

**September 2010**

## **Fishmeal and fish oil figures**

### **CONTENTS**

1. Fishmeal and fish oil – summary
2. WORLD – food and feed fisheries and aquaculture – key figures
3. WORLD – production, supply and consumption of fishmeal and fish oil
4. EUROPEAN – production, supply and consumption of fishmeal and fish oil
5. UK – production, supply and use of fishmeal and fish oil
6. Feeding fishmeal and fish oil to:
  - 6a farmed land animals
  - 6b fishmeal to farmed fish (aquaculture)
  - 6c fish oil to farmed fish (aquaculture)
7. Prices and market value

**Compiled by Seafish (with thanks to the International Fishmeal and Fish Oil Organisation (IFFO) for permission to use its data).**

### **For further information contact:**

Karen Green  
**Industry Environmental Communications**  
Sea Fish Industry Authority  
Humber Seafood Institute  
Origin Way  
Europarc  
Grimsby  
N E Lincs  
DN37 9TU  
k\_green@seafish.co.uk

**Tel:** 01472 252300

**Mobile:** 07515 993499

Seafish, the authority on seafood, was founded in 1981 by an act of parliament and supports the seafood industry for a sustainable, profitable future. Our services range from research and development, economic consulting, market research and training through to account management and legislative advice for the seafood industry.

**[www.seafish.org](http://www.seafish.org)**

**<http://seafish.sin.org>**

# 1. Fishmeal and fish oil – summary

## **MANUFACTURE**

Fishmeal and fish oil are produced mainly from sustainably managed stocks of fish for which there is currently little or no demand for human consumption. About 20 to 25% of the raw material is recycled trimmings from food fish processing, thus avoiding the environmental and financial costs of disposal.

These two fish products are manufactured in EU approved dedicated manufacturing plant and through a safety monitored supply chain. Fishmeal is never produced in the same factories as meat and bone meal.

Fishmeal is a light brown flour or meal produced by cooking, pressing, drying and milling fresh raw fish and fish trimmings. There are four different products sold as meal:

- High quality - usually for small-scale aquaculture units (trout farms) or marine species.
- LT (low temperature) meal - is highly digestible and used in salmon and piglet production.
- Prime
- FAQ (fair average quality) - lower protein content feed ingredient for pigs and poultry

## **PRODUCTION & CONSUMPTION**

World-wide annual production from approximately 400 dedicated fishmeal plants has been just under 5 million tonnes of fishmeal in the last two years. It has fluctuated between 4.8 and 6.2 million tonnes over the last five years. The main producing countries in 2008 were Peru, Chile, Thailand, USA, Japan, Denmark, China, Iceland and Norway. World production of fish oil is about 1 million tonnes. This is all produced from about 23 million tonnes of whole fish and trimmings.

The EU produced about 329,000 tonnes of fishmeal in 2008 (down from 335,000 in 2007) and consumes about 1 million tonnes. Fish oil production in the EU in 2008 was 111,400 tonnes, down from 119,700 tonnes. (With nearby Iceland and Norway added, as well as Russia and the Faroe Islands, production of fishmeal from the North East Atlantic, North Sea and other European regions was 720,000 tonnes in 2008; and production of fish oil 234,300 tonnes.)

## **USE**

Virtually all fishmeal is used as a high protein (60 to 72%) ingredient in feed for farmed land animals and farmed fish. Fish oil is used mainly in the feed of farmed fish and in very small quantities in land animal feed. Fishmeal is not fed straight (undiluted). The typical inclusion rate for fishmeal in farm animal diets is 1-5% of dry matter, mainly in specialist diets – e.g. for weaner pigs. A typical farmed salmon diet contains 20-30% fishmeal and 15-20% fish oil

Aquaculture expanded worldwide by more than 9% per annum for the 10 years to 2002 and since then at a slightly slower rate. While the use of fishmeal and fish oil will consequently increase – improved efficiency and some substitution means this is likely to be at a slower rate.

## 2. WORLD food and feed fisheries and aquaculture – key figures

### WORLD FISHING

Global capture production in 2006  
(FAO SOFIA Report 2008) 92.0Mt

Capture fisheries and aquaculture in 2006  
(FAO SOFIA Report 2008) 110 Mt

Of which, caught to produce fishmeal and fish oil in 2006  
(FAO SOFIA Report 2008) 20.2Mt  
(This is down 14% on 2005 and still well below the peak levels of more than 30 million tonnes recorded in 1994.)

### FISHMEAL AND FISH OIL PRODUCTION

#### Raw materials

a) Whole fish caught by dedicated  
feed fishing fleets (IFFO, 2008) 16.5Mt

b) Trimmings and rejects from  
food fish (IFFO 2008) 5.5Mt

Total raw material 22Mt

#### Production

Fishmeal (IFFO 2008) 4.8Mt

Fish oil (IFFO 2008) 1.0Mt

### AQUACULTURE

Aquaculture production in 2006  
(FAO SOFIA Report 2008) 51.7Mt

\*Use of fishmeal and oil in aquaculture production (2006, FAO)

	<b>Meal</b>	<b>Oil</b>
1992	0.96 Mt	0.23 Mt
2006	3.06 Mt	0.78 Mt

\*As % of world fishmeal consumption (2006, FAO)

	<b>Meal</b>		<b>Oil</b>		
	*2006	2010	2002	*2006	2010
2002	46%	50%	81%	81%	88%

\*Source: FAO The State of World Fisheries and Aquaculture 2008

### 3. WORLD production, supply and consumption of fishmeal and fish oil

About 300 dedicated fishmeal plants world-wide produce an average of about 5 million tonnes (2004-2008) of fishmeal and 1 million tonnes of fish oil per annum from around 23 million tonnes of fish. In order of output the fishmeal producer country ranking for 2008 was Peru, Chile, Thailand, USA, Japan, Denmark, China, Iceland and Norway.

\*The aquaculture sector consumed about 3.06 million tonnes (or 56.0 percent) of world fishmeal production and 0.78 million tonnes (or 87.0 percent) of total fish oil production in 2006. Thus, the total amount of fishmeal and fish oil used in aquafeeds is estimated to have grown more than threefold between 1992 and 2006, from 0.96 million tonnes to 3.06 million tonnes and from 0.23 million tonnes to 0.78 million tonnes, respectively. Aquafeed manufacturers are increasing their use of fishmeal and fish oil at the expense of all other sectors (e.g. human consumption, industrial and pharmaceutical).

\*Globally the demand for and use of fishmeal has increased rapidly, especially in some of the emerging aquaculture countries in Asia. China is the single largest user of fishmeal. In 2004, it used 1.6 mt, with 1.2 mt imported and the remainder coming from domestic production. Of this total amount, about 75% was used for aquaculture production. The Asia-Pacific aquaculture sector uses about 2.4 mt of fishmeal (equivalent to about 10.3 mt of raw material) as a feed source.

