ANNEX TO THE **WORLDWIDE FISHERIES MARKETING STUDY:** PROSPECTS TO 1985

SQUID

Government of Canada
Gouvernement du Canada

Fisheries and Oceans
Pêches et Océans

(This Report is one of a series of country and species annexes to the main study entitled the Overview)

D R A F T

Annex to the
Worldwide Fisheries Marketing Study:
Prospects to 1985

SQUID

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E. Wong
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FOREWORD

As a consequence of global extension of fisheries jurisdictions, a radical shift has taken place in the pattern of worldwide fish supply and demand. This change is still going on and will continue for many years before a new dynamic equilibrium situation is reached. However, in the midst of this re-adjustment, a new trade pattern is emerging -- some net exporting countries are now importing and vice versa. In the longer term, some countries will experience shortages of supply and others will have a surplus. Fortunately, Canada is amongst the latter group.

The implications for the marketing of Canadian fisheries products arising from the worldwide introduction of the 200-mile limit are extensive. With our vastly improved supply position relative to world demand, government and industry are understandably concerned about ensuring that the bright promise of increased market opportunities are real and can be fulfilled. One of the steps in this process is the publication of the Worldwide Fisheries Marketing Study which assesses the global potential on a country and species basis.

Specifically, the purpose of the Study is to identify the longer term market opportunities for selected traditional and non-traditional species in existing and prospective markets and to identify factors which may hinder or help Canadian fisheries trade in world markets. To date, over 40 country markets and 8 species groups have been analyzed. It should be noted that while the information contained in the Reports was up-to-date when collected, some information may now be dated given the speed with which changes are occurring in the marketplace. In this same vein, the market projections should be viewed with caution given the present and still evolving re-alignment in the pattern of international fisheries trade, keeping in mind the variability of key factors such as foreign exchange rates, energy costs, bilateral fisheries arrangements and GATT agreements which have a direct effect on trade flows.

Notwithstanding, the findings contained in these Reports represent an important consolidation of knowledge regarding market potential and implications for improvements in our existing marketing and production practices. The results of the Study should, therefore, usefully serve as a basis for planning fisheries development and marketing activities by both government and industry in order to capitalize on the identified market opportunities.

This draft report is published for discussion purposes and as such we invite your critical comments.

Ed Wong

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WORLDWIDE FISHERIES MARKETING STUDY

SQUID

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A. INTRODUCTION

Squid has been used quite extensively as bait for centuries but it is only since the end of the World War II that it began to be exploited widely for food. Annual landings of squid species are now nearly 1 million tonnes a year worldwide. Stocks are still considered to be under-exploited in many parts of the world, leading to increased interest in squid fisheries and new developmental activities in many countries. The potential catch is thought to be between 10 million and 100 million tonnes annually.

Relatively few countries consume squid in large quantities as part of the regular diet. Those that do include Japan, China, Hong Kong, Singapore, the Philippines, certain other Asian countries, Italy, Spain, Greece, and Portugal. Small amounts are also consumed in West Germany, France, the United States, Argentina, Chile, and some other nations of Latin America. Japan is the largest single market, consuming about two-thirds of the world's catch.

The inshore fishermen of Newfoundland for many years have produced squid for domestic and some foreign bait markets, but only in the last few years, with the encouragement and participation of the Japanese, has there been full recognition in Canada of the much greater economic potential of a squid fishery for food. With the advent of 200-mile economic zones and concern about adequate supply, demand exceeded supply in Japan in 1978. As a result Canadian processers had no difficulty selling their squid at very attractive prices. Consequently it appeared at the end of 1978 that there was a basic imbalance between world supply and demand and that Canadian processers would be able to benefit from a sellers' market in the foreseeable future.

However, developments in 1979 indicated that this view needed to be modified. There were heavy catches by Japanese vessels off Argentina and New Zealand and an increased supply from Canadian waters, leading to a market glut which developed rapidly in the middle of the year and a steep decline in price.

By 1980, with large and expensive inventories held over in Japan from 1979, imports from Canada and Argentina, and large domestic and distant-water catches exceeding 1979 catches by more than 100 000 tonnes the Japanese market went into a period of extensive oversupply and remained virtually closed to 1980 Canadian catches. These rapidly changing developments require a reassessment of the potential market for Canadian squid.

