



October 2011

Fishmeal and fish oil figures

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

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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 300 dedicated fishmeal plants has been around 5 million tonnes of fishmeal over the last four years. The main producing countries in 2009 were Peru, Chile, Thailand, USA, Japan and Denmark. World production of fish oil is just under 1 million tonnes. This is all produced from about 20 million tonnes of whole fish and trimmings.

Fishmeal from the North East Atlantic, North Sea and other European regions (including Iceland and Norway, Russia and the Faroe Islands), was around 580,000 tonnes in 2009; and production of fish oil 229,000 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 2008 (FAO SOFIA Report 2010)	89.5Mt
Aquaculture production in 2008 (FAO SOFIA Report 2010)	52.5Mt
Total capture and aquaculture (FAO SOFIA Report 2010)	142Mt
Of which, caught to produce fishmeal and fish oil in 2008 (FAO SOFIA Report 2010) (Minimal variation in the last three years but down 14% on 2005 and well below peak levels of more than 30 Mt in 1994.)	20.8Mt

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 2009)	4.8Mt
Fish oil (IFFO 2009)	1.0Mt

AQUACULTURE

Aquaculture production in 2008 (FAO SOFIA Report 2010)	52.5Mt
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Aquaculture's share of Global Fishmeal and Fish Oil Use

Year	Fishmeal	Fish oil
1990	10%	17%
2000	33-41%	42-54%
2008	58-60%	81-85%

Source: *Aquaculture and Feed Use in China. Seafood Summit, Vancouver. February 2011.*

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

The FAO State of World Fisheries and Aquaculture report 2008 states 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. *These figures were not updated in the 2010 SOFIA Report.*

FISHMEAL FIGURES

3.1 Fishmeal production Jan-Mar 2011

	Jan - Dec		Jan - Mar	
000 tonnes	2009	2010	2010	2011
Peru/Chile	2039	1487	131	215
Denmark/Norway	274	433	82	56
Iceland/North Atlantic	198	225	39	49
Total	2511	2146	252	320

Source: Globefish

3.2 Fishmeal production 2006–2009/Jan-Sept 2007-2010

	Jan – Dec				Jan – Sept			
	2006	2007	2008	2009	2007	2008	2009	2010
Peru	1378	1407	1396	1335	918	883	857	678
Chile	855	782	730	641	662	621	553	441
Denmark	209	166	161	181	132	128	148	123
Norway	170	172	136	129	146	115	102	99
Iceland	144	152	141	103	130	117	93	65
Total	2756	2679	2564	2389	1988	1864	1753	1406

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2010

WORLD cont'd

3.3 Production of fishmeal 2004- 2009 top six producers

Tonnes	2004	2005	2006	2007	2008	2009
Peru	1,982,700	2,019,900	1,378,000	1,407,000	1,430,300	1,346,900
Chile	933,100	870,400	854,700	781,900	729,700	641,000
Thailand		473,400	461,200	428,000	468,000	381,200
USA		268,600	232,000	251,500	216,200	249,000
Japan		221,900	219,600	210,000	202,900	192,000
Denmark	259,200	213,100	209,400	166,000	161,300	180,900
TOTAL		4,067,300	3,435,900	3,244,400	3,208,400	2,991,000
Rest of the World		1,955,400	1,794,100	1,808,400	1,798,400	1,784,200
TOTAL World	6,274,500	6,022,700	5,230,000	5,052,800	5,006,800	4,775,200

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2010

3.4 Total world production of fishmeal 1998 to 2009

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	6,022,700
2006	5,230,000
2007	5,052,800
2008	5,006,800
2009	4,775,200

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2010

WORLD cont'd

3.5 Fishmeal production by top 15 countries 1998 to 2009 (ranked according to 2009 figures)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Peru	815	1904	2309	1844	1941	1251	1983	2,019	1,378	1,407	1,396	1,347
Chile	642	957	842	699	839	664	933	794	759	770	673	641
Thailand	410	398	387	381	387	397	403	410	461	428	468	381
USA	294	355	335	342	337	318	353	268	232	251	212	249
Japan	379	409	387	227	225	230	295	230	219	200	202	192
Denmark	324	311	318	299	311	246	259	213	209	166	161	181
China	693	707	806	723	460	420	400	305	297	204	141	160
Norway	301	241	264	216	241	212	215	154	169	172	135	129
Mexico	45	48	65	61	65	65	55	55	80	73	105	116
Iceland	220	234	272	286	304	279	204	188	144	152	140	103
Morocco	55	59	53	55	61	64	63	66	28	60	78	100
Ecuador								87	91	88	100	98
Russian Fed	163	155	126	98	95	68	70	60	65	66	71	77
S Africa	94	84	109	111	93	113	114	108	73	88	83	71
Pakistan						46	47	48	51	56	56	62
UK (23)	52	53	50	47	48	52	51	53	44	44	42	37

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2010. Figures rounded up or down.
Only new 2009 figures added – no revisions have been made to previous years' figures.