\*Source: FAO *The State of World Fisheries and Aquaculture 2008*

#### FISHMEAL FIGURES

##### 3.1 Fishmeal production 2006 - 2008 and Jan-June 2007-2009 – top producers

Fishmeal Production: 5 major producers (1,000 tonnes)						
	Jan – Dec			Jan – June		
	2006	2007	2008	2007	2008	2009
<b>Peru</b>	1456	1420	1390	895	885	867
<b>Chile</b>	776	700	668	470	446	457
<b>Denmark</b>	213	162	151	130	130	120
<b>Norway</b>	176	155	148	120	83	62
<b>Iceland</b>	162	135	251	114	77	70
<b>Total</b>	<b>2783</b>	<b>2572</b>	<b>2608</b>	<b>1729</b>	<b>1621</b>	<b>1576</b>

Source: *Globefish*

<http://www.globefish.org/dynamisk.php4?id=4782>

## WORLD cont'd

### 3.2 Production of fishmeal 2003 - 2008

<i>Tonnes</i>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
Peru	1,250,800	1,982,700	2,019,900	1,378,000	1,407,000	1,396,100
Chile	664,300	933,100	794,200	810,800	770,000	673,300
Denmark	245,600	259,200	213,100	209,400	166,000	161,300
Norway	212,100	215,100	154,300	169,500	172,000	135,000
Iceland	278,700	204,200	188,400	144,100	152,000	140,900
<b>TOTAL</b>	<b>2,651,500</b>	<b>3,594,300</b>	<b>3,369,900</b>	<b>2,711,800</b>	<b>2,667,000</b>	<b>2,506,600</b>
Rest of the World	2,750,100	2,680,200	2,455,700	2,431,500	2,303,000	2,311,800
<b>TOTAL World</b>	<b>5,401,600</b>	<b>6,274,500</b>	<b>5,825,600</b>	<b>5,143,300</b>	<b>4,970,000</b>	<b>4,818,400</b>

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009

### 3.3 Total world production of fishmeal 1998 to 2008

*tonnes*

1988	6,837,000
1989	6,875,000
1990	6,380,000
1991	6,448,000
1992	6,263,000
1993	6,514,000
1994	7,441,000
1995	6,833,000
1996	6,912,000
1997	6,617,000
1998	5,208,000
1999	6,670,000
2000	7,125,000
2001	5,997,400
2002	6,201,700
2003	5,401,600
2004	6,274,500
2005	5,825,600
2006	5,143,300
2007	4,970,000
2008	4,818,400

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009

## WORLD cont'd

### 3.4 Fishmeal production by top 16 countries 1998 to 2008 (ranked according to 2008 figures)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peru	815	1904	2309	1844	1941	1251	1983	2,019	1,378	1,407	1,396
Chile	642	957	842	699	839	664	933	794	759	770	673
Thailand	410	398	387	381	387	397	403	410	461	428	468
USA	294	355	335	342	337	318	353	268	232	251	212
Japan	379	409	387	227	225	230	295	230	219	200	202
Denmark	324	311	318	299	311	246	259	213	209	166	161
China	693	707	806	723	460	420	400	305	297	204	141
Iceland	220	234	272	286	304	279	204	188	144	152	140
Norway	301	241	264	216	241	212	215	154	169	172	135
Mexico	45	48	65	61	65	65	55	55	80	73	105
S Africa	94	84	109	111	93	113	114	108	73	88	83
Morocco	55	59	53	55	61	64	63	66	28	60	78
Russian Fed	163	155	126	98	95	68	70	60	65	66	71
Pakistan						46	47	48	51	56	56
Panama							43	42	48	45	55
Argentina							47	43	50	40	50
UK (23)	52	53	50	47	48	52	51	53	44	44	42

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down. Only new 2008 figures added – no revisions have been made to previous years' figures.

### 3.5 Catch of top ten fishmeal producers 2007

'000 tonnes	2007 Fishmeal Production	Raw material
Peru	1,407	Anchovy
Chile	770	Anchovy, Jack Mackerel, Sprats, By-products
Thailand	428	Various species & By-products including Tuna
USA	251	Menhaden, Pollock By-products
China	204	Anchovy, various species
Japan	200	Tuna by-products, various species
Norway	172	Herring, sprat, blue whiting, by-products
Denmark	166	Sand eel, blue whiting, herring, by-products
Iceland	152	Herring, by-products
S Africa	88	Sardines & by-products

Source: Dawn Purchase, Marine Conservation Society, Seafood Summit, 2009

## WORLD cont'd

### 3.6 Fishmeal exports by top 16 countries 1998 to 2008 (ranked according to 2008 figures)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peru	661	1546	2365	1937	1520	1372	1751	2000	1338	1219	1561
Chile	494	606	572	491	497	576	494	709	470	474	478
Denmark	302	320	307	307	305	203	247	254	253	161	210
Germany	204	195	218	201	204	185	169	208	208	168	179
USA	96	87	95	108	113	110	141	165	118	105	89
Mexico						19	9	12	51	39	83
Ecuador	21	31	57	57	25	41	43	40	67	83	82
Morocco			21	27	20	35	34	55	48	33	70
Norway	152	161	85	83	122	73	61	51	37	34	64
Russia	95	105	113	79	68	61	33	33	36	43	50
Argentina							40	36	39	32	42
Iceland	219	235	250	272	306	239	223	197	126	127	41
F Islands						25	26	27	33	35	38
Mauritius			24	25	27	29	30	33	35	37	38
Korea						36	24	31	32	35	30
Thailand			10	7	20	11	20	31	77	84	25
UK (32)						8	6	10	12	7	14

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down. Only new 2008 figures added – no revisions have been made to previous years' figures.

### 3.7 Fishmeal imports by top 16 countries 1998 to 2008 (ranked according to 2008 figures)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
China	416	673	1241	984	976	797	1147	1598	980	986	1351
Japan	330	346	338	478	480	388	402	376	412	350	309
Norway	100	143	183	143	127	150	162	202	211	220	242
Germany	252	233	304	197	210	198	183	232	239	210	166
Taiwan	172	294	299	295	242	239	238	234	213	152	150
Vietnam	-	14	15	29	20	60	61	96	83	104	114
Denmark	94	139	131	130	135	167	132	142	155	151	113
Greece	40	40	53	77	84	74	69	87	85	96	93
UK	239	221	241	233	192	184	143	138	143	91	92
Spain	63	94	123	116	89	95	105	82	68	81	86
Russia	95	73	40	167	133	99	55	90	52	59	72
Indonesia	40	77	118	113	67	57	70	83	89	55	68
Australia						35	44	44	49	57	60
Chile							44	12	43	37	57
Italy	48	68	76	87	67	66	64	63	54	57	55
Turkey						18	54	39	44	55	50

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down. Only new 2008 figures added – no revisions have been made to previous years' figures.

## WORLD cont'd

### 3.8 Fishmeal consumption by top 16 countries 1996-2005 (ranked according to 2005 figures)

'000 tonnes	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
China	1240	1516	1113	1366	2030	1682	1406	1183	1528	n/a
Japan	802	792	699	744	710	691	687	596	703	n/a
Chile	293	261	149	351	270	222	351	36	467	n/a
Thailand	566	466	418	481	504	484	408	405	409	n/a
Norway	232	320	247	223	361	276	246	289	309	n/a
Taiwan				308	315	303	254	253	250	n/a
Peru					-58	-123	412	-83	234	n/a
USA	306	360	256	301	276	285	291	262	223	n/a
UK	278	313	266	253	269	265	229	228	188	n/a
Spain	107	161	137	145	214	205	182	193	185	n/a
Denmark	73	141	116	131	141	122	141	210	143	n/a
Russian Fed	276	250	108	127	58	202	145	118	103	n/a
S Africa	159	206	95	94	109	118	78	87	101	n/a
Vietnam	-	-	-	35	34	46	34	72	86	n/a
Mexico					72	63	51	51	75	n/a
Canada	95	103	94	79	111	114	88	77	74	n/a

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2005. Figures rounded up or down. After 2004, this series was discontinued.