B. SUPPLY

1. World resources

Conservative estimates suggest that the potential annual world catch for cephalopods on the continental shelve and the upper regions of the continental slope is in the order of 8 million to 10 million tonnes. But a very large effort would be required to realize this potential; some 3 000 jigging vessels are required to catch 300 000 tonnes of squid per annum in the Seas around Japan. In addition there are large oceanic resources which, on the basis of the estimated consumption of squid by whales, are assessed at between eight and 60 times greater than the shelf resource. Fishing for oceanic squid, however, presents a major technological problem, which has not yet been solved.

For squid stocks on the continental shelves there is reasonable estimate of around 500 000 million tonnes as the potential catch of Todarodes pacificus, the Japanese common squid in the north-west Pacific. Estimates for other areas such as Newfoundland are much rougher and within an order of magnitude only. The estimate for the potential catch of squid in the NAFO area is of the order of 150 000 tonnes.

On a world basis, the catch level of Cephelopod Molluses i.e. mainly squid, cuttlefish and octopus (all species) totalled 1.28 million tonnes in 1978. Table 1 places the global picture in perspective for the years 1972 to 1978, the latest year for which data are available.

TABLE 1

World landings of squid, cuttlefish and octopus compared with Illex Illecebrousus

Year	Squid, cuttlefish and octopuses landings in Millions in tonnes	Illex Illecebrosus 000 tonnes	% Illex of Total
1978	1.28	146.9	11.5
1977	1.20	99.2	8.3
1976	1.17	68.3	5.8
1975	1.19	32.5	2.7
1974	1.07	24.7	2.3
1973	1.07	19.9	1.9
1972	1.15	11.7	1.0

Source: FAO, Yearbook of Fishery Statistics; Vol. 46, 1978, Rome, Italy.

TABLE 2

Landings of major species of squid by principal harvesting countries - 1975-1978
('000 tonnes)

		1975	1976	1977	1978
Todardoes pacificus	Japan	358	281	208	216
	South Korea	40	45	18	18
	Others	1	1	--	--
	SUB TOTAL	399	327	226	234
Illex spp	Canada	3	11	31	37
	FRG	--	1	8	--
	Japan	3	6	8	8
	Spain	4	6	12	16
	USSR	14	24	27	9
	Argentina	4	7	2	59
	Others	5	13	11	18
	SUB TOTAL	33	68	99	147
Loligo spp	Spain	22	12	6	27
	Thailand	38	36	52	53
	US	10	9	9	17
	Others	25	23	24	26
	SUB TOTAL	95	80	91	123
Nototodarus sloani	Japan	19	20	27	26
	Others	--	--	--	--
	SUB TOTAL	19	20	27	26
Loligo pealei	Japan	11	5	8	3
	Spain	8	9	5	5
	Others	6	6	5	1
	SUB TOTAL	25	20	18	9
Other Squids	South Korea	19	28	20	2
	Japan	116	155	210	243
	USSR	26	17	48	12
	Others	38	48	34	61
	SUB TOTAL	199	248	312	318
	Total	770	763	773	857

Note: Neither FAO nor official Japanese statistics show separate entries for Japanese "red squid" (Ommastrephis bartrami) which is subsumed under other headings.

Source: FAO, Yearbook of Fishery Statistics, Vol. 46., 1978, Rome, Italy.

TABLE 3

World catch of squid and cuttlefish by principal catching countries

	1970	1971	1972	1973	1974	1975	1976	1977	1978
					(tonnes)				
Japan	519 000	482 500	601 300	487 300	473 517	534 289	496 824	490 444	521 217
Korea Rep. of	75 200	45 800	61 200	61 800	53 326	69 795	89 431	52 873	71 807
Thailand	59 900	50 600	65 200	59 700	63 000	62 750	64 794	86 681	88 629
Spain	28 500	28 500	48 800	76 500	74 916	55 329	59 494	45 328	82 661
USSR	4 600	28 500	23 200	29 800	26 135	39 593	41 905	84 996	28 675
Philippines	12 500	12 700	7 500	15 500	21 368	30 691	24 829	27 543	17 166
Italy	18 900	18 000	20 500	21 500	24 985	23 539	23 893	32 110	23 936
France	8 000	12 500	9 100	13 800	7 831	11 271	9 384	12 074	9 872
US	12 200	15 500	10 400	7 300	13 052	9 527	13 080	11 284	18 661
Canada	100	1 600	--	600	108	3 292	10 952	31 031	37 301
Other	49 200	54 900	58 900	102 501	85 197	99 005	125 641	129 890	192 217
Total	788 100	751 100	906 100	876 301	843 435	939 081	960 227	1 004 254	1 092 142

Source: FAO Yearbook of Fishery Statistics: Vols. 38 and 42, 46 and 47., Rome, Italy.