3.7 Fishmeal exports by top 15 countries 1998 to 2009 (ranked according to 2009 figures)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Peru	661	1546	2365	1937	1520	1372	1751	2000	1338	1219	1561	1583
Chile	494	606	572	491	497	576	494	709	470	474	478	609
Denmark	302	320	307	307	305	203	247	254	253	161	210	240
Iceland								190	125	126	158	104
Mexico						19	9	12	51	39	83	94
Morocco			21	27	20	35	34	55	48	33	70	92
Ecuador	21	31	57	57	25	41	43	40	67	83	82	91
USA	96	87	95	108	113	110	141	165	118	105	89	79
Argentina							40	36	39	32	42	38
Russia	95	105	113	79	68	61	33	33	36	43	50	35
Mauritania			24	25	27	29	30	33	35	37	38	31
France								22	22	15	25	27
Norway	152	161	85	83	122	73	61	51	37	34	64	27
Thailand			10	7	20	11	20	31	77	84	25	26
Korea						36	24	31	32	35	30	25
UK (23)						8	6	10	12	7	14	16

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2010. Figures rounded up or down.
Only new 2009 figures added – no revisions have been made to previous years' figures.

WORLD cont'd

3.8 Fishmeal imports by top 15 countries 1998 to 2009 (ranked according to 2009 figures)

'000 tonnes	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
China & Hong Kong	416	673	1241	984	976	797	1147	1598	980	986	1351	1310
Norway	100	143	183	143	127	150	162	202	211	220	242	328
Japan	330	346	338	478	480	388	402	376	412	350	309	281
Taiwan, China	172	294	299	295	242	239	238	234	213	152	150	180
Vietnam	-	14	15	29	20	60	61	96	83	104	114	115
UK	239	221	241	233	192	184	143	138	143	91	92	114
Denmark	94	139	131	130	135	167	132	142	155	151	113	100
Greece	40	40	53	77	84	74	69	87	85	96	93	90
Russia	95	73	40	167	133	99	55	90	52	59	72	69
Indonesia	40	77	118	113	67	57	70	83	89	55	68	67
Spain	63	94	123	116	89	95	105	82	68	81	86	64
Italy	48	68	76	87	67	66	64	63	54	57	55	56
Turkey						18	54	39	44	55	50	52
Canada								55	64	48	46	45
Korea								48	48	43	37	43

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2010. Figures rounded up or down. Only new 2009 figures added – no revisions have been made to previous years' figures.

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

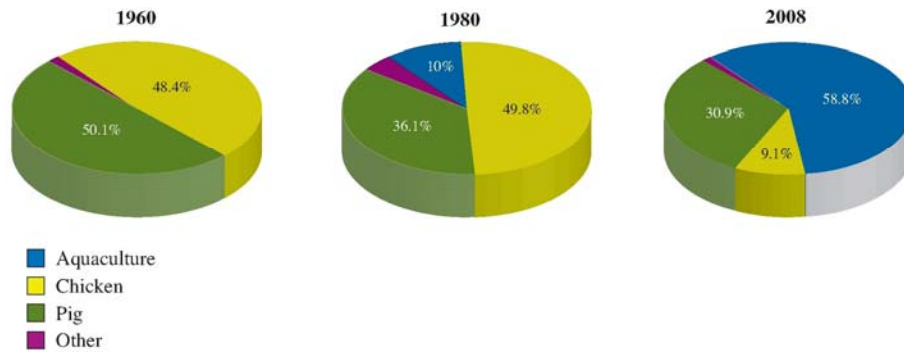
'000 tonnes	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
China	1240	1516	1113	1366	2030	1682	1406	1183	1528	n/a
Japan	802	792	699	744	710	691	687	596	703	n/a
Chile	293	261	149	351	270	222	351	36	467	n/a
Thailand	566	466	418	481	504	484	408	405	409	n/a
Norway	232	320	247	223	361	276	246	289	309	n/a
Taiwan, China				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.

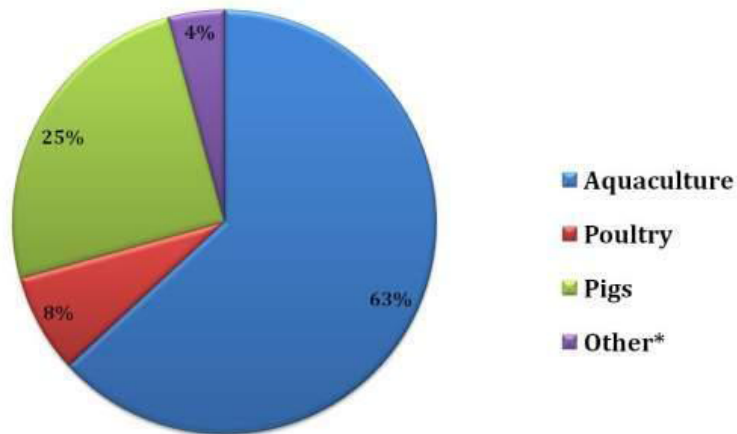
WORLD cont'd

3.10 World fishmeal market use by sector *Source IFFO*

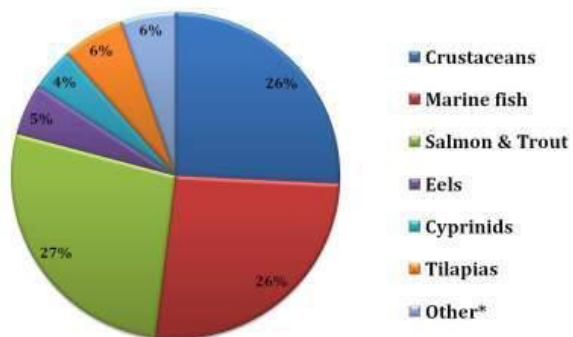
Changing uses of fishmeal



PERCENTAGE OF FISHMEAL USAGE PER MARKET 2009



PERCENTAGE OF FISHMEAL USAGE IN AQUACULTURE 2009



Source: IFFO - Fishmeal and Fish Oil –The Facts, Figures, Trends, and IFFO's Responsible Supply Standard. February 2011.