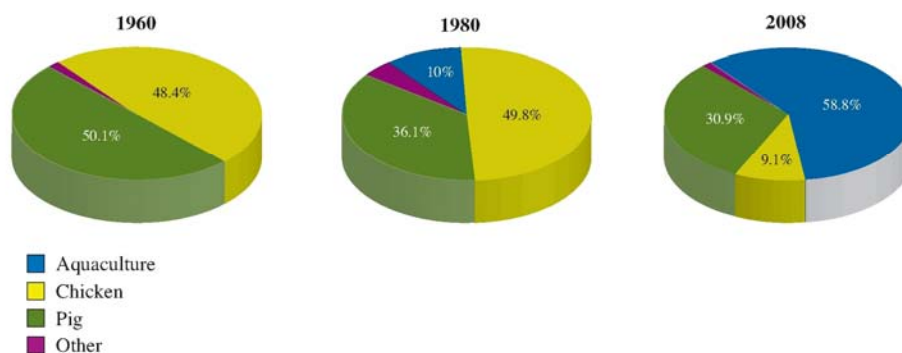
### 3.9 World fishmeal market use by sector – market estimate

%	2002*	IFFO est 2007**	2008	2010*
Ruminants	1	-	-	<1
Fish	46	65	59	56
Pigs	24	24	31	20
Poultry	22	7	9	12
Others	7	4	1	12

Source: \*Trade estimates reported in paper by R.D.Miles and F.A.Chapman, University of Florida 'The Benefits of Fish Meal in Aquaculture Diets'.

\*\* IFFO Fishmeal and Fish Oil Statistical Yearbook 2008 and 2009..

Changing uses of fishmeal



Source: IFFO



## WORLD cont'd

### FISH OIL FIGURES

#### 3.10 Fish body oil production by top 16 countries 1998-2008 (ranked according to 2008 figures)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Peru	123	515	593	300	221	205	352	287	286	337	275
Chile	7	188	171	145	146	130	138	145	155	187	167
USA	101	130	87	118	96	80	81	75	65	75	86
Iceland	88	102	95	96	70	104	49	63	54	51	72
Japan	58	68	70	63	64	61	68	67	68	60	62
Denmark	136	129	98	80	86	71	68	93	67	57	55
Norway	98	69	83	56	72	52	37	30	40	44	37
Mexico	6	7	7	7	8	9	12	13	26	21	35
Morocco	18	14	18	31	20	29	25	31	31	20	29
Turkey	5	5	5	6	9	14	14	14	15	16	17
Spain	20	20	20	21	20	21	22	23	23	23	16
UK	10	12	10	10	11	11	12	12	12	14	14
China	7	10	24	27	27	30	13	12	12	12	12
Ecuador							14	10	10	9	11
Panama				24	10	8	9	10	8	9	9.9
Sweden				8	9	9	9	9	10	10	9.8

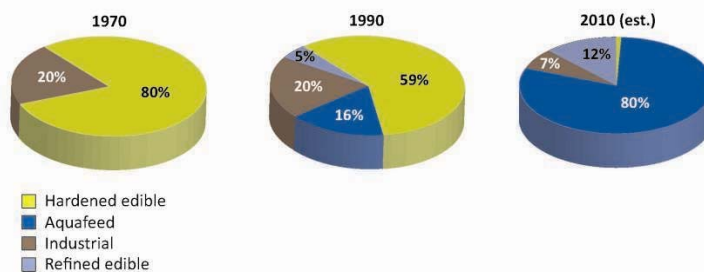
Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Rounded up or down. Only new 2008 figures added – no revisions have been made to previous years figures

#### 3.11 World fish oil market use by sector – market estimate

%	IFFO est 2007	2008
Fish	83	77
Others	17	11
Human		11

Source: IFFO Fishmeal and Fish Oil Statistical Yearbook 2008 and 2009.

#### Changing uses of fish oil



Source: IFFO

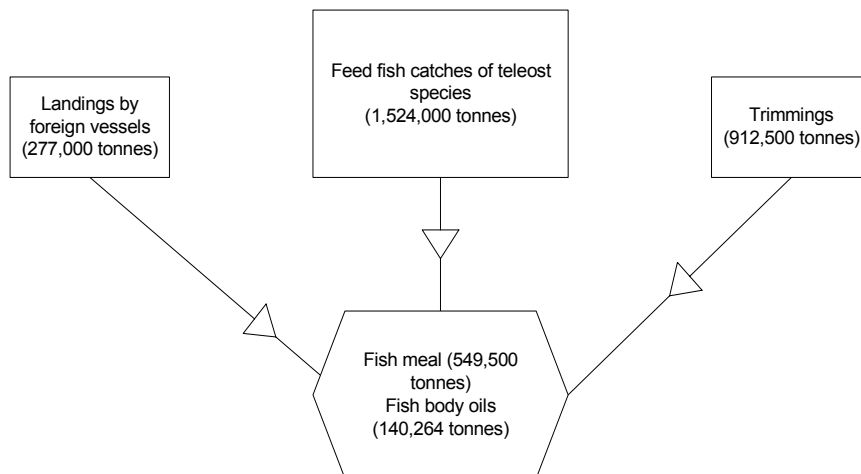
## 4. European production, supply and consumption of fishmeal and fish oil

### Sources of raw material for fishmeal and fish body oil

The raw material used to produce fish meal and fish body oil in the EU is derived from:

- Feed fish caught by EU registered vessels for the sole purpose of fish meal production.
- Feed fish caught by non EU vessels but landed into EU ports.
- Trimmings, fish off-cuts and offal from the fish processing industry.

The sources and quantities of raw material used to produce fishmeal and fish body oils in the EU



Note: Conversion factors fish weight (feed fish and trimmings) to meal = 1:0.2 and oil = 1:0.06.

*Extracted from derived data (National landings statistics; interviews with fish meal manufacturers). Taken from European Parliament report: The Fish meal and Fish oil Industry – Its role in the Common Fisheries Policy FISH 113 EN, page 5, Feb 2004*

## European cont'd

### FISHMEAL FIGURES

#### 4.1 European fishmeal production 1998 to 2008 (alphabetical incl Norway, Iceland, Faeroe Islands and Russia)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	304	311	318	299	308	246	259	213	209	166	161
Faeroe Islands	23	25	24	44	46	25	68	57	62	55	44
Finland	2	3	3	3	3	3	3	3	4	4	4
France	17	17	21	38	35	13	13	20	20	14	14
Germany	19	19	15	16	16	20	14	13	14	19	19
Greece	0	2	1	5	5	2	0	0	-	-	-
Iceland	220	234	272	284	304	279	204	188	144	152	141
Ireland	26	22	15	15	16	16	22	16	16	19	19
Italy	5	3	1	2	3	3	3	3	3	4	4
Norway	301	241	264	216	241	212	215	154	169	172	135
Poland	17	19	15	16	18	18	11	12	21	22	22
Portugal	3	4	3	3	NA	NA	NA	NA	-	-	-
Russia	163	155	126	98	95	68	70	60	65	66	71
Spain	93	84	120	115	117	119	103	20	20	20	20
Sweden	22	28	18	21	21	22	13	10	10	23	24
UK	52	53	50	47	48	52	51	53	44	44	42
<b>TOTAL</b>	<b>1,267</b>	<b>1,220</b>	<b>1,252</b>	<b>1,222</b>	<b>1,276</b>	<b>1,098</b>	<b>1,049</b>	<b>822</b>	<b>801</b>	<b>780</b>	<b>720</b>

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down. Only new 2008 figures added – no revisions have been made to previous years figures

#### 4.2 Use of trimmings in EU fishmeal production 2002

These figures date from 2003. No new information is available. IFFO currently estimates about 20 – 25% of the fishmeal produced in the EU-15 is manufactured from trimmings from food fish processing.

