THE FUTURE OF FISHMEAL AND FISH OIL

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International Fishmeal & Fish Oil Organisation

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Points to cover

• IFFO
• Current Supply Trends
• Current Demand Trends
• Mass balance of production and use
• Future Trends
• Ensuring responsible supply
• Conclusions
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.
Current Supply Trends
Focus on sustainability driving precautionary quotas

• Peru through IMARPE is moving towards an ecosystem approach
• Chile through IFOP are setting tighter quotas and also trying to control international fishing for jack mackerel
• Europe rebuilding fisheries and reforming Common Fisheries Policy

Negative effect on fishmeal & fish oil production volumes
Increased use of raw material for direct human consumption

- Norway - Capelin, Herring & Blue Whiting
- Denmark - Herring & Blue Whiting
- Chile - Jack Mackerel & Chub Mackerel
- Peru – Last year approx. 190,000 tonnes of anchovy went for human consumption (3%)

Negative effect on fishmeal & fish oil production volumes
Increasingly fishmeal is coming from fisheries by-products - now reached over 25% of Global Production.

Alaskan Pollock meal is a good example

Positive effect on fishmeal & fish oil production volumes

<table>
<thead>
<tr>
<th>Total Production .000 tonnes</th>
<th>Fishmeal</th>
<th>By-Product Coefficient</th>
<th>By-product FM Production</th>
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<td>23.0</td>
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<td>TOTAL 47</td>
<td>4,706.8</td>
<td>1205.6</td>
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<td>OTHERS</td>
<td>111.2</td>
<td>20</td>
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</table>

TOTAL WORLD                  | 4,818.0  | 25%                    | 1227.9                   |

IFFO Estimates
Increased pressure to convert trash fish to fishmeal & fish oil in S.E. Asia

• Over 5 million tonnes of low value fish is used for animal feed each year
• Most of this used to be fed directly to pigs, poultry and increasingly aquaculture
• Now discouraged due to poor storage qualities and high levels of wastage at feeding
• Trend to pelleted feed with fishmeal

Positive effect on fishmeal & fish oil production volumes
Result: Static or declining volumes
Current Demand Trends
Move from ‘Agri’ to ‘Aqua’ sector

Changing uses of fishmeal

- 1960: 50.1% Aquaculture, 48.4% Chicken, 1.5% Pig, 0% Other
- 1980: 36.1% Aquaculture, 49.8% Chicken, 10% Pig, 4% Other
- 2008: 30.9% Aquaculture, 58.8% Chicken, 9.1% Pig, 0% Other
Reducing dietary inclusion levels

Inclusion levels of marine ingredients in Salmonid diets
2000-2008

% Dietary Inclusion

- Blue line: Fishmeal %
- Red line: Fish Oil %

Growing aquaculture demand & reducing inclusion – resulting usage

Global fishmeal and fish oil usage in aquaculture
2000-2008

- Fish meal used in aquaculture
- Fish Oil used in aquaculture

Data FAO & IFFO
Fishmeal usage moving to Asia

Usage of fishmeal by region
% of global production

USA & Canada
Europe
Asia (ex China)
China
Latin America
Other
Increasingly fishmeal and fish oil being used as strategic feed ingredients

- Fishmeal still used for pigs in weaner feeds
- Fishmeal still critical in all aquaculture hatchery feeds
- Fish oil used to produce healthy aquaculture products
- And increasingly in agricultural feeds to provide EFA’s to animal & final consumer
Fish oil usage moving from hydrogenated fat to aquaculture & capsules for human use
A growing recognition of the importance of EPA & DHA

