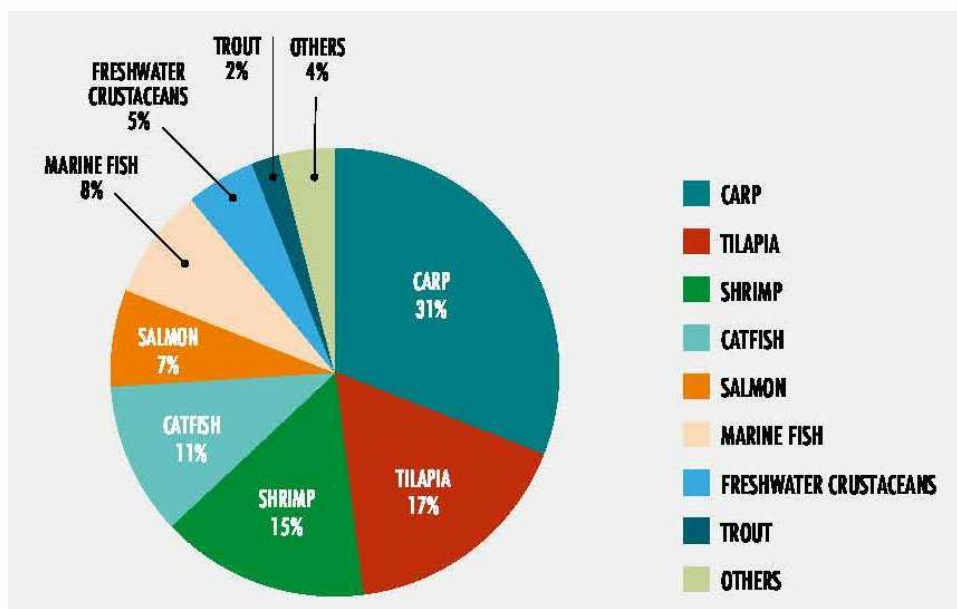
- Fishmeal and fish oil are still considered the most nutritious and most digestible ingredients for farmed fish feeds, but their inclusion rates in compound feeds for aquaculture have shown a clear downward trend largely as a result of supply and price variation. They are increasingly used selectively, for example for specific stages of production, particularly for hatchery, broodstock and finishing diets. Their incorporation in grower diets has decreased over time. For example, their share in grower diets for farmed Atlantic salmon is now often less than 10%.

Fishmeal and fish oil use in aquafeeds

The fishmeal and fish oil content of aquaculture feeds can be reduced without compromising the nutrient content of farmed aquatic products. Improvements in feed formulations and in feed manufacture, combined with better on-farm feed management, can hugely reduce the quantities of feed (and thus fishmeal and fish oil) used per kilogram of farmed aquatic food produced.

- Aquaculture feeds are manufactured from a variety of crops and crop co-products, wild fish and fish and livestock processing co-products. Some of them, such as fishmeal and fish oil, are produced from reductions of highly nutritious wild fish.
- However, the proportion of fish from capture fisheries being reduced to fishmeal and fish oil has been declining in recent decades, and it is projected that a growing share of fishmeal and fish oil production will be obtained from fish processing co-products.
- During the period 1995 to 2015, production of farmed aquatic species reliant on feeds increased more than fourfold, from 12 to 51 million tonnes, largely through intensification of production methods for shrimp, tilapias, carps and salmonids. Today, 48% of total global aquaculture production including aquatic plants (66% excluding aquatic plants) is produced using exogenous feed.

Share of consumption of total aquaculture feed by species group, 1995 – 2015 (%)



- The dietary inclusion rates of fishmeal and fish oil in aquaculture feeds have also been falling, increasingly replaced by crops, especially oilseeds.
- Fishmeal and fish oil inclusion rates in Atlantic salmon diets, for example, fell from 65% to 24% and from 19% to 11%, respectively, between 1990 and 2013. Food conversion ratios (the ratio of biomass of food fed to fish produced) over the past 25 years have fallen from around 3:1 to around 1.3:1 (GSI, 2017), largely because of better feed formulations, feed manufacturing methods and on-farm feed management.
- Although the use of fishmeal and fish oil in aquafeeds is more prevalent among higher trophic level finfish and crustaceans, low trophic level finfish species or groups (e.g. carp, tilapia, catfish, milkfish) are also fed with fishmeal and fish oil at rates of 2% to 4% of their diets. In total usage terms, the largest consumers of fishmeal in 2015 were marine shrimp, followed by marine fish, salmon, freshwater crustaceans, fed carp, tilapia, eel, trout, catfish and miscellaneous freshwater fish and milkfish.

Looking ahead to 2030

- About 16% of capture fisheries yield will be used to produce fishmeal in 2030.
- The estimated fishmeal and fish oil production, in product weight, should reach 5.3 million tonnes and 1.0 million tonnes, respectively.
- In 2030, fishmeal production should be 19% higher than in 2016, but about 54% of the growth will derive from improved use of fish waste, cuttings and trimmings obtained from fish processing.
- Fishmeal produced from fish by-products will represent 34% of world fishmeal production in 2030, compared to 30% in 2016. The fish model does not take into account the effects of the use of fish by-products on the composition and quality of the resulting fishmeal and/or fish oil. Possible effects include lower protein and increased ash (minerals) and small amino acids (e.g. glycine, proline, hydroxyproline) in comparison with products obtained from whole fish. This difference in composition may hinder increased use of fishmeal and/or fish oil in feeds used in aquaculture and livestock farming.
- Prices of fishmeal and fish oil are expected to continue trending upwards over the projection period, with growth of 20% and 16%, respectively, in nominal terms by 2030, as a result of strong global demand.