Country	Feed fish (tonnes)	Trimmings (tonnes)	% dependency (on trimmings)
Denmark	332,000	33,200	10%
UK	7,800	42,500	84%
Spain		42,000	100%
Sweden	18,750	6,250	25%
France		25,000	100%
Ireland	8,800	13,200	60%
Germany		17,000	100%
Italy		3,000	100%
<b>TOTAL</b>	<b>367,350</b>	<b>182,150</b>	<b>33%</b>

Source: Survey of fishmeal manufacturers; IFFO, (2003). Reproduced in European Parliament report: 'The Fish meal and Fish oil Industry – Its role in the Common Fisheries Policy' FISH 113 EN, page 15, Feb 2004 and Report – 'Assessment of the sustainability of industrial fisheries producing fishmeal and fish oil', page 72 for RSPB by Poseidon Aquatic Management Ltd. Sept 2004

## European cont'd

### 4.3 European fishmeal exports 1998 to 2008 (alphabetical incl Norway and Iceland/Faeroe Islands)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Belgium	5	11	22	3	7	3	3	1	7	3	5
Denmark	302	320	307	307	305	203	247	254	253	161	210
F' Islands	29	30	38	44	24	25	26	27	28	35	38
France	9	54	56	47	30	32	32	31	38	26	26
Germany	204	195	218	201	204	185	169	208	208	168	179
Greece	-	2	1	6	5	1	-	-	-	-	-
Iceland	219	235	250	272	306	239	223	197	126	127	41
Ireland	17	7	9	26	17	12	19	19	19	5	0.3
Italy	11	5	4	5	7	5	4	5	7	9	9
Neth'lands	22	26	20	19	19	1	12	5	7	7	8
Norway	152	161	85	83	122	73	61	51	37	34	64
Poland	-	19	13	15	21	15	10	10	10	9	5
Spain	24	32	29	26	24	22	17	17	17	26	20
Sweden	10	13	6	3	3	0	6	9	6	6	0.1
UK	22	21	22	15	11	8	6	10	12	7	14
<b>TOTAL</b>	<b>1,026</b>	<b>1,131</b>	<b>1,080</b>	<b>1,072</b>	<b>1,105</b>	<b>824</b>	<b>825</b>	<b>844</b>	<b>775</b>	<b>623</b>	<b>619.4</b>

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down.  
Only new 2008 figures added – no revisions have been made to previous years' figures

### 4.4 European fishmeal imports 1998 to 2008 (alphabetical including Norway and Iceland/Faeroe Islands)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Belgium	44	50	57	29	16	6	6	8	7	8	10
Cyprus	7	7	8	12	9	8	7	5	3	5	2
Czech Rep	22	20	23	26	22	17	11	12	8	6	7
Denmark	94	139	131	130	135	167	132	142	155	151	114
Finland	21	15	23	31	33	14	18	21	19	14	12
France	83	93	95	62	55	32	42	47	50	39	39
Germany	252	233	304	197	210	198	183	232	239	211	166
Greece	40	39	53	77	84	74	69	87	85	96	93
Hungary	37	32	35	40	35	26	19	25	10	6	4
Ireland	16	13	21	10	9	7	4	7	9	5	5
Italy	48	68	76	87	67	66	64	63	54	57	55
Neth'lands	64	49	73	52	73	64	63	55	34	27	26
Norway	100	145	183	143	127	150	162	202	211	221	242
Poland	2	2	4	19	16	13	14	23	17	14	14
Portugal	12	14	17	47	13	3	10	9	6	7	8
Spain	63	94	123	116	89	95	105	82	68	81	86
Sweden	3	2	2	-	-	-	-	-	-	-	-
UK	239	221	241	233	192	184	143	138	143	91	92
<b>TOTAL</b>	<b>1147</b>	<b>1236</b>	<b>1521</b>	<b>1311</b>	<b>1185</b>	<b>1124</b>	<b>1052</b>	<b>1158</b>	<b>1118</b>	<b>1039</b>	<b>975</b>

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down.  
Only new 2008 figures added – no revisions have been made to previous years' figures

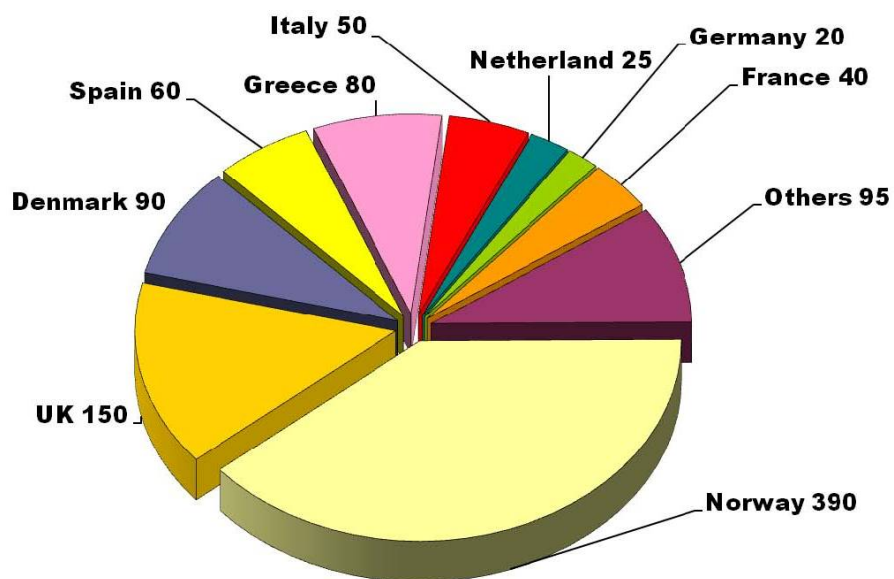
## European cont'd

### 4.5 European fishmeal consumption 1996–2005 (alphabetical incl Norway and Iceland/Faeroe Islands)

'000 tonnes	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Belguim	41	48	39	39	35	26	9	2	4	n/a
Cyprus	7	7	7	7	8	12	9	8	7	n/a
Czech Rep	26	26	21	20	23	26	22	17	11	n/a
Denmark	73	141	96	131	141	122	141	210	143	n/a
Finland	34	37	23	18	26	33	36	17	21	n/a
France	89	96	95	79	60	53	61	13	23	n/a
Germany	96	57	68	61	101	11	22	33	29	n/a
Greece	33	36	40	39	53	77	84	75	69	n/a
Hungary	37	35	37	32	35	40	35	26	18	n/a
Iceland	9	25	1	-1	23	13	-2	40	-	n/a
Ireland	33	32	25	29	27	-1	8	11	6	n/a
Italy	75	80	40	66	74	83	63	64	64	n/a
Netherlands	68	55	42	24	53	33	55	63	51	n/a
Norway	232	320	249	225	361	276	246	289	309	n/a
Poland	23	22	17	26	6	20	20	16	24	n/a
Portugal	17	22	15	21	17	47	70	3	13	n/a
Spain	107	161	132	140	214	204	182	193	185	n/a
Sweden	18	21	12	9	12	17	18	22	21	n/a
UK	278	313	269	254	269	265	229	228	188	n/a
TOTAL	1,296	1,529	1,228	1,219	1,604	1,567	1,453	1,448	1,186	n/a

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2005. Figures rounded up or down. After 2004, this series was discontinued.

### 4.6 European fishmeal consumption 2009 (EU-27 + Norway) 1,000,000 mt.



Source: Resource supply from sustainably managed sources - using the example of fishmeal. Michael Lutz, Koster Marine Proteins. 2010.