WORLD cont'd

Fishmeal production by species

3.11 Main species used for fishmeal/share of global output

Country/Region of production	Main species used in production	Global production share 2007	Global export share 2007
Peru	Anchovy	25%	41%
Chile	Jack mackerel, anchovy, sardines	13%	16%
China	Various	19%	0%
Thailand	Various	8%	3%
USA	Menhaden, Alaska pollock	5%	3%
Iceland	Blue whiting, herring, trimmings	2%	4%
Norway	Blue whiting, capelin, trimmings	3%	1%
Denmark	Sandeel, sprat, blue whiting, herring	3%	5%
Japan	Sardine, pilchard	4%	0%
Total		81%	73%

Source: Norwegian School of Economics and Business Administration. Bergen. Spring 2011. *Is the Aquaculture Industry Caught In a Fishmeal Trap?*

3.12 Whole fish used for fishmeal production

	Species	Marketability as food	Annual catch food and feed
Industrial grade forage fish	Gulf menhaden, sandeel, Atlantic menhaden, Norway pout	No market at all as food. Fishery would cease if no fishmeal plants.	1.2Mt
Food grade forage fish	Peruvian, Japanese, European and other anchovy. Capelin, blue whiting and European sprat.	Demand often small, localised or niche. Fishmeal plants take what food fish markets cannot absorb.	13.2Mt
Food fish rejected by the market	Chilean Jack mackerel, chub mackerel and other species of sardine, mackerel and herring.	Well established food markets. Landings not in demand for food go for fishmeal and fish oil.	6.25Mt

Source: IFFO - *Fishmeal and Fish Oil – The Facts, Figures, Trends, and IFFO's Responsible Supply Standard* (taken from Wijkstrom). February 2011.

3.13 Catch of top ten fishmeal producers 2007

'000 tonnes	2007 Prod	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

FISH OIL FIGURES

3.12 Fish oil Jan-Mar 2011

	Jan - Dec		Jan - Mar	
	2009	2010	2010	2011
<i>'000 tonnes</i>				
Peru/Chile	256	402	21	49
Denmark/Norway	80	254	22	18
Iceland/North Atlantic	35	130	11	17
Total	371	785	54	84

Source: Globefish

3.13 Fish body oil production by top 15 countries 1998-2009 (ranked according to 2009 figures)

<i>'000 tonnes</i>	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Peru	123	515	593	300	221	205	352	287	286	337	275	282
Chile	7	188	171	145	146	130	138	145	155	187	167	152
USA	101	130	87	118	96	80	81	75	65	75	86	75
Denmark	136	129	98	80	86	71	68	93	67	57	55	72
Japan	58	68	70	63	64	61	68	67	68	60	62	64
Iceland	88	102	95	96	70	104	49	63	54	51	72	62
Morocco	18	14	18	31	20	29	25	31	31	20	29	44
Norway	98	69	83	56	72	52	37	30	40	44	37	42
Mexico	6	7	7	7	8	9	12	13	26	21	35	33
Vietnam								5	7	15	26	20
Turkey	5	5	5	6	9	14	14	14	15	16	17	17
Spain	20	20	20	21	20	21	22	23	23	23	16	15
China	7	10	24	27	27	30	13	12	12	12	12	14
Ecuador							14	10	10	9	11	13
UK	10	12	10	10	11	11	12	12	12	14	14	10

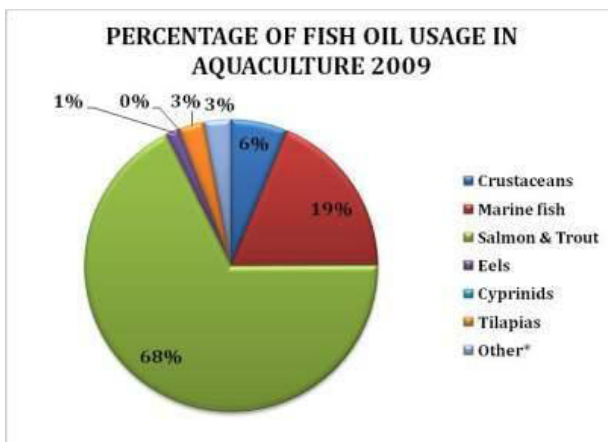
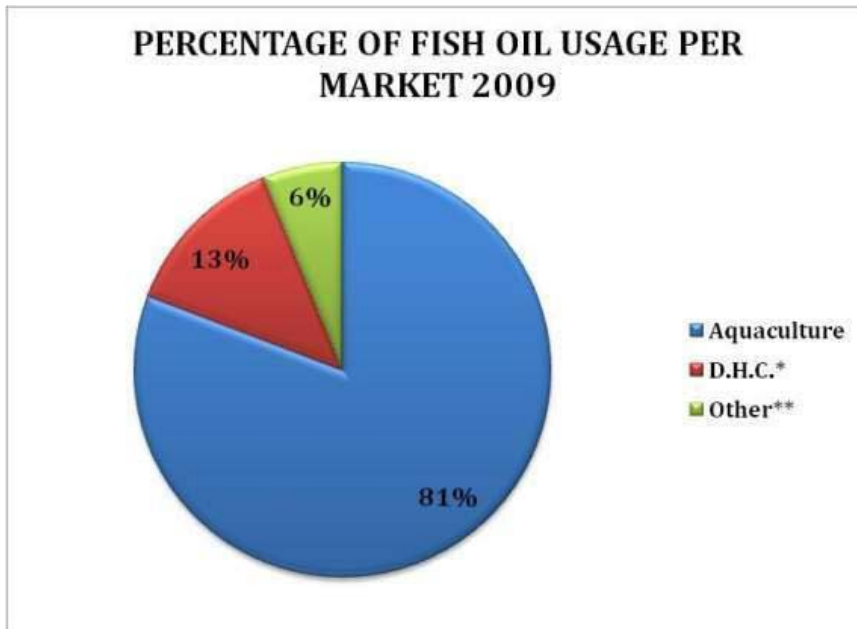
Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2010. Rounded up or down. Only new 2009 figures added – no revisions have been made to previous years figures

