Demand perspectives on fishmeal & fish oil

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International Fishmeal and Fish Oil Organisation is the global trade association representing fishmeal and fish oil producers and related trades. Represents two thirds of world production and 80% of trade in fishmeal and fish oil worldwide with producers in Europe, South America, Africa, USA, China and India.
Important feed ingredients

Fishmeal is an excellent high protein feed ingredient used at least at some stage in almost all intensive aquaculture systems.

Fish oil is the best source of the omega-3 fatty acids EPA & DHA and its use in feeds ensures a healthy product for the final consumer.

However, despite the growth of aquaculture, the global production of both fishmeal & fish oil has remained fairly static.
Production of fishmeal and oil has remained relatively steady although the introduction of precautionary quotas & increased use for direct human consumption has resulted in reduced volumes of whole fish going for fishmeal & oil.
Consumption of fishmeal is increasingly being concentrated in Asia with China continuing as by far the single largest market. In fish oil Europe continues to dominate the market with Latin America using less with the reduction in salmon production in Chile.
Eco-efficiency of fishmeal & fish oil

Seasonal surplus of less desirable fish and inedible by-products are collected.

They are efficiently converted into concentrated stable products which can be economically shipped to where they are required.

IFFO estimates 2008
Volumes of whole fish being used as feed are decreasing

Whole fish rendered for different purposes
Tonnes ,000

Aquaculture
Oil for Human Consumption
Oil other uses
Other land animals
Pigs
Chickens
As prices rise alternatives (e.g. soy meal, rapeseed oil) are used in partial replacement.

Increasing nutritional knowledge allows more replacement to take place particularly on more established species.

Improved genetics and processing are improving the quality of alternative proteins.

Increasingly fishmeal is being used as a strategic ingredient at lower levels and retained in special diets e.g. fry and broodstock diets.

Will static supplies of marine ingredients limit aquaculture growth?
Global aquaculture production has continued to grow while usage of fishmeal & fish oil is static.
Fishmeal usage moves from ‘Agri’ to ‘Aqua’ sector

Two species (chicken & pigs) used over 98% of production in 1960 but dropped to 40% of usage while production grew from 32 to 182 million tonnes
We estimate that in 2009 63% of global fishmeal production went to aquaculture and that was split almost equally between salmonids, marine fish, crustacean and others.
The transition of fishmeal from commodity to strategic ingredient has been accompanied by an upwards trend in relative value.
Why are fishmeal prices again at a historical high?

- All feed commodities have risen strongly – current ratio with soymeal is still around 4:1
- Continuing strong demand for fishmeal from SE Asia - particularly China
- Last year’s El Niño in Peru resulted in a large number of immature fish which has caused the early closure of the fishery – but the fish will mature and breed
- Issue with uncontrollable fishing in international waters has given problems to the Chilean Jack mackerel fishery
Fish oil usage moves from hydrogenated fat to aquaculture & capsules

A growing recognition of the importance of EPA & DHA

Changing uses of fish oil

1970: 80% Hardened edible, 20% Others

1990: 59% Hardened edible, 20% Aquafeed, 16% Others

2010 (est.): 80% Hardened edible, 12% Others, 7% Others
We estimate that in 2009 81% of global fish oil production went to aquaculture and that 68% of that went to salmonids.

Source: IFFO
The easy replacement of fish oil by rapeseed oil in salmon diets has meant the price ratio of feed grade oil has slightly trended down although current ratio is around 1.2-1.3:1

C&F feed grade fish oil/rapeseed oil prices ratio in Rotterdam (Netherlands) (US$/mt)

source: ISTA Mielke GmbH. Oil World
However, the growth of fish oil for direct human consumption is opening up a significant market (currently 20-25%) with a price premium

GOED 2009 estimates

Best Case: 349,000 MT

Expected Case: 239,500 MT

Worst Case: 192,460 MT
The result of the growing replacement of fish oil in salmon diets:

The nutrient requirements of the salmon can be met by low dietary levels of fish oil (5%).

However, this might have a negative effect on their performance and survival under stressful conditions, especially given high omega-6.

The final level of EPA/DHA in the fillets is decreasing.

Salmon have been sold on their health giving properties and this will be increasingly challenged.

Professor: salmon becoming a floating vegetable.
Feeding fish to fish is the most efficient feed use.

Fish being cold blooded animals and supported by water are the most efficient users of feed.

Typical Feed Conversion Ratios: Pigs 4:1, Poultry 2:1, Fish 1.2:1

Typical Protein Retention levels: Pigs 13%, Poultry 18%, Fish 40%
Feeding fish to fish

Fish is a natural food for fish – all fish are carnivorous at some stage

Fishmeal & fish oil provide an almost perfect nutrient balance promoting health & welfare

Ethical objections about not feeding the poor are misplaced

Increasing amounts are going for direct human consumption
Some are concerned about the ethics of feeding fish to fish – subject of a recent FAO report

The use of wild fish as aquaculture feed and its effects on income and food for the poor and the undernourished

“The idea of landing large quantities of anchoveta, or sand eel, or most of the other species used in feed fisheries, and using them to provide food for the poor is a laudable objective, but unrealistic

…..there does not seem to be any foundation for the argument that aquaculture threatens the sustainability of South American reduction fisheries and, therefore, endangers the food security of those who are already undernourished or the income levels of the poor in Chile, Peru or anywhere else”
But he says:

“Where feed fisheries are not managed sustainably, aquaculture today constitutes an important threat to world fish stocks because of aquaculture’s reliance on fishmeal and thus on reduction fisheries”

