



# LINKAGE BETWEEN FARMED AND WILD FISH - fishmeal & fish oil as feed ingredients in the context of sustainable aquaculture

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## Points to cover:

- Introduction
- Fishmeal & fish oil as feed ingredients
- Global overview of fishmeal & fish oil production and consumption
- Impact of innovation on feed formulation
- Compliance with the FAO Code of Responsible Fisheries
- Conclusions

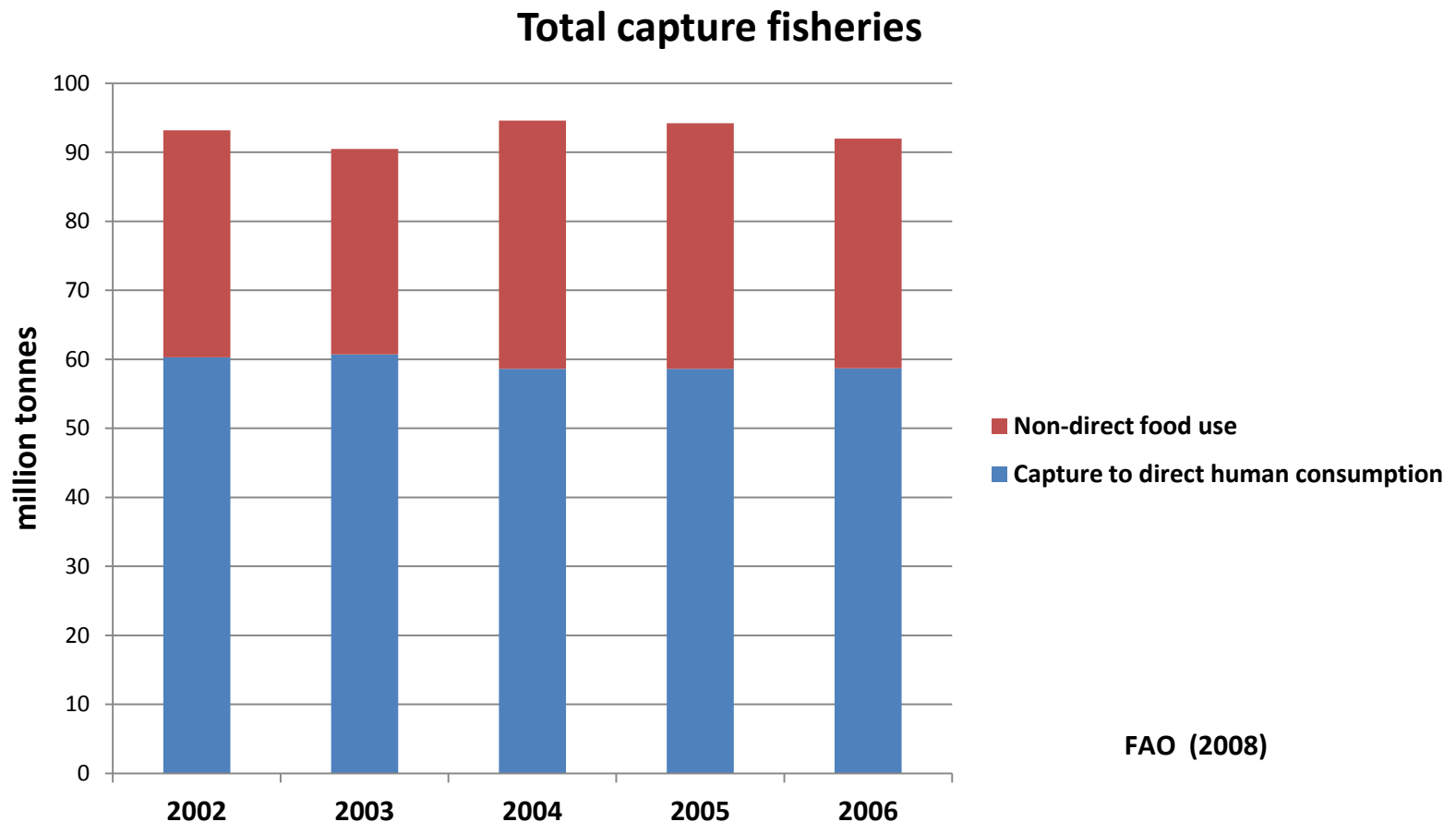


# IFFO

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.