3.14 World fish oil market use by sector – market estimate

%	IFFO est 2007	2008	2009
Fish	83	77	81
Others	17	11	6
Human		11	13

Source: IFFO Fishmeal and Fish Oil Statistical Yearbook 2008/200/2010.

WORLD cont'd



Source: IFFO - Fishmeal and Fish Oil –The Facts, Figures, Trends, and IFFO's Responsible Supply Standard. February 2011.

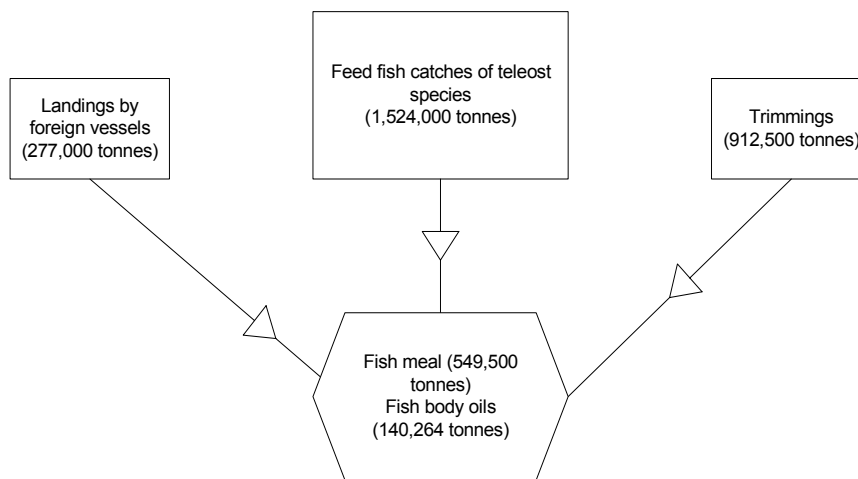
4. European production, supply and consumption of fishmeal and fish oil

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 1999 to 2009 (alphabetical incl Norway, Iceland, Faeroe Islands and Russia)

'000 tonnes	*1999	*2000	*2001	*2002	*2003	*2004	*2005	*2006	*2007	*2008	*2009
Denmark	311	318	299	308	246	259	213	209	166	161	181
Faeroe Islands	25	24	44	46	25	68	57	62	55	44	**9.2
Finland	3	3	3	3	3	3	3	4	4	4	**0.2
France	17	21	38	35	13	13	20	20	14	14	**5.3
Germany	19	15	16	16	20	14	13	14	19	19	**6.1
Greece	2	1	5	5	2	0	0	-	-	-	-
Iceland	234	272	284	304	279	204	188	144	152	141	103
Ireland	22	15	15	16	16	22	16	16	19	19	**4.2
Italy	3	1	2	3	3	3	3	3	4	4	
Norway	241	264	216	241	212	215	154	169	172	135	129
Poland	19	15	16	18	18	11	12	21	22	22	**0.6
Portugal	4	3	3	NA	NA	NA	NA	-	-	-	**1.9
Russia	155	126	98	95	68	70	60	65	66	71	77
Spain	84	120	115	117	119	103	20	20	20	20	**15.8
Sweden	28	18	21	21	22	13	10	10	23	24	**9.9
UK	53	50	47	48	52	51	53	44	44	42	37
TOTAL	1,220	1,252	1,222	1,276	1,098	1,049	822	801	780	720	580

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

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%
TOTAL	367,350	182,150	33%

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 1999 to 2009 (alphabetical incl Norway and Iceland/Faeroe Islands)

'000 tonnes	*1999	*2000	*2001	*2002	*2003	*2004	*2005	*2006	*2007	*2008	**2009
Belgium	11	22	3	7	3	3	1	7	3	5	24.1
Denmark	320	307	307	305	203	247	254	253	161	210	169.5
F' Islands	30	38	44	24	25	26	27	28	35	38	0.8
France	54	56	47	30	32	32	31	38	26	26	15.4
Germany	195	218	201	204	185	169	208	208	168	179	9.1
Greece	2	1	6	5	1	-	-	-	-	-	-
Iceland	235	250	272	306	239	223	197	126	127	41	82.6
Ireland	7	9	26	17	12	19	19	19	5	0.3	-
Italy	5	4	5	7	5	4	5	7	9	9	0.3
Neth'lands	26	20	19	19	1	12	5	7	7	8	11.2
Norway	161	85	83	122	73	61	51	37	34	64	56.5
Poland	19	13	15	21	15	10	10	10	9	5	0.2
Spain	32	29	26	24	22	17	17	17	26	20	2.7
Sweden	13	6	3	3	0	6	9	6	6	0.1	2.4
UK	21	22	15	11	8	6	10	12	7	14	5.0
TOTAL	1,131	1,080	1,072	1,105	824	825	844	775	623	619.4	379.8

Source – *IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down. New 2008 figures added – no revisions to previous years' figures. ** IFFO intelligence.