TABLE 4

World catch of squid and cuttlefish by major producing areas

FAO Zone	Area	1970	1971	1972	1973	1974	1975	1976	1977	1978
						(tonnes)				
61	NW Pacific	580 600	517 700	646 300	524 100	478 446	572 060	552 811	521 225	559 195
71	W Central Pacific	85 400	82 600	87 400	99 700	110 676	124 987	125 227	141 162	137 838
21	NW Atlantic	15 500	27 600	40 000	66 200	65 420	69 031	96 072	123 695	99 027
27	NE Atlantic	21 900	26 800	20 700	19 000	18 242	20 029	15 991	20 117	20 110
41	SW Atlantic	NA	NA	NA	NA	NA	5 157	9 242	3 261	74 630
34	E Central Atlantic	38 300	43 600	61 100	98 101	101 909	75 498	75 204	52 465	71 320
37	Mediterranean	26 800	26 700	27 800	22 200	23 818	25 012	23 932	26 240	24 415
77	E Central Pacific	11 300	14 400	9 300	5 700	10 740	8 271	10 140	9 514	19 724
81	S. Pacific	NA	NA	100	15 500	24 626	19 791	19 748	55 515	35 503
	Other	8 200	10 100	13 400	25 200	24 450	21 110	30 150	51 060	45 380
	Total	788 000	749 500	906 100	875 701	858 327	940 946	958 517	1 004 254	1 087 142

Source: IBID.

In terms of world landings of Illex, more than 91% of catches in 1978 were landed by seven countries, as follows in order of importance.

TABLE 5

World Illex landings

Country	Percentage of world landings
1. Argentina	40*
2. Canada	25
3. Spain	11
4. USSR	6
5. Japan	5
6. Cuba	3
7. Mexico	2
8. Other	8
TOTAL	100%

Source: FAO, Yearbook of Fishery Statistics Vols. 38 & 42, 46 to 47, Rome, Italy.

* The 1980 Argentinian fishery only produced about 15 000 tonnes.

2. Fishery management

Illex illecebrosus and Todarodes pacificus are now fully exploited in the NAFO area and in the seas around Japan respectively and require routine fisheries management. Difficulties of management arise because of extremely short life cycles. The fisheries are conducted each year on new stocks. However, due to insufficient data the determination of the relationship between size, stock and recruitment for Illex is difficult. It does appear, however, that an opportunistic species having a short lifespan, rapid growth and relatively low fraternity are generally characterized by moderately strong stock recruitment relationships.

At present squid fisheries in the NAFO area are regulatd by mesh size, type of fishing gear, open seasons and areas, and catch quotas. The Japanese limit by licence the number of boats in each size class that are allowed to fish for squid. They also regulate the effort of their larger vessels (30-100 tonnes) by limiting the number of lamps to approximately 50 or the power supply to 150 kilowatts. This is a rare example of effort regulation. Management regimes have also recently been introduced in New Zealand and Australia.

3. Squid fisheries of Japan

Japanese common squid (Todorodes pacificus) production in the prewar years registered 75 000 tonnes to 150 000 tonnes annually, and increased rapidly in the postwar years to 656 445 tonnes in 1952, or 14% of total fisheries production that year. In 1955, though the catch showed a decline from that of 1952, it still reached nearly 100 000 tonnes. Squid represents one of the most important fisheries in Japan, involving many independent fishermen. Squid also are the most important species among cephalopods, accounting for 90% of total production of these species.

There are many rich fishing grounds in the Pacific Ocean off Hokkaido and the northern port of Honshu. These waters produce 80% to 90% of the country's total catch.

The squid-jigging season varies according to the fishing area, but July-December is the peak period off Hokkaido and northern Honshu. Jigging is carried on all night with the use of lights to attract the schools of squid approaching the coast. No expensive gear is needed, and many small boats with a crew of only family members go out jigging, as in Newfoundland . During the season the coasts are congested with villagers jigging for squid, which has become the most important source of income for these people. In the principal fishing areas in the southern part of Hokkaido and northern Honshu, squid accounts for as much as 60% of the total fish production.

Small fishing boats are confined to the immediate coastal waters, while larger boats, which are increasing in number, operate in more distant waters. Catches are landed at the larger ports. Some of the catch is consumed fresh and some frozen or dried.

Of the approximately 90 species of squid in Japanese waters the most important species is in the Ommastrephidae family, surume-ika. There are three populations of sureme-ika. (Japanese common squid), Todarodes pacificus, also called Nototodarus Sloani japanicus, breeding independently in winter, autumn and summer. The main spawning ground for all is in the East China sea. The winter population is distributed all around Japan, extending as far north as the Kurile Islands and Sakhalin, while the autumn

population is restricted to the western side of Japan and the summer population to the Pacific coast of south Honshu.