# Two thirds of catches go for direct human consumption





Total Production .000 tonnes	Fishmeal	By-Product Coefficient %	By-product FM Production
ANGOLA	5.3	50	2.7
ARGENTINA	50.0	55	27.5
AUSTRALIA	14.0	50	7.0
BRAZIL	42.5	22	9.4
CAMBODIA	3.0	60	1.8
CANADA	31.2	100	31.2
CHILE	673.3	14	94.3
CHINA	141.0	5	7.1
DENMARK	161.3	20	32.3
ECUADOR	48.0	14	6.7
FAROE ISLANDS	44.4	5	2.2
FINLAND	3.6	70	2.5
FRANCE	13.7	100	13.7
GERMANY	19.0	100	19.0
ICELAND	140.9	32	45.1
INDIA	19.3	5	1.0
INDONESIA	15.0	30	4.5
IRAN	29.8	30	8.9
IRELAND	19.3	40	7.7
ITALY	4.3	100	4.3
IVORY COAST	1.0	60	0.6
JAPAN	202.9	90	182.6
KOREA (Rep)	49.6	20	9.9
LITHUANIA	22.0	20	4.4
MALAYSIA	44.2	40	17.7
MALDIVES	2.0	80	1.6
MAURITIUS	5.0	60	3.0
MEXICO	105.8	50	52.9
MOROCCO	78.0	15	11.7
NAMIBIA	12.5	100	12.5
NEW ZEALAND	27.0	10	2.7
NORWAY	135.0	22	29.7
PAKISTAN	56.2	20	11.2
PANAMA	55.2	10	5.5
PERU	1,396.1	2	27.9
POLAND	22.4	40	9.0
RUSSIAN FED.	71.0	50	35.5
SENEGAL	4.3	100	4.3
SEYCHELLES	20.0	70	14.0
SOUTH AFRICA	83.8	10	8.4
SPAIN	20.0	100	20.0
SWEDEN	23.6	50	11.8
TAIWAN	18.2	70	12.7
THAILAND	468.0	60	280.8
U.K.	42.0	70	29.4
U.S.A.	216.2	25	54.1
VIETNAM	45.9	50	23.0
TOTAL 47	<b>4,706.8</b>		1205.6
OTHERS	111.2	20	22.2
<b>TOTAL WORLD</b>	<b>4,818.0</b>	<b>25%</b>	<b>1227.9</b>

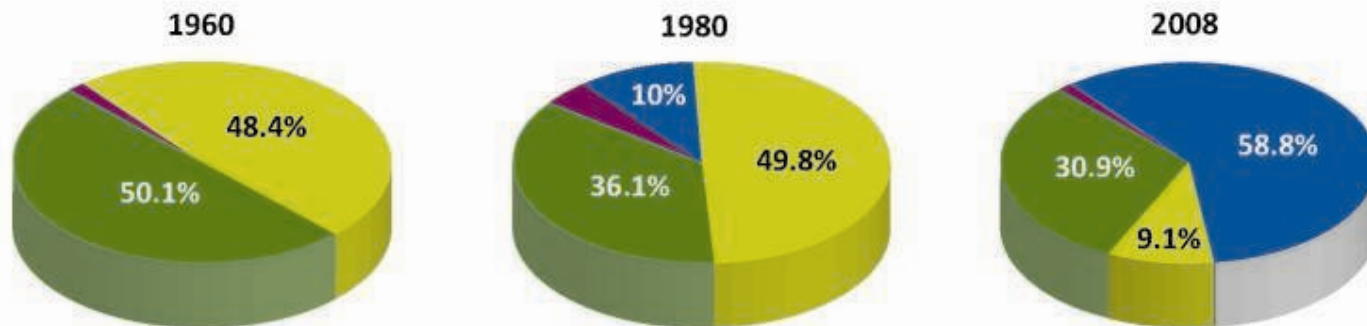
Increasingly fishmeal is coming from fisheries by-products - now reached over 25% of Global Production.