4.4 European fishmeal imports 1999 to 2009 (alphabetical including Norway and Iceland/Faeroe Islands)

'000 tonnes	*1999	*2000	*2001	*2002	*2003	*2004	*2005	*2006	*2007	*2008	**2009
Belgium	50	57	29	16	6	6	8	7	8	10	28.9
Cyprus	7	8	12	9	8	7	5	3	5	2	0.2
Czech Rep	20	23	26	22	17	11	12	8	6	7	0.2
Denmark	139	131	130	135	167	132	142	155	151	114	144.6
F Islands											11.6
Finland	15	23	31	33	14	18	21	19	14	12	4.6
France	93	95	62	55	32	42	47	50	39	39	29.8
Germany	233	304	197	210	198	183	232	239	211	166	4.9
Greece	39	53	77	84	74	69	87	85	96	93	36.4
Hungary	32	35	40	35	26	19	25	10	6	4	0.3
Ireland	13	21	10	9	7	4	7	9	5	5	0.4
Italy	68	76	87	67	66	64	63	54	57	55	16.2
Neth'lands	49	73	52	73	64	63	55	34	27	26	22.7
Norway	145	183	143	127	150	162	202	211	221	242	263
Poland	2	4	19	16	13	14	23	17	14	14	3.0
Portugal	14	17	47	13	3	10	9	6	7	8	1.3
Spain	94	123	116	89	95	105	82	68	81	86	22.8
Sweden	2	2	-	-	-	-	-	-	-	-	2.8
UK	221	241	233	192	184	143	138	143	91	92	***47.7
TOTAL	1236	1521	1311	1185	1124	1052	1158	1118	1039	975	641.4

Source – *IFFO Fishmeal and Fish Oil Statistical Yearbook 2009. Figures rounded up or down. New 2008 figures added – no revisions to previous years' figures. ** IFFO intelligence.

*** This figure is not supported by trade source data which shows imports of 114.5.

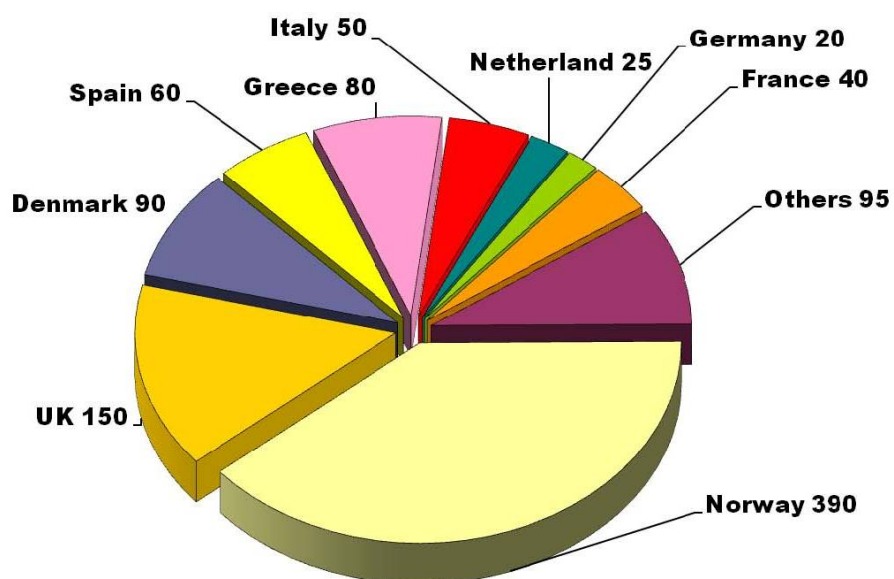
European cont'd

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
TOTAL	386.1	366.5	340.6	297.0	293.5	295.1	227.5	261	237.5	228.3	234.2

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

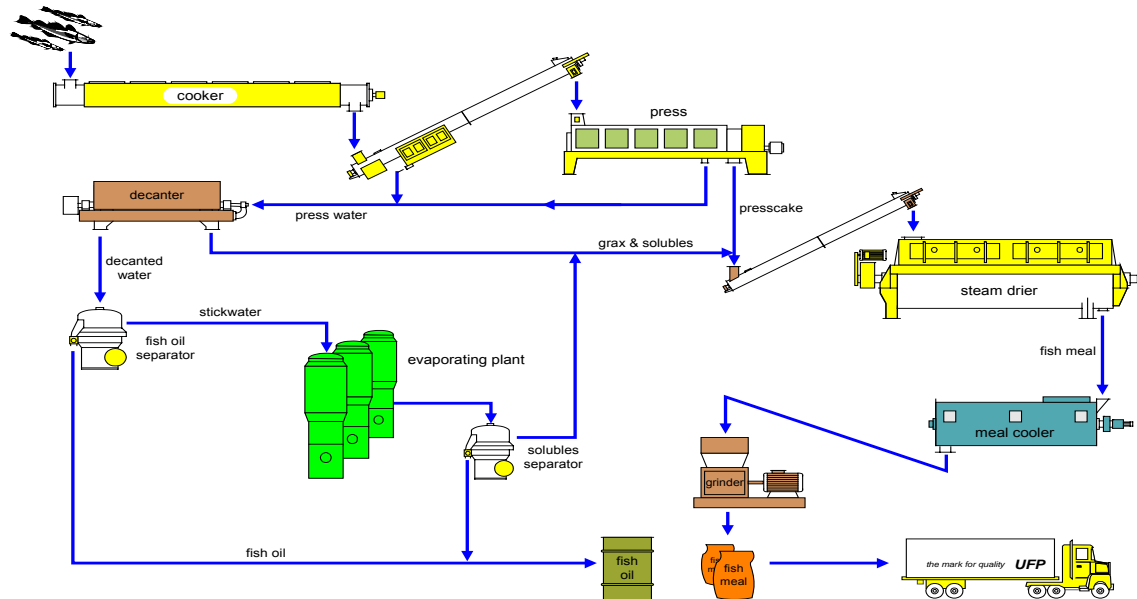
(alphabetical incl Norway and Iceland/Faeroe Islands)