The offshore fishery in the Sea of Japan is based on the autumn stock. The winter population is the most abundant inshore. This fishery for about 300 000 tonnes of squid annually involves approximately 30 000 vessels. These two populations account for 90% to 95% of the total Japanese catch of Todarodes pacificus.

With some declines in the catch rates for Todarodes pacificus on the Pacific coast over the past year a fishery has developed for the larger Japanese red squid, Ommastrephes bartrami. In 1979 about 120 000 tonnes of red squid, murasaki-ika or aka-ika, was landed. Due to high catches of surume-ika, Todarodes pacificus, in 1980, less effort was expected to be directed toward red squid, and catches were expected to be slightly less than 100 000 tonnes. However, with the drop in price of surume-ika averaging about 35% in 1980, fishermen increased their effort towards aka-ika and actually caught 144 000 tonnes. The relative abundance of these species has fluctuated markedly from year to year, governed in part by differing hydrographic conditions such as salinity and water temperatures. Such conditions make it extremely difficult to project landings. In recent years Japanese fleets have begun exploiting other stocks of squid in distant waters. In 1969, fishing for Loligo pealii off the east coast of the US was started. In 1972 the fishing for Illex illecebrosus off Newfoundland and Nototodarus sloani sloani off New Zealand were first explored.

TABLE 6
Japanese domestic squid landings by method of catch

	1979			
	Sureme-ika Matsu-ika	Aka-ika	Other	Total
Jigging	232 000	91 000	10 000	333 000
Gillnet	--	34 000	1 000	35 000
Other	48 000	--	113 000	161 000
TOTAL	280 000	125 000	124 000	529 000

	1980			
	Sureme-ika Matsu-ika	Aka-ika	Other	Total
Jigging	356 000	60 000	10 000	426 000
Gillnet	--	84 000	1 000	85 000
Other	49 000	--	80 000	129 000
TOTAL	405 000	144 000	91 000	640 000

Source: MOAFF

TABLE 7

Japanese squid catch by jigging vessel size (1978)

	Number of fishing vessels	Number of trips	Number of days fished	Catch (tonne)
Non-powered boat	126	6 004	6 004	27
Powered boat				
0 - 3 (tonnes)	19 147	892 950	893 271	14 265
3 - 5	8 966	582 340	586 025	24 684
5 - 10	3 027	198 950	216 683	26 797
10 - 20	2 002	134 491	177 204	37 056
20 - 30	85	3 246	8 699	3 011
30 - 50	469	10 959	45 349	27 877
50 - 100	1 298	20 540	182 600	141 051
100 - 200	44	377	8 691	12 464
200 - 500	192	1 295	38 140	76 446
Total	35 230	1 845 148	2 156 662	377 916

Source: Annual Report of Statistics of Fishery and Culture Production.

TABLE 8

Japanese annual catch of squid and cuttlefish, 1970-1981

	Japanese Squid (Surume-ika)	Cuttlefish	Other Squid (murasaki-ika matsu-ika)	Total
1970	412 240	14 740	91 937	518 917
1971	364 349	15 413	102 756	482 518
1972	464 365	15 090	119 995	599 450
1973	347 566	12 225	126 496	486 287
1974	335 018	18 190	117 759	470 967
1975	385 255	15 517	137 066	537 838
1976	312 144	19 750	169 975	501 869
1977	264 239	20 415	227 925	512 579
1978	198 517	18 772	302 458	519 747
1979	212 846	14 148	301 837	528 831
1980	310 000	14 000	316 000	640 000
1981*	340 000	14 000	289 000	643 000

Source: Preliminary, Ministry of Agriculture, Forestry and Fisheries, Japan.

4. Squid fisheries of North America

The short finned Illex illecebrosus and the long-finned Loligo pealii are both common on the continental shelf off the Eastern Seaboard of North America. There is an overlap of their distribution in the north west Atlantic with Loligo most abundant from Cape Hatteras to Georges Bank and the inshore Illex abundant from Cape Cod to Newfoundland. Both species spend the winter offshore on the edge of the continental shelf, migrating inshore in spring, Loligo to spawn and Illex to feed. Illex spawns at some time during the offshore phase, probably beyond the edge of the continental shelf.

Loligo is caught by an international fleet offshore in winter on the edge of the continental shelf in the mid-Atlantic bight.