# **Fishmeal & fish oil as feed ingredients**

# Move from 'Agri' to 'Aqua' sector

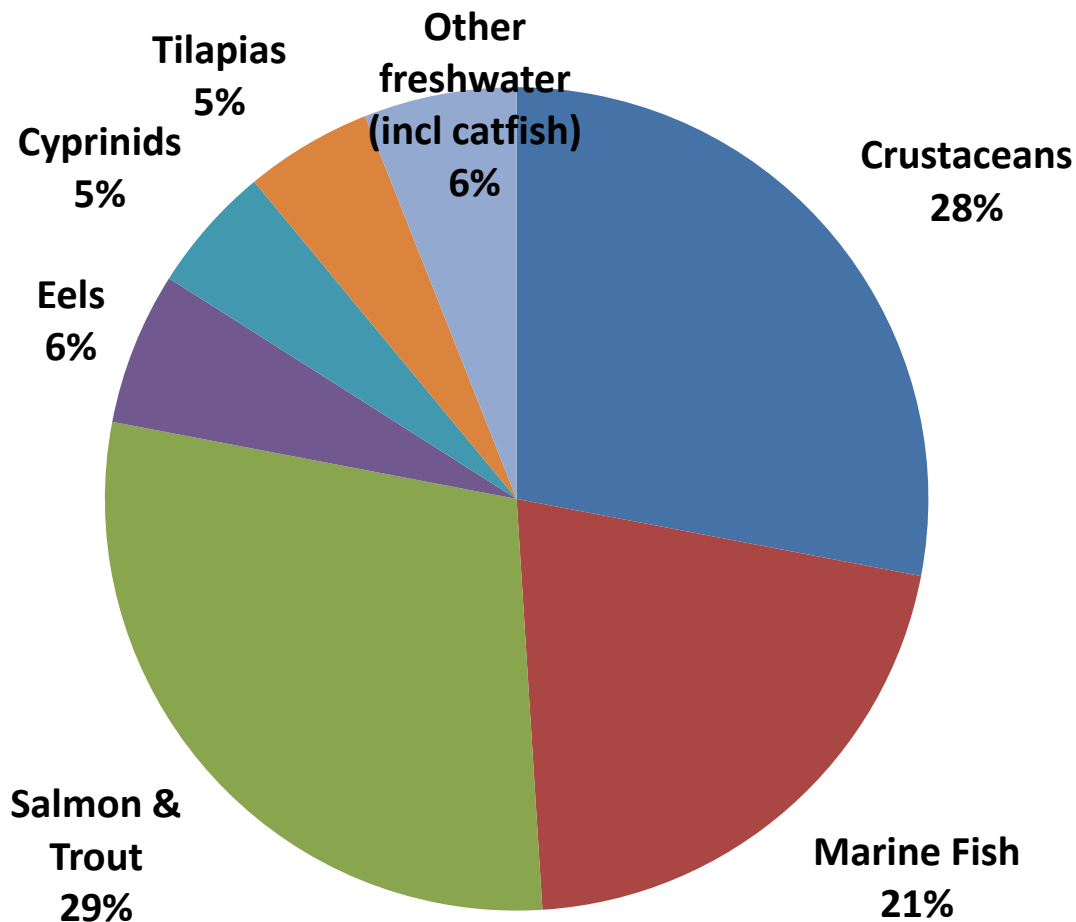
## Changing uses of fishmeal



- Aquaculture
- Chicken
- Pig
- Other



# Use of fishmeal in Aquaculture - 2008

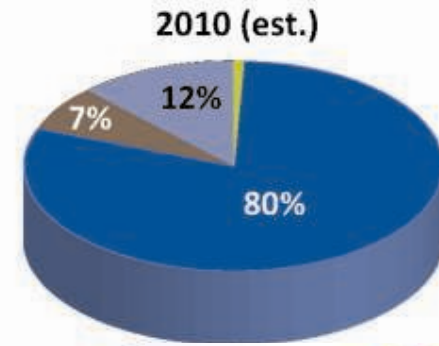
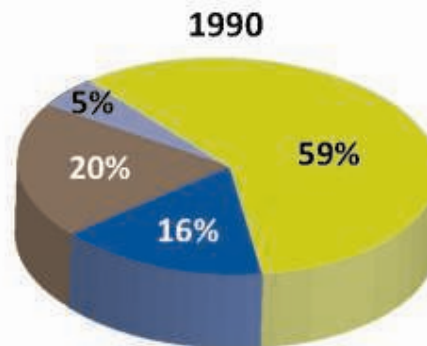
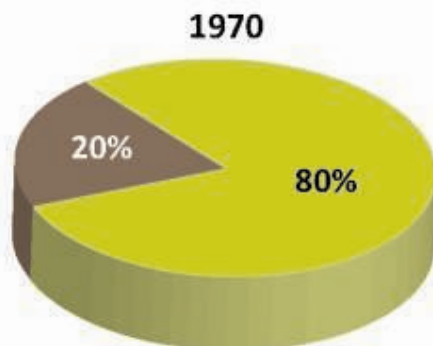