'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
TOTAL	584.5	525.7	381.1	458.1	514.35	495.8	418.7	453.2	489.3

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

UFI Grimsby – production process



5.1 Summary of fishmeal supply – UK 2002 – 2010

000 tonnes	2002	2003	2004	2005	2006	2007	2008	2009	2010
UK Consumption	c237.8	c231.2	184.2	187.6	168.8	122.5	115.1	130.4	c135.4
Imports from EU	33.3	30.5	48.8	57.1	62.2	39.8	40.5	46.5	55.5
Imports from non-EU	154.5	150.7	91.1	87.8	74.4	45.3	46.8	63.2	41.9
UK production	50	50	50	53	44	44	42	37	38
UK exports			5.7	10.3	11.8	6.6	14.2	16.3	n/a

Source – Trade sources.

5.2 Sources of UK fishmeal imports Jan – Mar 2011

000 tonnes	Jan - March		
	2009	2010	2011
Peru	7.3	8.9	7.1
Denmark	1.1	8.1	7.0
Germany	0.9	3.1	2.7
Iceland	0	0	1.4
Ireland	7.0	0.4	0.8
Norway	1.1	2.4	0
Faroe Is	0	0	0
Chile	0	0	0
Others	0.5	2.8	1.5
Total	18.0	25.6	20.5

Source: Globefish

UK cont'd

5.3 Sources of UK fishmeal imports 2000 to 2010

000 t	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Imports from non EU											
Peru	70.1	54.7	28.9	47.0	19.4	23.2	37.6	21.2	24.6	54.3	33.6
Iceland	57.5	52.5	64.2	49.1	42.5	34.6	13.6	3.8	10.3	1.7	2.8
Norway	32.1	28.0	35.6	16.5	9.5	3.7	7.9	9.9	3.8	2.4	3.6
Chile	13.6	18.9	11.6	21.4	6.5	12.6	10.9	5.1	0.2	4.8	0.3
Faroe Is	8.7	11.7	14.2	9.7	11.5	10.9	2.3	3.4	7.9	0	
M'rocco	4.5	4.8	0	7.0	1.7	2.8	2.1	1.9	0	0	1.6
Sub tot	186.5	172.6	154.5	150.7	91.1	87.8	74.4	45.3	46.8	63.2	41.9
Imports from EU											
Denm'k	6.1	9.6	17.8	14.3	24.7	16.1	25.2	12.9	22.0	19.1	29.7
G'many	33.8	26.0	9.6	8.6	8.2	25.4	30.8	13.5	8.3	2.5	14.9
Eire	14.2	19.9	5.9	6.0	15.1	11.7	6.1	11.6	9.2	22.2	10.9
N'Lnds	0	1.7	0	1.6	0.8	3.9	0.1	1.8	1.0	2.7	0
Sub tot	14.1	57.2	33.3	30.5	48.8	57.1	62.2	39.8	40.5	46.5	55.5
Others	2.1	3.2	4.5	2.2	2.5	3.0	2.9	2.6	3.6	4.8	3.4
Total	242.7	233.0	192.3	183.4	142.5	148.0	139.4	87.7	91.0	114.5	101.0

Trade sources.

5.4 Fishmeal consumption and imports - UK 1996 to 2010

000' tonnes	UK consumption	UK imports	From EU	From non EU
1996	272,000	241,995	Na	Na
1997	330,000	284,788	34,289	250,499
1998	260,000	238,602	34,968	203,634
1999	270,000	221,056	41,260	19,796
2000	290,000	240,951	50,226	190,725
2001	280,000	232,765	60,183	172,582
2002	240,000	191,990	36,473	155,517
2003	233,000	183,442	31,486	151,956
2004	192,000	142,492	51,227	91,265
2005	187,000	136,892	48,770	88,122
2006	189,000	138,973	62,634	76,339
2007	134,800	90,800	44,500	46,300
2008	134,100	92,100	40,200	51,900
2009	130,400	109,700	46,500	63,200
2010	C 135,400	97,400	55,500	41,900

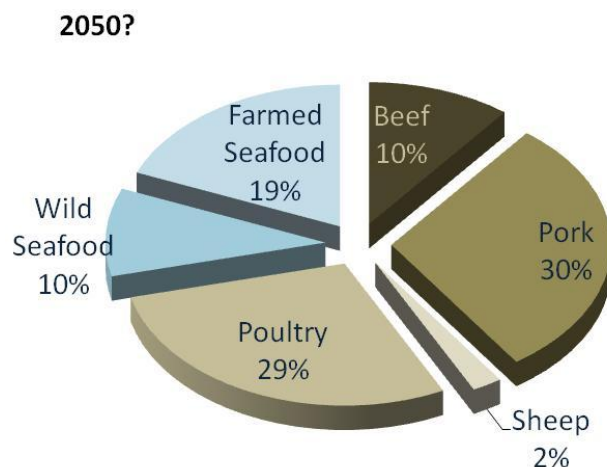
Source: Trade sources.