- Most fisheries have been poorly managed at some stage
- Significant improvements have been made in the last ten years
- For example Peru now has some of the best managed fisheries in the world:

<table>
<thead>
<tr>
<th>Country</th>
<th>Average score</th>
<th>Country</th>
<th>Average score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peru</td>
<td>6.42</td>
<td>Sweden</td>
<td>3.82</td>
</tr>
<tr>
<td>Namibia</td>
<td>5.10</td>
<td>Pakistan</td>
<td>3.81</td>
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<tr>
<td>USA</td>
<td>5.10</td>
<td>Indonesia</td>
<td>3.80</td>
</tr>
<tr>
<td>Germany</td>
<td>4.90</td>
<td>Japan</td>
<td>3.78</td>
</tr>
<tr>
<td>Poland</td>
<td>4.82</td>
<td>Australia</td>
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<tr>
<td>Norway</td>
<td>4.71</td>
<td>Spain</td>
<td>3.77</td>
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<td>Senegal</td>
<td>4.70</td>
<td>Taiwan</td>
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<tr>
<td>Chile</td>
<td>4.67</td>
<td>Thailand</td>
<td>3.74</td>
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<tr>
<td>South Africa</td>
<td>4.64</td>
<td>Viet Nam</td>
<td>3.70</td>
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</table>
Responsible management of fisheries

World’s largest feed fishery - the Peruvian anchovy – now well managed

Europe re-building their feed fisheries

Still concern over feed fisheries in Asia – mostly due to the use of trash fish and a lack of fisheries information

It is becoming increasingly important to be able to demonstrate responsible fisheries management of the raw material
So there is continued value chain concern over two critical areas

The need to demonstrate that any whole fish processed come from well managed fisheries and that there are no illegal, unreported or unregulated (IUU) fish included. Also that any fisheries by-products do not come from endangered or IUU fish.

The need to demonstrate that production in the factory ensures pure and safe products. Also that the supply-chain then maintains the purity and identity of the products with a chain of custody demonstrating traceability.
To reassure the value-chain IFFO launched its Global Standard for Responsible Supply

- RS is a B-to-B initiative following the ISO-65 Standard
- Standard developed by multi-stakeholder committee including retailers & NGOs
- 3rd party auditable standard ensures responsible raw material procurement & good manufacturing practice
- The standard requires an applicant to demonstrate that the factory:
  - Sources its whole-fish raw material from fisheries managed according to the FAO Code of Conduct for Responsible Fisheries
  - Avoids the use of Illegal, Unreported & Unregulated fish IUU
  - Does not source fisheries by-products from IUCN red listed fisheries
  - Manufactures under a recognised quality control scheme to ensure product safety & purity
IFFO-RS progress to date - 1

Launched to members in October 2009

First factory was awarded certification in February 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Fishery</th>
<th>Nº of companies</th>
<th>Nº of certified factories</th>
<th>Nº of factories pending</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peru</td>
<td>Peruvian anchovy (<em>Engraulis ringens</em>)</td>
<td>9</td>
<td>44</td>
<td>10</td>
</tr>
<tr>
<td>USA</td>
<td>Gulf menhaden (<em>Brevoortia patronus</em>)</td>
<td>2</td>
<td>2</td>
<td>0</td>
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<tr>
<td>Iceland</td>
<td>Summer spawning Herring (<em>Clupea harengus</em>)</td>
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<tr>
<td></td>
<td>Capelin (<em>Mallotus villosus</em>)</td>
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<tr>
<td></td>
<td>Blue whiting (<em>Micromesistius poutassou</em>)</td>
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<tr>
<td></td>
<td>Atlanto spring spawning herring (<em>Clupea harengus</em>)</td>
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<tr>
<td>Denmark</td>
<td>Norway pout (<em>Trisopterus esmarkii</em>)</td>
<td>2</td>
<td>2</td>
<td>1</td>
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<tr>
<td></td>
<td>Sand eel (<em>Ammodytes marinus</em>)</td>
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<td></td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>20</strong></td>
<td><strong>54</strong></td>
<td><strong>18</strong></td>
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</table>
This represents over 20% of world production of fishmeal and fish oil.

There are more factories in assessment.

Factories utilising fisheries by-products can now apply for approval under a recently launched new extension to the RS standard.

The IFFO-RS standard is under continuous development e.g. Chain-of-Custody, Improvers programme.
We estimate that it should be possible to get around 9 million tonnes of raw material RS approved by 2015.

That is around 2 million tonnes of fishmeal and 420K tonnes of fish oil.

This represents around 40% of global production.

There will also be some MSC material available (RS recognises MSC as proof of responsible fisheries management).
## Contrasting roles of MSC and IFFO RS

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<thead>
<tr>
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<th>IFFO RS</th>
<th>MSC</th>
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<tbody>
<tr>
<td>Feed/Food Safety</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Ecolabel</td>
<td>No (B2B)</td>
<td>Yes</td>
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<tr>
<td>FAO Code for Responsible Fisheries</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Claim</td>
<td>Responsible</td>
<td>Sustainable</td>
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<td>Main Focus</td>
<td>Fishmeal Factory</td>
<td>Food Fisheries</td>
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<tr>
<td>By Products Standard</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Conclusions

Volumes of marine ingredients are static as more fish go for human consumption but more by-products are used to make fishmeal & fish oil

Marine ingredients are no longer commodities and are increasingly being used strategically in specialist diets or as nutraceuticals

Sustainable Aquaculture will continue to grow using the same or lower volumes of higher value marine ingredients

The market will increasingly demand responsible sourcing of marine ingredients with independent certification eg IFFO RS which now covers over 20% world supply