# Fish oil usage moving from hydrogenated fat to aquaculture & capsules

A growing recognition of the importance of EPA & DHA

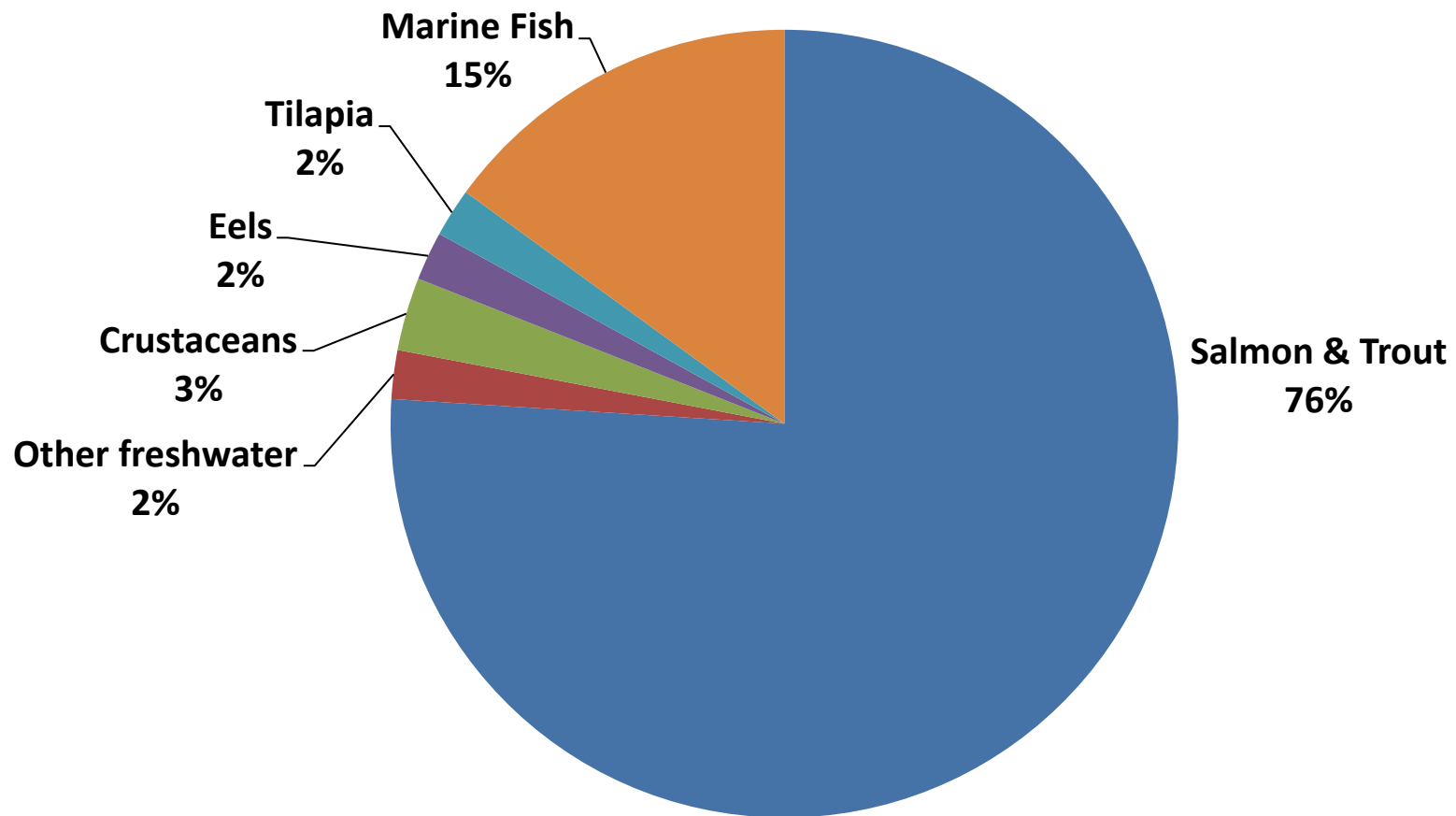
## Changing uses of fish oil



- Hardened edible
- Aquafeed
- Industrial
- Refined edible



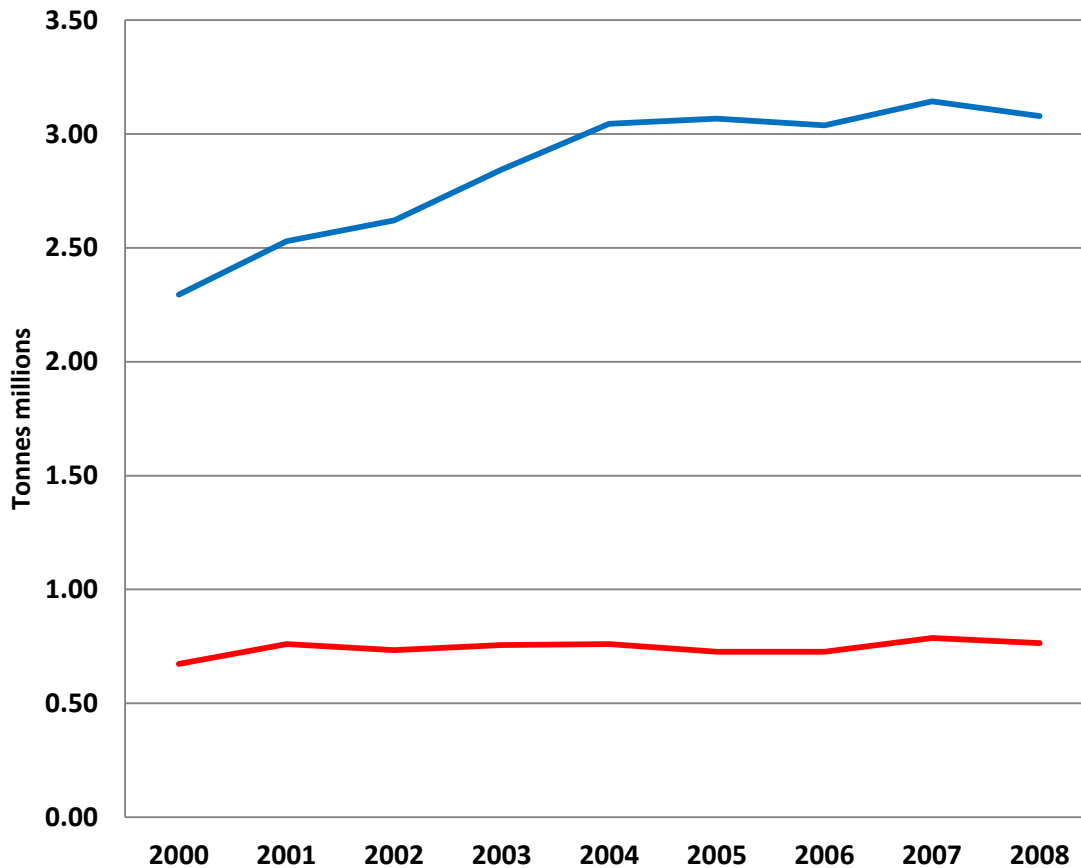
# Use of fish oil in aquaculture 2008



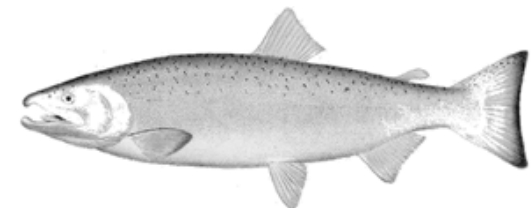


# **Global overview of fishmeal & fish oil production and consumption**

# Global fishmeal & fish oil usage in aquaculture



— Fish meal used in aquaculture  
— Fish Oil used in aquaculture



Data FAO & IFFO

# Mass Balance of Production 2008



# Fishmeal used in farmed production

thousand tonnes

	FM	Raw Material	Whole Fish	Farmed Production	FIFO
Chicken	440	1957	1468	N/A	N/A
Pig	1263	5613	4210	N/A	N/A
Other Land Animals	160	711	533	N/A	N/A
Crustaceans	786	3494	2621	4673	0.56
Marine Fish	738	3281	2461	2337	1.05
