

I A F M M

FISH OIL BULLETIN

international association of fish meal manufacturers

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EVALUATION OF THE QUANTITIES OF HARDENED FISH OIL USED IN DIFFERENT PRODUCTS IN DIFFERENT COUNTRIES

1. INTRODUCTION

By virtue of the wide variety of triglycerides of which it is composed, hardened fish oil used in oil blends for industrial margarines and shortenings enhances the performance of certain products when used for their designed purposes. These uses are:-

the incorporation of air during the "creaming" procedure of cake batter production, thus giving a baked product of better volume and crumb structure than is obtained from blends not containing hardened fish oil. (Note: the statement refers to simple oil and fat blend systems without the incorporation of specialised emulsifiers) and

the production of "puff" or "flaky" pastry for which a fat or margarine is required which is plastic and extensible and resistant to "work softening". The use of higher melting point hardened fish oils in such fats or margarines enhances these properties.

It was therefore decided to estimate on a world basis the tonnage of hardened fish oil used for these purposes i.e. in

cake margarines and shortenings used for "creaming",
pastry margarine or fats,

to determine the size of a possible premium market for fish oil.

2. DISCUSSION

2.1. Fish Oil Consumption

Appendix 1 gives figures for 1976, '77 and '78 of the production, imports and exports, and therefore the consumption of fish oil by twelve countries which together accounted for about 80% of the world's fish oil handling. The percentage column indicates the percentage share of the total of the twelve countries for each country in the three years.

It can be seen from the table that the principal users are the U.K, Germany FR, Norway, Peru, the Netherlands and Japan. Together these countries account for about 70% of the world's consumption of fish oil.

The use of fish oil for technical purposes is low except for Peru, 21% of consumption and U.S.A. 100%. Overall it seems likely that about 5% of the world's fish oil production is used in this manner.

2.2 Individual Countries

U.K

The basic production tonnages in the following calculations are obtained from the U.K. Government Statistical Service. The apportionment amongst the various product types is derived from knowledge of the local market. No hardened fish oil is exported as such.

Production

Industrial Margarines

1978	51,000 tonnes			
	of which cake margarine about 50%	=	25,000 tonnes	
	of which non all vegetable products about 95%	=	23,750	
	Fat blend at 80%	=	19,000	
	hardened fish oil (at 60% of blend)	=	11,400	11,400
	and pastry margarine ca 50%	=	25,000	
	of which non all vegetable products ca 85%	=	21,250	
	Fat blend at 80%	=	17,000	
	hardened fish oil (at 30% of blend)	=	5,100	<u>5,100</u>
	Total hardened fish oil	=		<u>16,500 t</u>

Industrial Shortenings

1978	137,000 tonnes		
	of which for frying, 5,000 t/month	=	60,000 tonnes
	of which for bread fats, 2,000 t/month	=	24,000
	therefore balance, shortenings	=	53,000
	Non all vegetable shortenings at 95%		
	of total	=	50,350
	Hardened fish oil at 65% of blend	=	32,700
			<u>32,700</u>
	TOTAL (1978) hardened fish oil	=	<u>49,200 t</u>
	(Premium Use)		

With consumption of fish oil (see Appendix 1) of about 215,000 t/a the "premium" use amounts to 23% of total fish oil consumed.

Germany F.R.

(Source: personal communication)

Margarine

The size of the non domestic margarine market is approximately 80,000 tonnes/annum.

Of this, ca 75% is industrial (cake and pastry)		
margarines	=	60,000 t/a
The fat blend in these margarines at 80%	=	48,000
Hardened fish oil is used at 50% of the fat blend	=	<u>24,000 t/a</u>

Shortenings

Production is of the order of 35,000 tonnes/annum

About 50% of this is used for creaming purposes	=	17,500
Such products contain 50% hardened fish oil	=	<u>9,000 t/a</u>

TOTAL hardened fish oil for "premium" use	=	<u>33,000 t/a</u>
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The apparent consumption of fish oil (Appendix 1) is about 150,000 t/a but Germany FR exports a considerable quantity of hardened fish oil, possibly as much as 20,000 t/a. If this figure, without allowing for refining losses, is deducted from the consumption figure, a net internal consumption of 130,000 t/a is obtained and the "premium" use amounts to about 25%.

Norway

(Source: letter from Mr. B.C. Vedeler to IAFMM containing official Norwegian Government figures for 1978)

Production 1978

	Total tonnes	Hardened Fish Oil	
		%	tonnes
Margarines: vegetable	27,900	-	-
hardened fish oil	46,600	50	23,300
Total	74,500	-	-
Shortening	4,100	60	2,500
Baking	3,200	75	2,400
TOTAL	81,800		28,200

The probable use of baking fat is for bread.

Of the hardened fish oil type margarine it is reasonable to assume that 20% (9,300 tonnes) was used for cake and pastry margarines:

At 50% hardened fish oil content = 4,600 tonnes
 together with the 2,500 tonnes used in shortenings
 the total "premium" use = 7,100 tonnes

There is a big discrepancy between the total hardened fish oil figure above (28,200 t/a) and the apparent consumption shown in Appendix 1 (1978 -105,000 t). Apart from refining loss, this discrepancy may be explained by export of hardened fish oil. If the 28,200 t figure is taken, the "premium" use amounts to 25% of the total hardened fish oil.