## European cont'd

### FISH OIL FIGURES

#### 4.7 European fish body oil production 1998-2008

(alphabetical incl Norway, Iceland, Faeroe Islands and Russia)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	135.9	129.3	97.7	80.5	85.7	71.3	68.1	93	66.8	56.9	55.5
Faeroe Islands	9.0	10.0	9.5	9.5	9.8	10.4	10.6	11	11.5	9.6	9.2
France	4.2	4.0	4.0	4.3	4.4	4.6	4.7	5	5.2	5	5.3
Germany	6.1	6.0	6.3	6.4	6.4	6.2	6.5	6	7	5.5	5.8
Iceland	88.5	102.1	95.0	96.0	70.3	103.6	48.9	63	53.6	50.7	72.5
Ireland	4.0	3.9	3.8	4.0	4.2	4.3	4.4	4	3.7	3.8	4.3
Norway	98.0	68.9	82.6	56.0	71.9	52.5	36.7	30	39.7	44.4	37.1
Portugal	1.8	1.2	1.7	1.4	1.2	1.4	1.4	1	1.5	1.6	1.8
Russia	18.8	11.8	11.8	10.8	10.8	10.8	3.6	4	3.8	3.9	4
Spain	21.6	19.9	19.9	20.6	20.3	20.9	22.0	23	23	23	16
Sweden	7.4	9.6	9.7	8.2	8.7	8.8	9.0	9	9.6	9.7	9.8
UK	9.6	11.6	10.4	10.1	10.6	11.1	11.6	12	12.1	14.2	12.9
<b>TOTAL</b>	<b>386.1</b>	<b>366.5</b>	<b>340.6</b>	<b>297.0</b>	<b>293.5</b>	<b>295.1</b>	<b>227.5</b>	<b>261</b>	<b>237.5</b>	<b>228.3</b>	<b>234.2</b>

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Only new 2008 figures added – no revisions have been made to previous years' figures

#### 4.8 European fish body oil consumption 1996-2005

(alphabetical incl Norway and Iceland/Faeroe Islands)

'000 tonnes	1996	1997	1998	1999	2000	2001	2002	2003	2004
Belgium	27.1	19.3	1.8	1.6	3.8	1.2	0.2	3.0	9.5
Czech Rep	0.5	0.3	0.1	0.3	0.1	0.1	0.1	0.1	2.6
Denmark	51.0	59.7	46.9	55.8	50.9	54.8	54.4	49.5	66.2
Finland	7.3	9.1	5.6	4.9	3.4	4.5	4.4	4.5	2.3
France	15.4	26.3	21.0	27.1	25.4	30.5	16.3	23.2	21.8
Germany	64.8	42.0	10.2	13.6	19.7	13.9	13.1	9.2	5.5
Iceland	8.1	6.8	7.2	8.1	8.1	7.9	8.4	7.6	6.2
Ireland	15.2	7.9	7.0	5.6	5.1	5.1	4.5	4.5	4.6
Italy	22.1	21.3	19.4	28.1	28.5	21.6	17.3	18.2	15.5
Netherlands	97.5	72.7	11.0	47.4	60.1	32.9	11.5	8.9	17.4
Norway	149.1	156.2	154.5	179.3	214.2	211.1	202.1	216.1	214.8
Poland	3.1	1.8	0.5	1.0	1.0	1.1	1.7	2.1	2.7
Portugal	0.0	0.1	0	0	2.9	1.2	1.6	1.3	1.5
Spain	26.4	20.7	35.0	30.0	33.8	41.3	30.8	42.9	43.6
Sweden	2.4	1.1	2.5	0.8	3.7	3.7	4.1	4.8	5.3
UK	94.5	80.4	58.4	54.5	53.6	64.9	48.2	57.3	69.8
<b>TOTAL</b>	<b>584.5</b>	<b>525.7</b>	<b>381.1</b>	<b>458.1</b>	<b>514.35</b>	<b>495.8</b>	<b>418.7</b>	<b>453.2</b>	<b>489.3</b>

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2005. Information not available after 2004.

## 5. UK production, supply and use of fishmeal and fish oil

### 5.1 Summary of fishmeal supply – UK 2002 – 2008

Tonnes	2002	2003	2004	2005	2006	2007	2008
Consumption	240,000	233,000	192,000	187,000	189,000	134,800	134,100
Imports from EU	35,000	31,000	51,000	49,000	63,000	44,500	40,200
Imports from non-EU	155,000	152,000	91,000	88,000	76,000	46,300	51,900
UK production	50,000	50,000	50,000	50,000	50,000	44,000	42,000

Source – Trade estimates

### 5.2 Sources of UK fishmeal imports 2000 to 2008

Tonnes	2000	2001	2002	2003	2004	2005	2006	2007*	2008*
Peru	70,096	54,732	28,877	47,036	19,434	23,201	37,623	21,200	24,600
Iceland	57,498	52,568	64,248	49,097	42,513	33,346	13,607	3,800	10,300
Norway	32,051	28,026	35,626	15,503	9,537	3,699	7,893	10,900	3,900
Chile	13,598	18,857	11,624	21,394	6,514	12,639	10,923	5,100	200
Thailand	-	-	-	-	-	-	-	-	-
Faroe Islands	8,725	11,694	14,162	9,747	11,508	10,893	2,296	3,400	7,900
M'rocco	0	0	0	6,954	1,709	2,844	2,131	1,900	-
Ec'dor	1,007		24	0			625	-	-
Mexico	-	-	-	-	-	-	-	-	-
USA	-	-	-	-		933	1,241	-	-
Others	7,750	6,705	956	1,225	50	21	-		5,000
<b>Sub tot</b>	<b>190,725</b>	<b>172,582</b>	<b>155,517</b>	<b>151,956</b>	<b>91,265</b>	<b>88,122</b>	<b>76,339</b>	<b>46,300</b>	<b>51,900</b>
Denm'k	4,777	9,624	17,829	14,297	24,701	16,093	25,168	13,100	22,000
G'many	33,815	25,980	9,612	8,551	8,206	15,748	30,782	13,500	8,400
Eire	9,730	21,549	5,547	5,997	15,060	11,591	6,043	13,200	9,700
N'Lnds	9	1,685	10	1,561	773	3,908	74		-
France	1,647	415	1,102	441	384	438	417	-	-
Bel/Lux	0	0	0	0		23		-	-
Spain	248	330	1,323	639	2101	715	102	300	100
Italy	0	0	1	0		244	48	-	-
Port'gal			1,049	0				-	-
Sweden	0			0				-	-
Others	0			0				-	-
<b>Sub tot</b>	<b>50,226</b>	<b>60,183</b>	<b>36,473</b>	<b>31,486</b>	<b>51,227</b>	<b>48,770</b>	<b>62,634</b>	<b>44,500</b>	<b>40,200</b>
<b>Total</b>	<b>240,951</b>	<b>232,765</b>	<b>191,990</b>	<b>183,442</b>	<b>142,492</b>	<b>136,892</b>	<b>138,973</b>	<b>90,800</b>	<b>92,100</b>

Mainly trade sources but \*Figures taken from IFFO Fishmeal and Fish Oil Statistical Yearbooks 2008 and 2009.