Salmon & Trout	916	4069	3052	2365	1.29
Eels	186	825	619	244	2.53
Cyprinids	130	577	433	13037	0.03
Tilapias	143	636	477	2737	0.17
Other Freshwater	180	800	600	2102	0.29
<b>Aquaculture Sub-total</b>	<b>3079</b>	<b>13683</b>	<b>10262</b>	<b>27495</b>	<b>0.37</b>
<b>Total</b>	<b>4942</b>	<b>21964</b>	<b>16473</b>		

# Fish Oil used in farmed production

thousand tonnes

	FO	Raw Material	Whole Fish	Farmed Production	FIFO
Human Consumption	126	2689	2017	N/A	N/A
Other uses	110	2340	1755	N/A	N/A
Crustaceans	28	589	442	4673	0.09
Marine Fish	115	2455	1841	2337	0.79
Salmon & Trout	604	12857	9643	2365	4.08
Eels	15	320	240	244	0.98
Cyprinids	1	24	18	13037	0.00
Tilapias	18	376	282	2737	0.10
Other Freshwater	15	313	235	2102	0.11
<b>Aquaculture Sub-total</b>	<b>796</b>	<b>16934</b>	<b>12701</b>	<b>27495</b>	<b>0.46</b>
<b>Total</b>	<b>1032</b>	<b>21964</b>	<b>16473</b>		