Peru

(Source: letter from Eng. M. Tudela G. to IARMM)

Production

Oils and Fats End products in metric tons

Year	Veg.Oil	Comp.Oil 50% HFO	Total oils	Fats 90% HFO	Marg 53.4% HFO	Total Fats	Total Oils/Fats
1977	13,031	109,150	122,181	34,288	13,441	47,729	169,910
1978	53,799	*55,254	109,053	33,151	14,425	47,576	156,629
1979	10,957	84,722	95,679	34,098	16,479	50,577	146,256

(*) Reduced production of compound oil due to low production of fish oil.

**Hydrogenated Fish Oil for Local Consumption
in Metric Tons**

Year	Comp. Oil	HFO in Comp.Oil	Fats	HFO in fats	Marg	HFO in Marg	Total HFO
1977	109,150	54,575	34,288	30,859	13,441	7,177	92,611
1978	*55,254	27,627	33,191	29,836	14,425	7,703	65,166
1979	84,722	42,361	34,098	30,688	16,479	8,800	81,849

(*) Reduced production of compound oil due to low production of fish oil.

The compound oil is used for domestic cooking and salads.

The fats are used for frying and pastry.

The margarine figures encompass both domestic and industrial uses.

About 38,000 t/a of hardened fish oil is used in fats and margarines.

Probably about 10% of this figure (4,000 t/a) is used for "premium" products. Based on a total hardened fish oil usage of 80-90,000 t/a, the percentage for "premium" use is 5%.

Japan

(Source: personal communication containing Japanese Government statistics.)

Production 1977

Margarines total oils used	= 96,700 tonnes
of which hardened fish oil	= 45,000
Hardened fish oil as % of total	= 47%
Shortenings total oils used	= 137,300
of which hardened fish oil	= 32,300
Hardened fish oil as % of total	= 24%
TOTAL hardened fish oil used	= <u>77,300</u>

A breakdown of these products into industrial, retail, cake (creaming) and pastry categories is not available. The vast bulk of the margarine is probably used on bread but, due to western and particularly U.S.A. influence, it is thought that as much as a quarter of the shortening production is used for cakes or creaming and pastries. It is therefore estimated that some 8,000 t/a of hardened fish oil are used for these purposes. This is 10% of the total shown above.

Denmark

(Source: personal communication)

Production 1979

Margarine all types	=	95,000 tonnes
industrial	= ca	22,500
of which cream margarine (75%)	=	16,900
of which non all vegetable (75%)	=	12,700
of which fat content (80%)	=	10,100
of which hardened fish oil (40%)	=	4,000

(Note: no hardened fish oil used in pastry margarines, and no creaming shortenings produced.)

"Consumption" of fish oil 1978	=	27,000 tonnes
Estimated export of hardened fish oil	=	6,000
Net consumption of hardened fish oil	=	20,000

Therefore "premium" use is 20% of total hardened fish oil.

Netherlands

Figures for products, and usage of fish oil in those products, are not available. The situation in Holland is, however, very similar to that in Germany FR. Therefore, in the table which follows an estimated "premium" use figure is given, based on the German percentage.

3. CONCLUSION

Gathering together the above information the following table is produced: **Note:** figures in brackets are estimates, as noted in the discussion.

"Premium" Use of Hardened Fish Oil

- i.e. - in cake and creaming margarines and shortenings,
- in flaky pastry margarines and fats.

World crude fish oil production about 1 million tonnes per annum.

Country	Total consumption t/a	"Premium" use HFO	
		t/a	%
U.K.	215,000	49,000	23
Germany FR	130,000	33,000	25
Norway	28,000	7,000	25
Peru	85,000	(4,000)	(5)
Japan	80,000	(8,000)	(10)
Denmark	20,000	4,000	20
Netherlands	<u>114,000</u>	<u>(28,500)</u>	<u>(25)</u>
TOTALS	672,000	133,500	20

The table accounts for about two thirds of the world's fish oil production and in it are the biggest users. The writer believes that the other third would produce an increase of about 27,000 tonnes of "premium" use hardened fish oil, bringing the overall figure to 160,000 tonnes per annum, or 17% of crude oil production, allowing for refining loss.

F.V.K.Young
30/1/81

APPENDIX 1

Crude Fish Oil Statistics C. Wright and S.J. Bowman (IARMM) in metric tons x 1000

		Prodn.	Imports	Exports	Consumed	%
U.K.	1976	17	212	7	222	28
	77	21	185	6	200	25
	78	18	217	6	229	26
NORWAY	76	241	11	151	101	13
	77	224	10	143	91	11
	78	171	17	83	105	12
JAPAN	76	121	2	85	38	5
	77	173	2	116	59	7
	78	221	5	214	12*	1
PERU	76	109	-	3	106	13
	77	106	-	3	103	13
	78	129	-	2	127	14
DENMARK	76	97	1	86	12	2
	77	96	2	75	23	3
	78	78	3	66	15	2
ICELAND	76	30	-	32	-	-
	77	71	-	74	-	-
	78	94	-	74	20	2
U.S.A.	76	93	11	81	23	3
	77	61	8	44	25	3
	78	134	9	101	42	5
CHILE	76	35	-	20	15	2
	77	60	-	26	34	4
	78	77	-	56	21	2
S.& S.W.AFRICA	76	44	1	12	23	4
	77	26	1	1	26	3
	78	47	2	12	37	4
CANADA	76	10	0.5	10	-	-
	77	13	0.5	16	-	-
	78	13	-	9	4	-

GERMANY FR	76	10	133	7	136	17
	77	11	146	5	152	19
	78	13	137	7	143	16
NETHERLANDS	76	-	117	12	105	13
	77	-	113	12	101	12
	78	-	146	10	136	15
TOTAL	76	-	-	-	791	-
	77	-	-	-	814	-
	78	-	-	-	891	-

* Improbably low - production figure believed to be 322,000 tonnes.