## UK cont'd

### 5.3 Fishmeal consumption and imports - UK 1996 to 2008

<i>000' tonnes</i>	<b>UK consumption</b>	<b>UK imports</b>	<b>From EU</b>	<b>From non EU</b>
<b>1996</b>	272,000	241,995	<i>Na</i>	<i>Na</i>
<b>1997</b>	330,000	284,788	34,289	250,499
<b>1998</b>	260,000	238,602	34,968	203,634
<b>1999</b>	270,000	221,056	41,260	19,796
<b>2000</b>	290,000	240,951	50,226	190,725
<b>2001</b>	280,000	232,765	60,183	172,582
<b>2002</b>	240,000	191,990	36,473	155,517
<b>2003</b>	233,000	183,442	31,486	151,956
<b>2004</b>	192,000	142,492	51,227	91,265
<b>2005</b>	187,000	136,892	48,770	88,122
<b>2006</b>	189,000	138,973	62,634	76,339
<b>2007</b>	134,800	90,800	44,500	46,300
<b>2008</b>	134,100	92,100	40,200	51,900

*Source: Trade sources*

### 5.4 UK fishmeal market use by sector 2004

<b>%</b>	<b>UK 2004</b>
Ruminants	Zero
Fish	55
Pigs	15
Poultry	25
Others	5

*Source: Trade estimates*



## 6a. Feeding fishmeal and oil to farmed land animals

Fishmeal as an ingredient is particularly suited to meet the demands of the contemporary food chain. It is a natural and safe product from responsibly managed fisheries with health, welfare and environmental benefits.

The aquaculture sector consumed around 56% of world fishmeal production and 87% of total fish oil production in 2006\*. Other uses are poultry and pigs and other markets (mainly pet food). Use in ruminant feed, which had been about 5-10% of the EU market, is currently zero, as there is a precautionary EU ban on its use in ruminant feed as part of BSE controls.

- Fishmeal is fed to farm animals, not only to improve productivity, but also to protect health and welfare and reduce dependence on antibiotics and other drugs.
- Fishmeal has low antigenicity, making it easy for young animals to digest.
- Fishmeal has anti-inflammatory properties which improve animal's disease resistance
- Fishmeal and fish oil can claim to be the first "functional feeds" – offering, through their high omega-3 content, specific health and welfare benefits to both farmed livestock and to the human population eating the animal products.

*\*Source: FAO The State of World Fisheries and Aquaculture 2008*

## Feeding fishmeal and oil to farmed land animals cont'd

6a.1 Recommended rates of inclusion in diets for optimum benefit (currently only used in pig and poultry feed)

<b>Pig</b>	<b>% inclusion</b>
Creep	5-10
Weaner	5-10
Grower	3-5
Finisher	3
Sow	3
<b>Poultry</b>	<b>% inclusion</b>
Chick rearing	Up to 3
Broiler	2-5
Layer	2
Breeder	1-5
Turkey	3-10
Pheasant/game	3-7
<b>Dairy Cattle</b>	
Late pregnancy	2.5-10
Lactating	5-10
Calves	2.5-10
<b>Beef Cattle</b>	
<b>Sheep</b>	
<b>Breeding ewes</b>	
Pregnant	2-7.5
Lactating	5-10
<b>Growing lambs</b>	
Early weaned/ Intensively reared	2.5-7.5
Finishing lambs/ On forage diets	2.5-7.5
Reduce body fat/ On overfat lambs	5-10

Source: Nutritional advice in 2002

## Feeding fishmeal and oil to farmed land animals cont'd

### 6a.2 Comparison of basic nutritive characteristics of various protein concentrates

	<b>Crude Protein g/kg</b>	<b>Crude fat g/kg</b>	<b>Energy MJ DE/kg</b>	<b>Calcium g/kg</b>	<b>Phosphorus g/kg</b>
Fishmeal (herring)	720	100	11.0	55	33
White fishmeal	620	40	10.8	75	36
Skimmed milk	330	5	11.3	12.5	10.1
Low lactose whey	170	10	12.1	15	12
Whey	120	7	14.0	8.7	7
Dried blood	800	10	8.49	2.8	2.2

Source: IFFO 2002

### 6a.3 Amino acid composition fishmeal/other protein sources

<b>g/kg</b>	<b>Fishmeal</b>	<b>Soya bean</b>	<b>Barley (42)</b>
Lysine	48	27	5
Methionine	16	6	2
Cystine	5	6	3
Threonine	25	17	4
Tryptophan	6	7	2
Leucine	43	38	8
Iso-leucine	25	28	4
Valine	28	22	6
Phenylalanine	23	21	6
Arginine	35	32	5
Histidine	17	11	2

Source: IFFO 2002

### 6a.4 A comparison of fishmeal with other protein sources

<b>Feed Ingredient</b>	<b>Fishmeal Chilean</b>	<b>Fishmeal Herring</b>	<b>Fishmeal White</b>	<b>Soyabean Meal – hipro</b>	<b>Milk Pwd – skimmed</b>
<b>As received %</b>					
Crude protein	66	71	66	48	34
Digestible CP	63	66	63	46	31
	<b>Essential amino acids:</b>				
Total lysine	5.0	5.6	4.4	2.7	2.3
Available lysine	4.8	5.4	4.2	2.5	2.2
Methionine + cysteine	2.5	2.6	2.4	1.3	1.2
Tryptophan	0.8	0.8	0.6	0.8	0.4

Source: Reprinted in *Fishmeal for Pigs* from *The Feeds Directory*

## Feeding fishmeal and oil to farmed land animals cont'd

### 6a.5 Fishmeal Nutritional Value

Feed Ingredient % as fed	Fishmeal		
	White	South American Herring	
Crude protein	65	66	70
Digestible CP	63	63	65
Oil	6	9	10
Moisture	7-9	9	7-9
Ash	19	11	11
Metabolisable Energy MJ/kgDM	13.1	13.4	16.4

*Source: Reprinted in Fishmeal for Sheep and Fishmeal for Dairy Cattle from The Feeds Directory*

## 6b. Feeding fishmeal to farmed fish

### Fishmeal usage in aquaculture – overall figures

#### 6b.1 Key feed manufacturers and estimated industrial aquafeed production and market share

	Mkt share 2007 (%)	Feed tonnage in 2006	Feed tonnage in 2007
<b>Northern Europe (NE)</b> Norway, Scotland, Ireland and Faroe Islands			
BioMar	23	300,000	316,250
Ewos	30	412,500	412,500
Skretting	43	500,000	591,250
Others	4	37,500	55,000
<b>Total (tonnes)</b>		<b>1,250,000</b>	<b>1,375,000</b>
<b>NE (% of total)</b>		<b>65</b>	<b>65</b>
<b>Rest of Europe (RE)</b> >1000 tonnes: Den, Fin, Fr, Gr, It, Pol, Sp, Ger, Russ Fed, Tur, Cz Reop, Sw, Nths			
BioMar	18	128,250	137,000
Skretting	18	128,250	130,500
Provimi	9	60,750	65,250
Persus	7	47,250	50,750
Didaq	6	40,500	43,500
Aller Aqua	5	33,750	36,250
Feedus	4	27,000	29,000
Others	33	209,250	239,250
<b>Total (tonnes)</b>		<b>675,000</b>	<b>725,000</b>
<b>RE (% of total)</b>		<b>35</b>	<b>35</b>
<b>Total aquafeeds NE + RE (tonnes)</b>		<b>1,925,000</b>	<b>2,100,000</b>

Source: FAO Technical Paper 541. Impact of rising feed ingredient prices on aquafeeds and aquaculture production. August 2010. Taken from BioMar Annual Report 2008.

#### 6b.2 Global fishmeal usage by species in 2000 to 2020

Species tonnes	Tot FM used	Mean % FM	Tot FM used	Mean % FM	Tot FM used	Mean % FM	Tot FM used	Mean % FM	Tot FM used	Mean % FM
	2000		2005		2010		2015		2020	
Carp	541	9	649	8	316	3	279	2	182	1
Tilapia	199	11	268	9	148	3	158	2	126	1
Shrimp	476	25	1044	24	860	12	790	8	616	5
Salmon	530	40	628	35	400	18	340	12	290	8
Marine fish	476	44	700	36	671	24	675	16	455	8
Trout	239	36	253	34	182	18	155	12	132	8
Catfish	61	8	220	12	192	6	148	3	107	2
Milkfish	31	10	23	5	11	2	14	2		
Eels	239	62	218	60	179	45	145	35	108	25

Source: Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds. Trends and future prospects. Albert Tacon and Marc Metian. August 2008.