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.

Fishmeal is primarily used in aquaculture feed, but is also used in used in poultry and pig diets 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.



- Assumes no growth in wild caught seafood
- Assumes similar relative seafood demand (29%)
- Assumes meat and seafood demand of 600 million tonnes
- Farmed seafood is roughly double 2006 production.

Source: WWF presentation at Humber Seafood Institute Summit. September 2011.

Feeding fishmeal and oil to farmed land animals cont'd

6a.1 Comparison of basic nutritive characteristics of various protein concentrates

	Crude Protein g/kg	Crude fat g/kg	Energy MJ DE/kg	Calcium g/kg	Phosphorus g/kg
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.2 Recommended rates of inclusion in diets for optimum benefit (currently only used in pig and poultry feed)

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

Source: Nutritional advice in 2002

Feeding fishmeal and oil to farmed land animals cont'd

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

g/kg	Fishmeal	Soya bean	Barley (42)
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

Feed Ingredient As received %	Fishmeal Chilean	Fishmeal Herring	Fishmeal White	Soyabean Meal – hipro	Milk Pwd – skimmed
Crude protein	66	71	66	48	34
Digestible CP	63	66	63	46	31
Essential amino acids:					
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*

6a.5 Fishmeal Nutritional Value

Feed Ingredient% as fed	Fishmeal		
	White	S 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
Northern Europe (NE) 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
Total (tonnes)		1,250,000	1,375,000
NE (% of total)		65	65
Rest of Europe (RE) >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
Total (tonnes)		675,000	725,000
RE (% of total)		35	35
Total aquafeeds NE + RE (tonnes)		1,925,000	2,100,000

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.

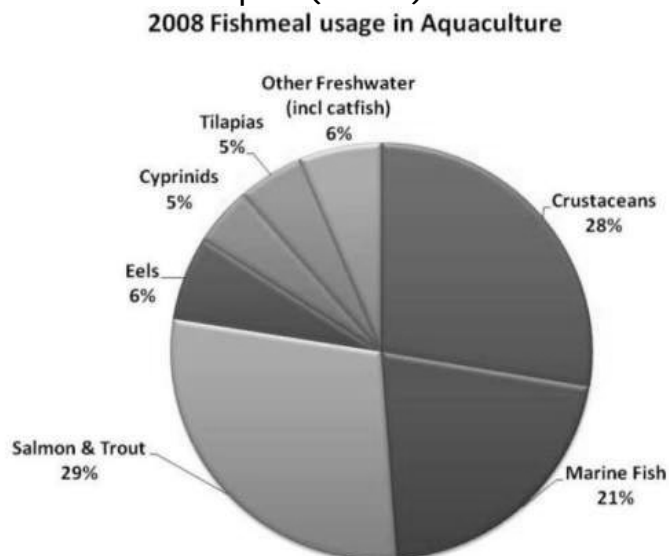
6b.4 Fishmeal usage by species 2007

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)

6b.10 PEPPA targeted fishmeal inclusion factors

Species	Current inclusion (%)	Targetted inclusion (%)
Atlantic salmon	35 - 47	12 - 16
Rainbow trout	30 - 35	5
Seabeam	40 - 45	15
Common carp	20 - 25	0

Source: Norwegian School of Economics and Business Administration. Bergen. Spring 2011. Is the Aquaculture Industry Caught In a Fishmeal Trap? PEPPA = Perspectives for Plant Protein Use in Aquaculture.

Fishmeal usage in aquaculture – conversion efficiency

6b.11 Conversion efficiency of pelagics to farmed fish

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.	2003	2010
	Marine eels	3.1 – 3.9
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.

Feeding fishmeal to farmed fish cont'd

6b.12 Calculated FIFO for aquaculture, pigs and poultry (2008)

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

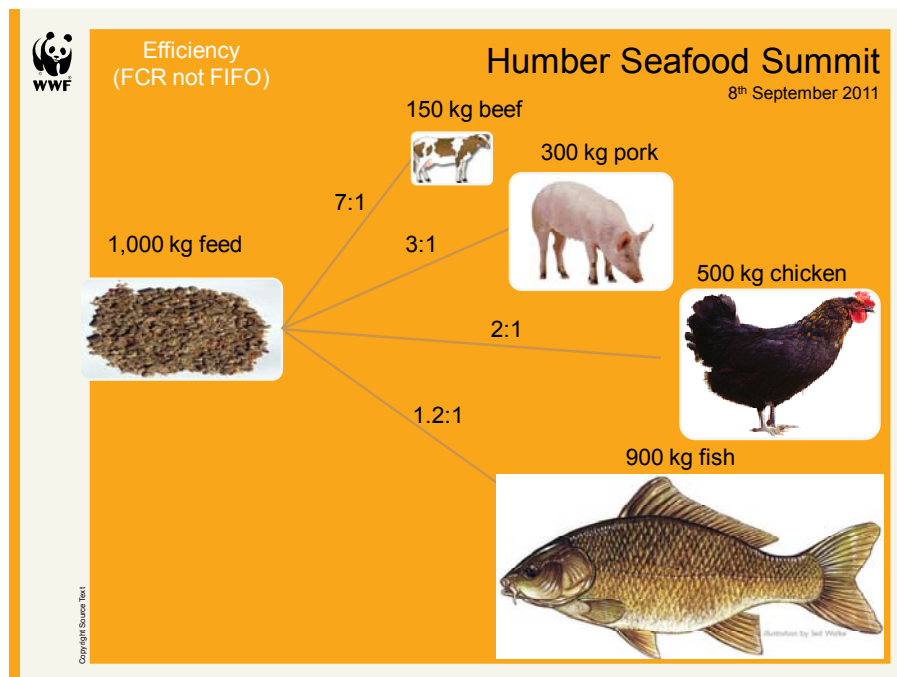
6b.13 Summary of Fish in – Fish out (FIFO) Ratios as calculated by IFFO (2008)