# Total Mass Balance and resulting FIFO's

thousand tonnes

	FO	FM	Water	Total RM	Whole Fish	Farmed Production	FIFO
Chicken	0	440	1178	1619	1214	N/A	N/A
Pig	0	1263	3380	4643	3482	N/A	N/A
Other Land Animals	0	160	428	588	441	N/A	N/A
Other oil uses	110	0	294	404	303	N/A	N/A
Human Consumption	126	0	337	463	347	N/A	N/A
Crustaceans	28	786	2178	2992	2244	4673	0.48
Marine Fish	115	738	2285	3138	2354	2337	1.01
Salmon & Trout	604	916	4069	5588	4191	2365	1.77
Eels	15	186	537	738	554	244	2.26
Cyprinids	1	130	350	481	361	13037	0.03
Tilapias	18	143	430	591	443	2737	0.16
Other Freshwater	15	180	521	716	537	2102	0.26
<b>Aquaculture Sub-total</b>	<b>796</b>	<b>3079</b>	<b>10371</b>	<b>14246</b>	<b>10684</b>	<b>27495</b>	<b>0.39</b>
<b>Total</b>	<b>1032</b>	<b>4942</b>	<b>15990</b>	<b>21964</b>	<b>16473</b>		





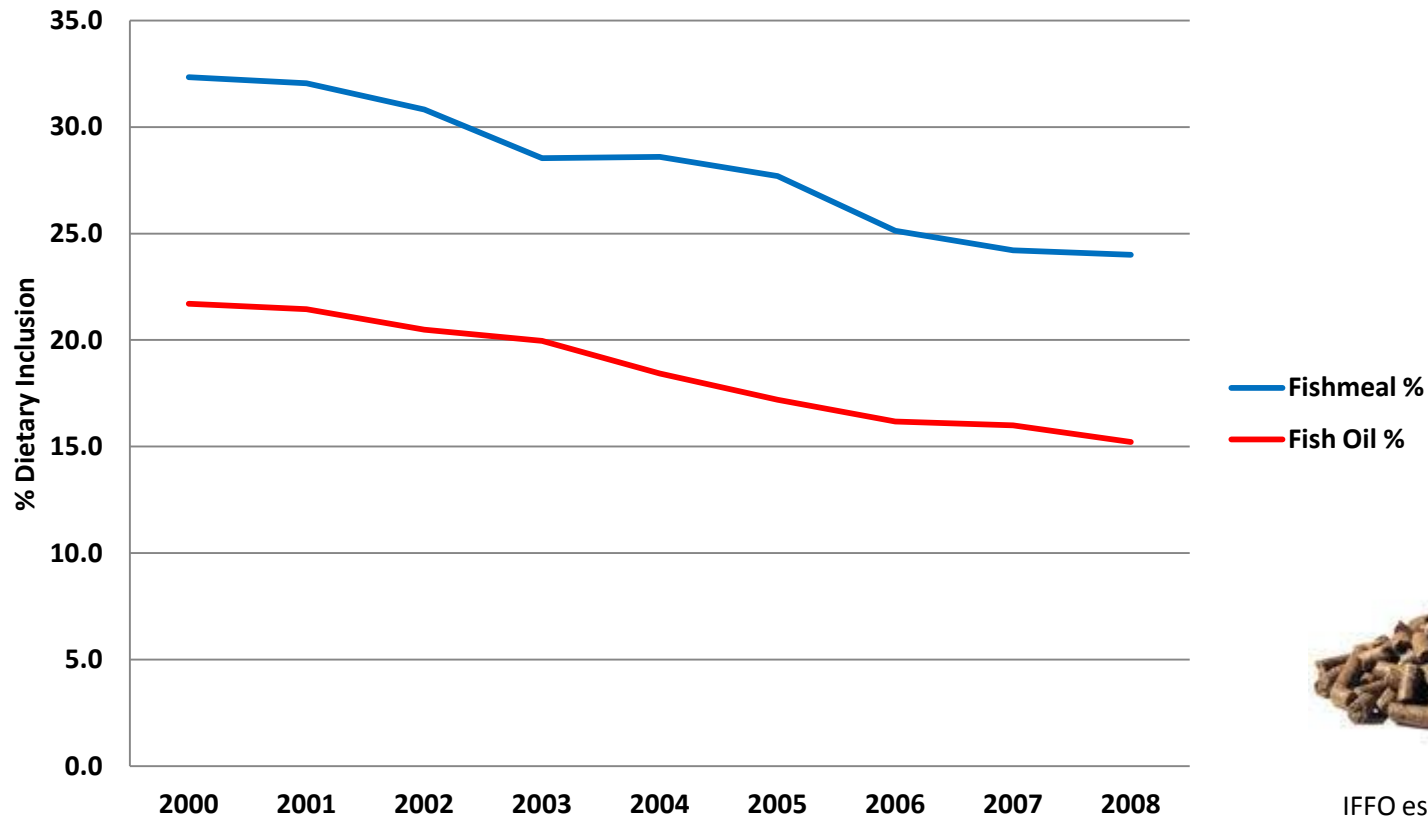
# **Impact of innovation on feed formulation in aquaculture**