## Feeding fishmeal to farmed fish cont'd

### 6b.3 Global fishmeal usage total 2000 to 2020

000 tonnes	Tot species production	Total fed production	Total feeds used	Total feed estimates	Total fm used
2000	14,900	8,000	14,782	15,055	2,922
2005	22,341	13,729	28,812	20,958	4,300
2010	31,632	21,351	34,647	27,744	3,291
2015	44,143	31,578	48,874		3,111
2020	60,014	45,557	66,636		2,385

Source: Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds. Trends and future prospects. Albert Tacon and Marc Metian. August 2008.

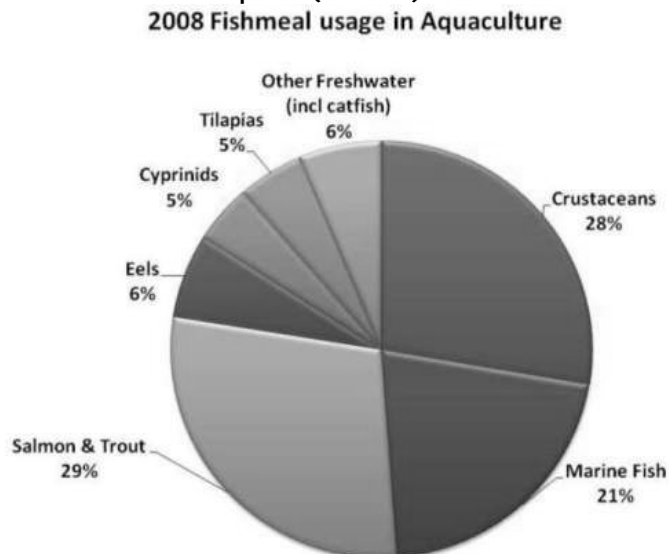
### 6b.4 Fishmeal usage by species 2007

tonnes	
Shrimp	1,060
Marine fishes	1,014
Salmon	893
Trout	388
Carp	385
FW Crustaceans	284
Eel	229
Catfish	196
Tilapia	175
MSC Freshwater fishes	148
Milkfish	32

\*\*Source: Climate Change, Food Security & Aquaculture: Albert G.J. Tacon, Marc Metian & Sena S. De Silva. April 2010

## Fishmeal usage in aquaculture – % figures

### 6b.5 Overview % split (2008)



Source: 'Linkage between farmed and wild fish – fishmeal and fish oil as feed ingredients in the context of sustainable aquaculture.' IFFO April 2010.

## Feeding fishmeal to farmed fish cont'd

### 6b.6 Estimated global use of fishmeal in 2005 - 2007

Species % of total aquaculture production	FAO estimate 2003*	FAO estimate 2005*	Tacon estimate 2006**	IFFO estimate 2007**
Shrimp	22.8	3.2	27	24
Marine finfish	20.1	6.0	18	23
Salmon	19.5	1.8	15	17
Chinese carp			11	17
Carp	14.9	7.7		
Trout	7.4	9.5	6	6
Eel	5.8	1.1	6	5
Catfish	0.8	4.1	5	
Tilapia	2.7	2.3	5	2
Freshwater crustaceans	4.7	41.8	4	5
Misc freshwater carnivorous fish			3	
Milkfish	1.2	4.3		
Other		18.1		

\* Source: FAO The State of World Fisheries and Aquaculture 2008.

\*\*Source: Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds. Trends and future prospects. Albert Tacon and Marc Metian. August 2008.

## Fishmeal usage in aquaculture – inclusion rates

### 6b.7 Fishmeal % inclusion rates compound aquafeed 2006

Major cultivated species	Current estimated use of fishmeal
Shrimp	5 – 40%
Salmon	20 – 50%
Trout	15 – 55%
Eel	40 – 80%
Marine fish	7 – 70%
Tilapia	0 – 20%
Milkfish	1 – 5%
Freshwater prawns	5 – 25%
Chinese carp	0 – 20%
Catfish	3 – 40%

Source: Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds. Trends and future prospects. Albert Tacon and Marc Metian. August 2008.

### 6b.8 Typical feed composition - main nutrients (Europe)

Species (% incl)	Protein	Lipid	Carbohydrate
Atlantic salmon	35-55	30-40	7-15
Rainbow trout	42-45	20-24	
Gilthead seabream	45-50	12-24	20
European seabass	43-50	12-25	20
Turbot	48-52	12	
European eel	40-49	12-16	20
Sea trout	52	12	17
Common carp	30-35	5-10	30-40

Source: FAO Technical Paper 541. Impact of rising feed ingredient prices on aquafeeds and aquaculture production. August 2010. Taken from Aquamax (2008).

## Feeding fishmeal to farmed fish cont'd

### 6b.9 Targeted reduction of dependency on fishmeal and fish oil.

Species	Current inclusion (%)		Targeted inclusion (%)	
	Fishmeal	Fish oil	Fishmeal	Fish oil
Atl'tic salmon	35-47	25-33	12-16	8-12
Rainbow trout	30-35	20-25	5	5
Seabream	40-45	15-20	15	10
Common carp	20-25	5-10	0	0

Source: FAO Technical Paper 541. Impact of rising feed ingredient prices on aquafeeds and aquaculture production. August 2010. Taken from RAFOA and PEPPA (personal communication).

## Fishmeal usage in aquaculture – conversion efficiency

### 6b.9 Conversion efficiency of pelagics to farmed fish

<b>Species group - Pelagic input per unit of production – kg per kg fresh weight. Wet weight – sum of fishmeal and fish oil consumption figures x'd by 4 or 5.</b>		
	<b>2003</b>	<b>2010</b>
Marine eels	3.1 – 3.9	1.8 – 2.3
Marine fish	2.5 – 3.2	1.5 – 1.9
Trout	2.5 – 3.1	0.8 – 1.0
Salmonids	3.1 – 3.9	1.2 – 1.5
Marine shrimp	1.6 – 2.0	1.0 – 1.2
Freshwater crustaceans	0.9 – 1.1	0.5 – 0.6
Milkfish	0.30 – 0.37	0.11 – 0.14
Catfish	0.22 – 0.28	0.16 – 0.20
Tilapia	0.23 – 0.28	0.11 – 0.14
Feeding carp	0.19 – 0.24	0.02

Source: Tacon 2004 in International Aquafeed. Volume 8 Issue 4 2005.