Changing uses of fish oil
Mass Balance of Production 2008

Whole Fish: 16,473
By-Products: 5,491
FISH OIL: 1,032
Water/Steam: 15,990
4,942

IFFO estimates published OECD 2010

Thousand tonnes
## Total Mass Balance and resulting FIFO’s

*thousand tonnes except fish-in-fish-out ratio*

<table>
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<tr>
<th></th>
<th>FO</th>
<th>FM</th>
<th>Water</th>
<th>Total RM</th>
<th>Whole Fish</th>
<th>Farmed Production</th>
<th>FIFO</th>
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<td>Chicken</td>
<td>0</td>
<td>440</td>
<td>1178</td>
<td>1619</td>
<td>1214</td>
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<tr>
<td>Pig</td>
<td>0</td>
<td>1263</td>
<td>3380</td>
<td>4643</td>
<td>3482</td>
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<td>N/A</td>
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<td>Other Land Animals</td>
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<td>160</td>
<td>428</td>
<td>588</td>
<td>441</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>Other oil uses</td>
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<td>0</td>
<td>294</td>
<td>404</td>
<td>303</td>
<td>N/A</td>
<td>N/A</td>
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<td>Human Consumption</td>
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<td>0</td>
<td>337</td>
<td>463</td>
<td>347</td>
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<td>Marine Fish</td>
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<td>3138</td>
<td>2354</td>
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<td>Salmon &amp; Trout</td>
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<td>916</td>
<td>4069</td>
<td>5588</td>
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<td>537</td>
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<td>554</td>
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<td>716</td>
<td>537</td>
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<td>Aquaculture Sub-total</td>
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<td>3079</td>
<td>10371</td>
<td>14246</td>
<td>10684</td>
<td>27495</td>
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<tr>
<td>Total</td>
<td>1032</td>
<td>4942</td>
<td>15990</td>
<td>21964</td>
<td>16473</td>
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</tbody>
</table>

**IFFO 2008 estimates published OECD 2010**
FIFO Ratios in Aquaculture

FIFO 2000-2008 based on whole rendered fish

- Salmonids
- All fed Aquaculture

IFFO estimates
Use of whole fish in Aquaculture

Volumes of whole fish rendered for Aquaculture, 000 tonnes

- All fed Aquaculture
- Salmonids

IFFO estimates
Global use of rendered whole fish

Whole fish rendered for different purposes
Tonnes, 000

Aquaculture
Oil for H C
Oil other uses
Other land animals
Pigs
Chickens

IFFO estimates
Future Trends
Fishmeal future usage trends

- Aqua will continue to take a larger share
- Dietary inclusion levels will continue to fall in established species; new farmed species will start with high dietary levels (e.g., Tuna, cobia)
- Lower inclusion levels will require higher quality and special products e.g., controlled enzyme produced peptides
Fish Oil future usage trends

• Increasing confirmation of the importance of EPA & DHA in human & animal health
  • Heart function
  • Brain Function
  • Diabetes
  • Allergies

• Increasing volumes going for direct human consumption

• New GM plant products with long-chain omega-3 will appear but likely to be a precursor of EPA and not DHA in the foreseeable future

• Increasing volumes of fish oil from aquaculture – but beware the levels of EPA & DHA
Fishmeal future supply trends

- Fishmeal supplies will continue to be tight
- Increasing volumes of raw material will come from fisheries by-products
- More & more of the fisheries by-products will come from aquaculture
- Supplies of whole fish will increasingly come from stocks shown to be responsibly managed in order to reassure concerns over sustainability
Reassuring the value-chain about fisheries management

• FAO Code of Responsible Fisheries is the only internationally recognised measure of good management

• MSC standard certifies fisheries that are managed according to the FAO Code

• Currently small volumes of fishmeal & fish oil available from MSC approved fisheries
IFFO recently launched its Global Standard for Responsible Supply (RS)

- RS is a B-to-B initiative following the ISO-65 Standard
- 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
  - Avoids the use of IUU fish
  - Manufactures under a recognised quality control scheme to ensure product safety & purity
IFFO RS - progress to date

• Launched in October 2009
• Recently announced first approved plant – one in Peru for the processing of Peruvian Anchovy
• Another 70 factories under assessment as of April 2010 in four different countries (over 25% of world production)
IFFO RS – The Future

• Continuous development of the programme
• Fisheries by-product element being added
• Discussions on how to cover factory pollution
Improvers Programme 1

- Concern that Factories in some countries will find the RS Standard difficult to achieve
- No wish to dilute the Standard
- Desire to bring about fishery and factory improvement where required
- May require government commitment
- May require access to capital funds for investment in factory & fisheries management
- IFFO in discussion with FAO on implementation
Improvers Programme 2
To consist of:

• Identification of areas of non-compliance
• Structured programme of continuous improvement
• Agreed milestones along a defined timeline
• Final goal to be accreditation to RS Standard
Conclusions

• Fishmeal and fish oil will continue to play an important role in the healthy production of many farmed aquatic and terrestrial animals
• Fishmeal is becoming less of a commodity and more of a strategic nutritional ingredient
• The unique properties of fish oil will ensure continued strong demand to promote human health
• It will become increasingly important to be able to demonstrate that production is being conducted in a responsible manner