# Marine ingredients in aquaculture

- Fishmeal & fish oil increasingly becoming strategic ingredients
- As aquaculture volumes grow, inclusion levels decrease in established species with increasing nutritional knowledge
- Partial replacement of fishmeal by vegetable proteins with improved processing & breeding technology
- Fish oil inclusion levels also decreasing as feeding regimes improve to spare EPA & DHA
- In the longer-term EPA & DHA will become available from algae and genetically modified plants

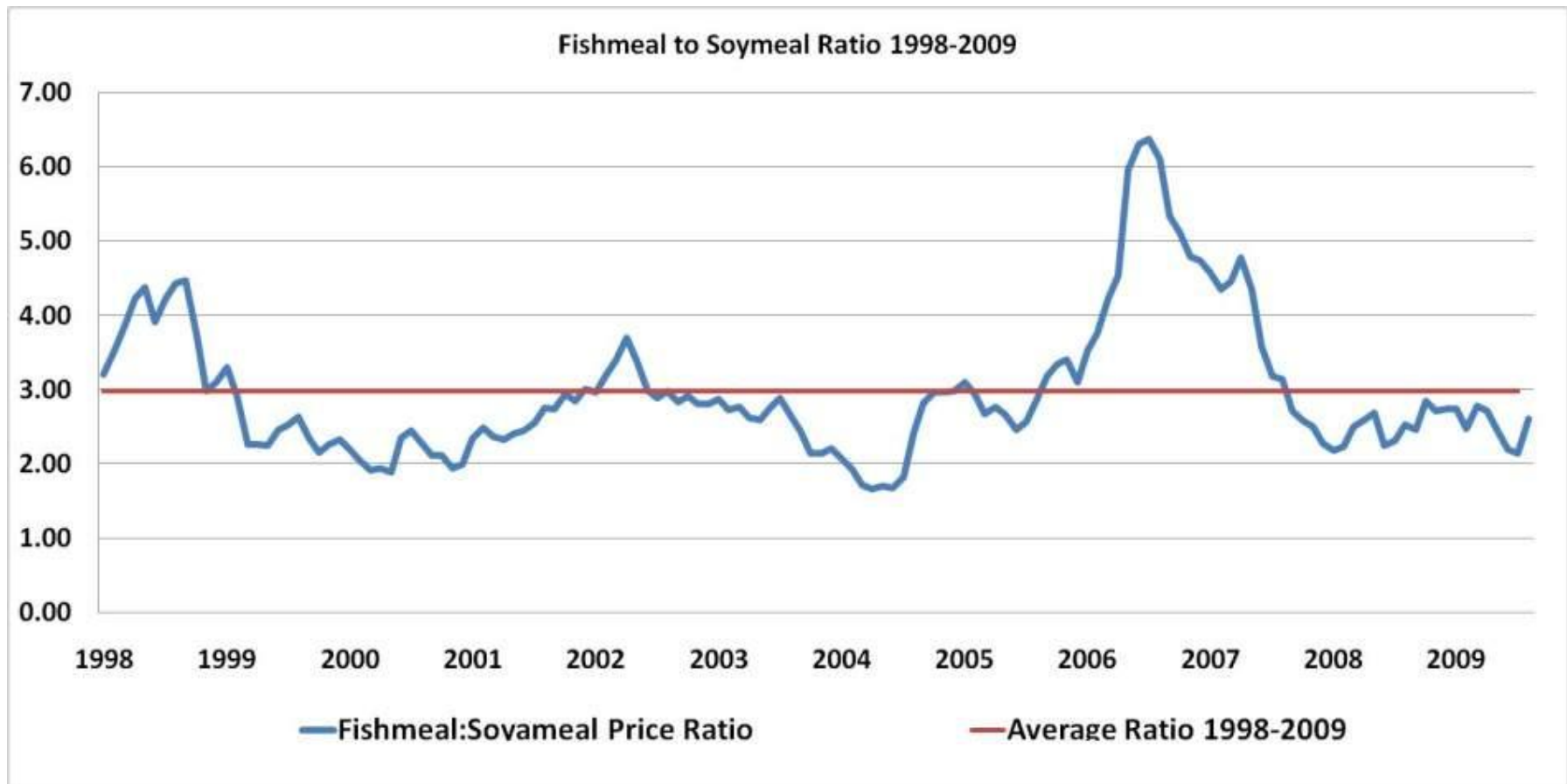
# Reducing dietary inclusion levels

**Inclusion levels of marine ingredients in Salmonid diets  
2000-2008**



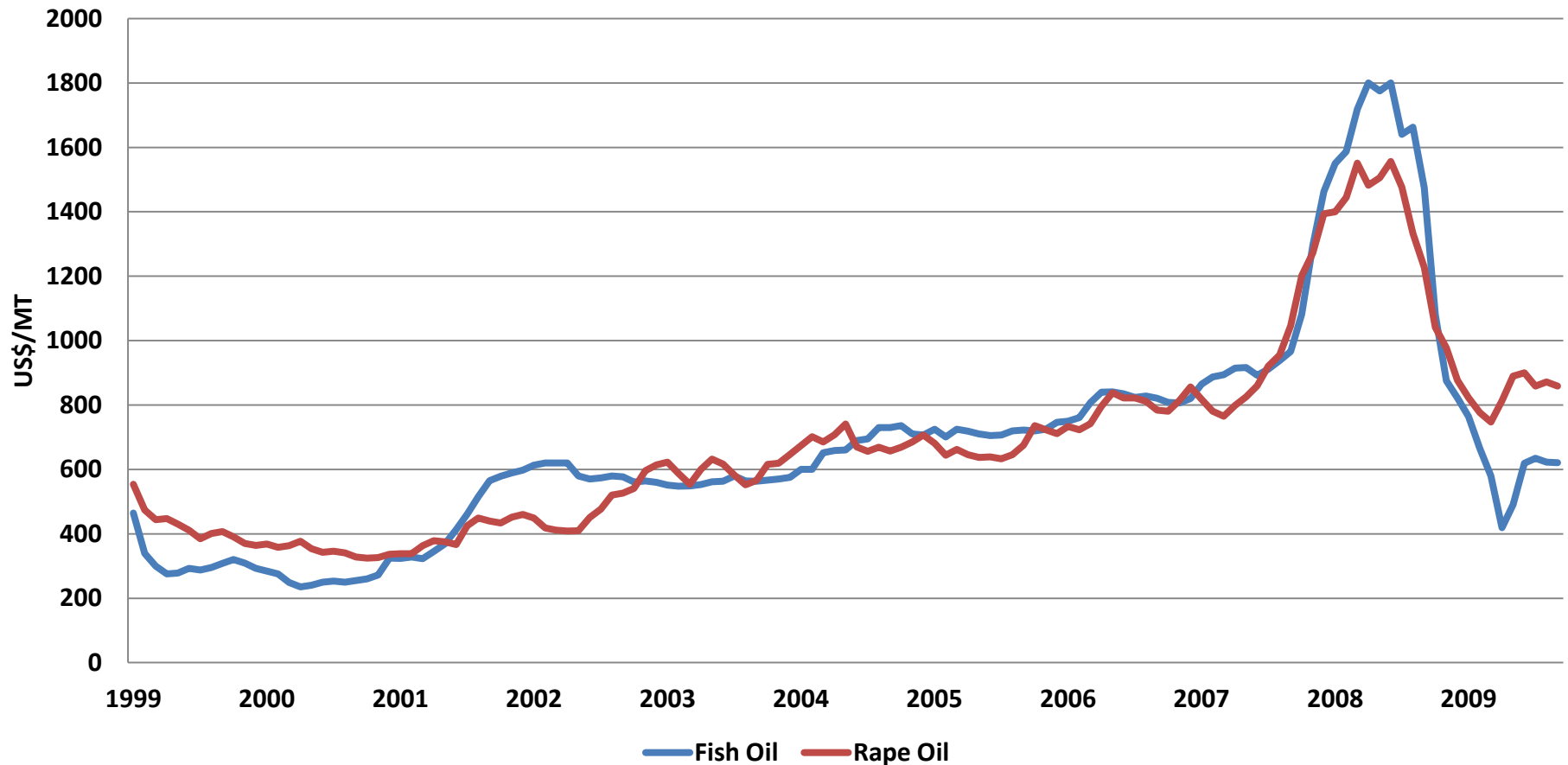
IFFO estimates

# Market ensures fishmeal remains competitive

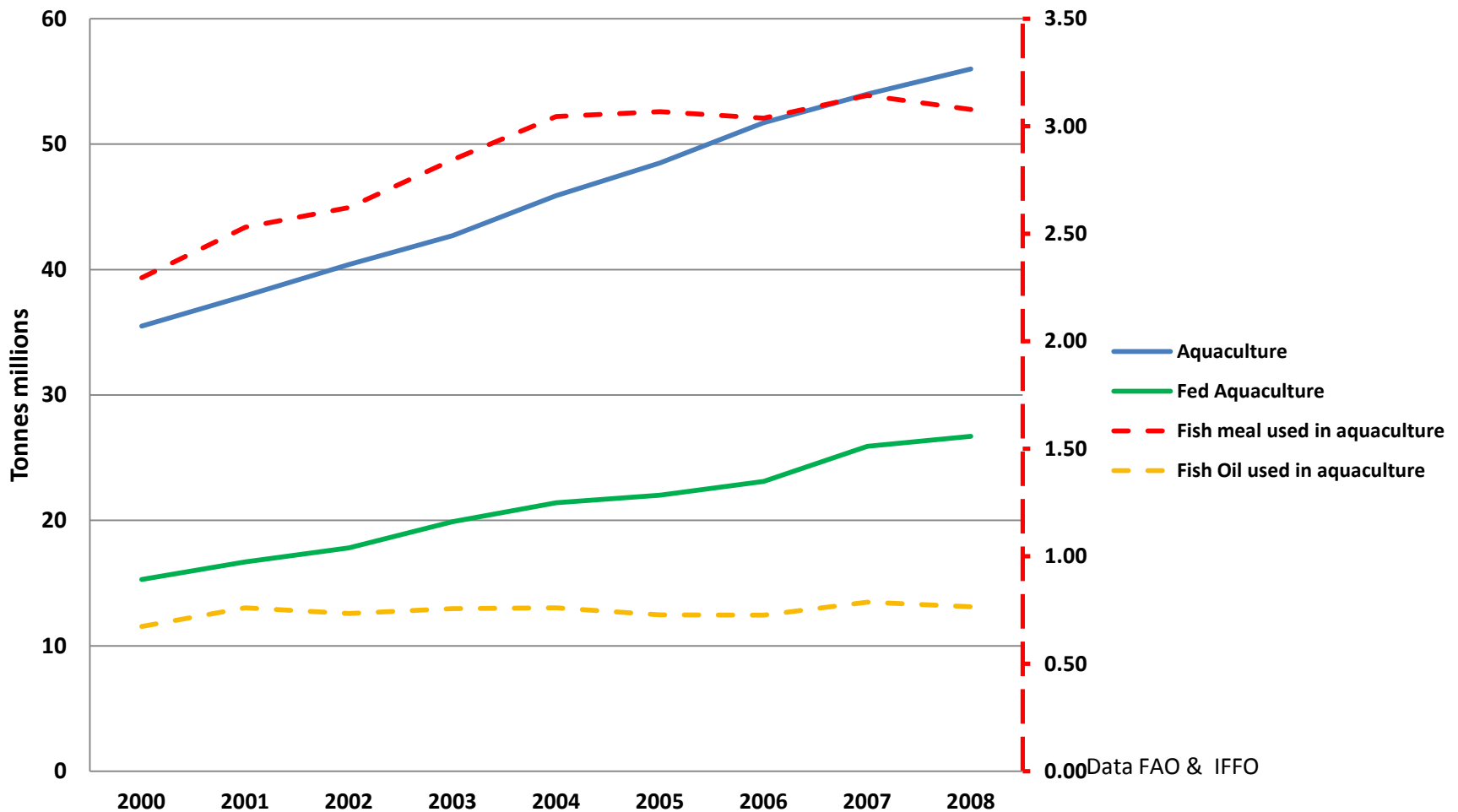


# Market ensures oil prices remain competitive

## Monthly Prices of Fish Oil and Rape Oil 99-09



# Global aquaculture production with fishmeal and fish oil usage





# **Compliance with the FAO Code of Responsible Fisheries**

# Reassuring the value-chain about feed fisheries management

- FAO Code of Responsible Fisheries is the only recognised measure of good fisheries management
- MSC standard certifies fisheries that are managed according to FAO Code
- Currently small volumes of fishmeal & fish oil available from MSC approved fisheries – more under assessment





# IFFO recently launched its Global Standard for Responsible Supply (RS)

- RS is a B-to-B initiative following the ISO-65 Standard
- 3<sup>rd</sup> 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



## RS progress to date

- Launched in October 2009
- Recently announced first approved plant – TASA's Callao Norte plant in Peru when processing Peruvian Anchovy
- Another 48 factories under assessment as of March 2010 in four different countries (over 25% of world production)

## RS – The Future

- Continuous development of the programme
- Fisheries by-product element being added
- Discussions on how to cover factory pollution
- Possibility of an improvers' programme to encourage positive change in areas where the Standard is not currently met – notably parts of Asia



# Conclusions

- The production of fishmeal & fish oil from whole wild fish is set to continue but volumes are likely to decrease with more fish going for human consumption and tight quotas
- Volumes from fisheries by-products (including from aquaculture) will continue to grow improving eco-efficiency
- Aquaculture will continue to grow by reducing the inclusion level of marine ingredients but ensuring that they are produced under recognised certification standards
- These standards will help improve production practices and contribute to the improved sustainability of global aquaculture

## The Future

*A combination of improved nutrition, better raw material processing, and responsibly sourced marine ingredients should ensure that aquaculture feeds have the means to remain sustainable for the foreseeable future.*