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
Salmon	30	20	24	5	2.2	3,157
Trout	30	15	24	5	1.9	1,226
Eel	55	5	24	5	2.9	784
Marine Fish	32	8	24	5	1.9	2,858
Shrimp	20	2	24	5	1.2	3,754
FW Crustaceans	15	1.5	24	5	0.5	586
Tilapia	6	0.5	24	5	0.3	718
Catfish	10	1.7	24	5	0.4	777
Milkfish	3	1	24	5	0.1	65
Carp	5	0	24	5	0.1	1,460
Misc FW Carn. Fish	40	5	24	5	0.5	386
Total of Fed farmed fish & shellfish					0.66	15,770
Pigs	0.25	0			0.03	4,748
Poultry	0.3	0			0.02	1,577
Total					0.09	22,096

Source: IFFO 2008

Feeding fishmeal to farmed fish cont'd

6b. 14 Efficiency FCR (not FIFO)



Source: WWF working towards a future for sustainable aquaculture. Humber Seafood Institute Summit. September 2011.

General – aquaculture

6b.15 World aquaculture production of fish and crustacea by top 16 countries 2002-2008 (ranked according to 2008 figures)

'000 tonnes	2002	2003	2004	2005	2006	2007	2008
China	27,650	28,585	17,094	19,526	34,015	20,792	21,830
India	2,187	2,313	2,794	2,962	3,169	3,102	3,459
Vietnam	703	937	1,043	1,293	1,511	1,914	2,291
Indonesia	914	996	1,045	1,197	1,292	1,392	1,689
Thailand		1,064	896	953	1,042	1,041	1,038
Bangladesh	786	857	914	882	892	945	1,005
Norway	551	584	633	657	708	838	841
Phillipines	443	459	481	520	586	669	698
Egypt	376	445	471	539	595	635	693
Myanmar	190	252	400	485	575	604	674
Chile	545	563	569	614	647	603	630
USA	497	544	384	369	352	366	344
Japan	817	811	310	312	301	306	304
Brazil		273	256	242	255	275	276
Taiwan, China	325	346	2523	237	216	233	222
TOTAL World	40,236	38,909	29,692	31,766	34,208	36,362	38,834

Source – FAO reproduced in IFFO Fishmeal and Fish Oil Statistical Yearbooks 2010.

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

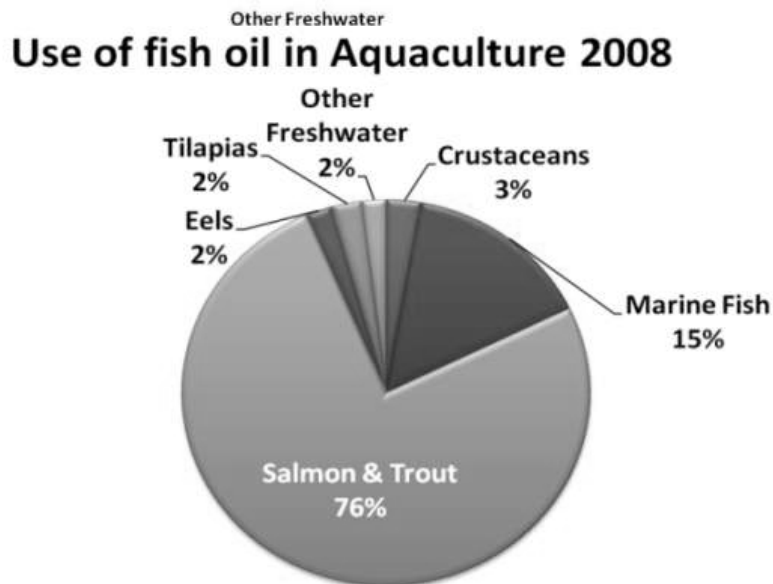
000 tonnes	Tot species production	Total fed production	Total feeds used	Total feed estimates	Total fishmeal used
2000	14,900	8,000	14,782	15,055	718
2005	22,341	13,729	28,812	20,958	843
2010	31,632	21,351	34,647	27,744	770
2015	44,143	31,578	48,874		756
2020	60,014	45,557	66,636		712

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 2010

	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
Jan 2010	1,586	327	1: 4.90	1,681	407	1: 4.10
Sep 2010	1,348	336	1: 4.00	1,648	401	1: 4.10

Source – IFFO Fishmeal and Fish Oil Statistical Yearbook 2010.

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