### 6b.10 Calculated FIFO for aquaculture, pigs and poultry (2008)

	<b>World Production '000 t</b>	<b>Use of Fish '000 t</b>	<b>% Coming from fishery by products</b>	<b>Use of whole wild fish '000 t</b>	<b>FIFO /FIPO</b>
<b>Aquaculture</b>	23,851	15,570	22	12,301	0.52
<b>Pigs</b>	141,222	4,748	22	3,703	0.03
<b>Poultry</b>	76,245	1,577	22	1,230	0.02
<b>Total</b>	241,318	22,096	22	17,235	0.07
<b>Salmon</b>	1,465	3,157	22	2,462	1.68

**FIFO** = Fish In: Fish Out ratio

**FIPO** = Fish In: Product Out (product is fish, pork and chicken)

Source: IFFO 2008



## Feeding fishmeal to farmed fish cont'd

6b.11 Summary of Fish in – Fish out (FIFO) Ratios as calculated by IFFO (2008)

Species	FM in Diet %	FO in Diet %	Yield of FM from wild fish %	Yield of FO from wild fish %	FIFO Ratio	Wild Fish used '000 t
<b>Salmon</b>	30	20	24	5	2.2	3,157
<b>Trout</b>	30	15	24	5	1.9	1,226
<b>Eel</b>	55	5	24	5	2.9	784
<b>Marine Fish</b>	32	8	24	5	1.9	2,858
<b>Shrimp</b>	20	2	24	5	1.2	3,754
<b>FW Crustaceans</b>	15	1.5	24	5	0.5	586
<b>Tilapia</b>	6	0.5	24	5	0.3	718
<b>Catfish</b>	10	1.7	24	5	0.4	777
<b>Milkfish</b>	3	1	24	5	0.1	65
<b>Carp</b>	5	0	24	5	0.1	1,460
<b>Misc FW Carn. Fish</b>	40	5	24	5	0.5	386
<b>Total of Fed farmed fish &amp; shellfish</b>					0.66	15,770
<b>Pigs</b>	0.25	0			0.03	4,748
<b>Poultry</b>	0.3	0			0.02	1,577
<b>Total</b>					<b>0.09</b>	<b>22,096</b>

Source: IFFO 2008

## General – aquaculture

6b.12 World aquaculture production by top 16 countries 2002-2007 (ranked according to 2007 figures)

'000 tonnes	2002	2003	2004	2005	2006	2007
China	27,650	28,585	30,268	32,010	34,015	31,420
India	2,187	2,313	2,794	2,962	3,123	3,354
Vietnam	703	937	1,198	1,437	1,657	2,156
Indonesia	914	996	1,058	1,213	1,309	1,392
Thailand		1,064	1,260	1,304	1,407	1,390
Bangladesh	786	857	914	882	892	945
Norway	551	584	636	661	708	830
Chile	545	563	665	698	802	829
Japan	817	811	761	737	723	765
Phillipines	443	459	512	557	623	709
Egypt	376	445	471	539	595	635
Korea Rep	210	315	333	356	438	606
Myanmar	190	252	400	485	575	604
USA	497	544	606	492	465	526
Taiwan	325	346	313	301	307	315
Brazil		273	269	257	271	289
<b>TOTAL World</b>	<b>40,236</b>	<b>38,909</b>	<b>41,889</b>	<b>44,282</b>	<b>47,321</b>	<b>50,329</b>

Source – FAO reproduced in IFFO Fishmeal and Fish Oil Statistical Yearbooks 2009.

## Feeding fish oil to farmed fish

### Fish oil usage in aquaculture – overall figures

6c.1 Estimated global use and demand for fish oil within compound feeds 2000 – 2020

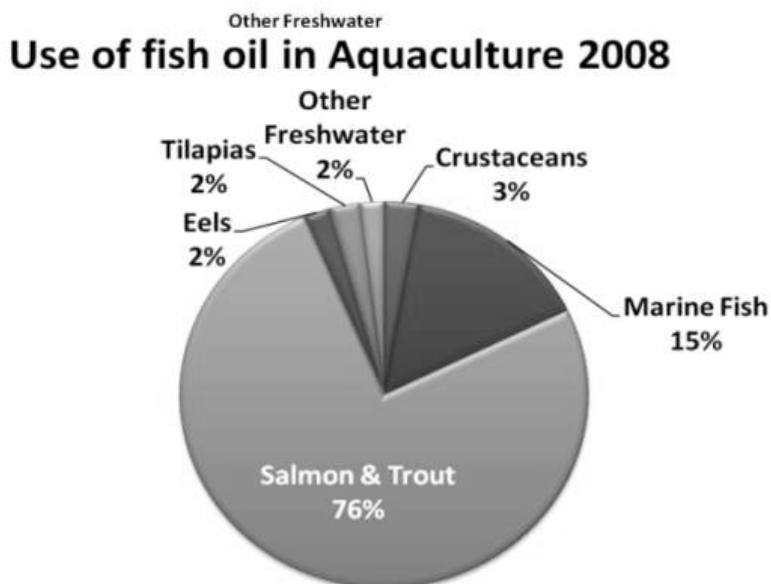
000 tonnes	Tot species production	Total fed production	Total feeds used	Total feed estimates	Total fishmeal used
2000	14,900	8,000	14,782	15,055	718
2005	22,341	13,729	28,812	20,958	843
2010	31,632	21,351	34,647	27,744	770
2015	44,143	31,578	48,874		756
2020	60,014	45,557	66,636		712

Source: *Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds. Trends and future prospects.* Albert Tacon and Marc Metian. August 2008.

### Fish oil usage in aquaculture – % figures

6c.2 Overview % split (2008)

2008 Fishmeal usage in Aquaculture



Source: 'Linkage between farmed and wild fish – fishmeal and fish oil as feed ingredients in the context of sustainable aquaculture.' IFFO April 2010.

## Feeding fish oil to farmed fish

### 6c.3 Fish oil usage within compound aquafeeds 2006

Major cultivated species	Current estimated use of fish oil within compound aquafeed
Shrimp	0.5 – 10%
Salmon	9 – 35%
Trout	3 – 40%
Eel	0 – 24%
Marine fish	1 – 15%
Tilapia	0 – 10%
Milkfish	0 – 2%
Freshwater prawns	0 – 3%
Chinese carp	0 – 2%
Catfish	0 – 15%

*Source: Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds. Trends and future prospects. Albert Tacon and Marc Metian. August 2008.*

### 6c.4 Estimated global use of fish oil

Species % of total aquaculture production	*FAO estimate 2003	**Tacon estimate 2006	**IFFO estimate 2007
Shrimp	7.3	12	10
Marine finfish	13.8	20	14
Salmon	51.0	43	43
Trout	15.7	13	11
Carp	5.5		
Eel	1.4	2	1
Catfish	1.0	4	1
Tilapia	2.0	2	13
Freshwater crustaceans	1.7	2	1
Misc freshwater carnivorous fish		2	-
Milkfish	0.6	1	3

\* Source: FAO The State of World Fisheries and Aquaculture 2008

\*\*Source: Global overview on the use of fish meal and fish oil in industrially compounded aquafeeds. Trends and future prospects. Albert Tacon and Marc Metian. August 2008.

## 7. Prices and market value

### 7.1. Prices of fishmeal and soyabean meal 2002 to 2008

	FOB Peru Prices \$ tonne			C & F North Europe \$ tonne		
	Fishmeal Peru FAQ	Soyameal Brazil	F'meal to soyameal ratio	Fishmeal Hamburg	Soyameal Hamburg	F'meal to soyameal ratio
Jan 2002	538	182	1: 2.96	585	186	1: 3.15
Jan 2003	539	188	1: 2.87	607	197	1: 3.08
Jan 2004	588	284	1: 2.07	682	293	1: 2.33
Jan 2005	554	179	1: 3.10	673	222	1: 3.03
Jan 2006	716	203	1: 3.52	910	219	1: 4.16
Jan 2007	1048	229	1: 4.57	1234	257	1: 4.80
Jan 2008	844	386	1: 2.18	1104	454	1: 2.43
Jan 2009	820	300	1: 2.74	1009	378	1: 2.67

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2009.

### 7.2 UK average prices for English fishmeal 1981 to 2002

£/tonne, ex-store

1981	270
1982	275
1983	320
1984	355
1985	300
1986	271
1987	272
1988	330
1989	330
1990	320
1991	320
1992	365
1993	305
1994	287
1995	300
1996	375
1997	405
1998	465
1999	330
2000	321
2001	428
2002	462

Source - United Fish Products to 1997, then average of ASI weekly prices