Canada's East Coast Fishery

Newfoundland fishermen have a long tradition of taking Illex inshore for use as bait in the longline cod fishery. Records indicate that a small dried squid industry also existed in Newfoundland since the start of this century. In 1910 small volumes of dried squid were exported to China. These exports peaked at more than 2 000 tonnes per year just before the Chinese Communists took over. Since 1964, however, with the advent of distant-water fleets, there has been a rapid expansion of the squid fisheries in northwest Atlantic. Known catches all sources of Illex have increased progressively from less than 5 000 tonnes in 1970 to more than 160 000 tonnes in 1979. In 1979, 57.2% of squid landings were caught by the inshore fishermen.

As Canada did not have the capacity to harvest squid offshore, foreign freezer trawlers were chartered by Canadian interests to help them develop an expanded squid industry. During 1978 and 1979 a series of charter programs referred to as developmental charters were initiated. These charter programs were discontinued in 1980. However, special charters were allowed under certain conditions in 1981.

In 1980 the Canadian government approved licences for the entry into the Canadian offshore fishery of up to four new freezer trawlers dedicated to underutilized species. Under the terms of the licence, a vessel had to be purchased by the licence-holder by the second year of operation, but vessels could be chartered during the first year. In 1980 only one licence-holder purchased a vessel. Two others entered into charter arrangements and the fourth did not participate in the fishery. Slightly more than 1 400 tonnes were landed by these three vessels plus the Atmar, a freezer-equipped jigging vessel operating out of New Brunswick.

The largest categories of squid production in Canada are frozen, whole and tube squid followed by bait and dried squid. There has also been some processing of semi-dried or half-dried skinned products, daruma.

Plants are licensed by the provincial government in Newfoundland to process squid. In Nova Scotia no licences are required. If the goods are

to be exported they must be covered by a registration certificate from federal fisheries inspectors, who check to ensure that minimum standards are maintained.

Another valuable product is dried squid, sold primarily to Chinese markets in Hong Kong and Singapore. It is prepared primarily by fishermen and their families, and is sold directly to buyers or sub-agents who grade and package the product, which may then go into larger processing plants for final distribution. There is no processing licence required for fishermen. If the product is exported, it must be inspected by fisheries inspectors who verify the quality of the shipment and make sure it meets acceptable standards. In 1981 a grading system for dried squid was implemented. (See Appendix II).

Squid drying has also been done mechanically. A saltfish drier has been used to dry squid, however it is not defined enough in terms of maintaining accurate humidity and temperature control to produce dried squid to proper specifications. Experimentation is continuing.

TABLE 9

Canadian squid catches and landed values
(Q in tonnes, Value: $000)

	1975/76/77	1978		1979		1980 (1	
	Q	Q	V	Q	V	Q	V
Nova Scotia	NA	17 722	7 539	25 397	10 549	760	13
New Brunswick	NA	26	6	676	224	114	1
PEI	NA	1	0	513	234	0	--
Quebec	NA	0	0	1	2	0	--
Newfoundland	3 202/ 9 927/27 733	44 058	8 104	86 069	19 328	33 879	339
Atlantic Coast	3 292/10 952/38 544	61 807	15 469	112 656	30 337	34 753	345

Developmental charters and cooperative squid arrangements (2)

	Maritimes		Newfoundland		Total	
	Q	V	Q	V	Q	V
1978	16 694	7 133	9 160	1 417	25 854	8 550
1979	20 030	9 117	3 036	706	23 066	9 823

(1) Preliminary
(2) These figures are included in landing totals.

Source: DFO Worksheets.

TABLE 9

Actual catch and allocation by nation of Illex in SA 3 & 4 (1976 to 1980)

	1976		1977		1978		1979		1980	
	Quota	Catch	Quota	Catch	Quota	Catch	Quota	Catch	Quota	Catch
Bulgaria	--	1 034	--	2 998	1 000	955	1 000	3 006	500	202
Canada	10 000	10 872	10 000	39 036	65 000	63 174	76 000	115 704	100 000	34 753
Cuba	--	3 248	--	4 685	4 500	4 105	4 500	4 018	2 250	1 602
France	--	442	--	1 359	--	3 653	--	4 800	2 500	364
FRG	--	27	--	8 020	--	1 150	--	--	--	--
Italy	--	1 355	--	2 467	--	1 054	--	1 326	--	--
Japan	--	3 055	--	3 145	4 500	4 513	4 500	4 555[b]	17 000	16 135
Poland	--	809	--	2 939	2 000	1 944	10 500	10 486	1 000	489
Portugal	--	264	--	1	1 000	582	1 000	1 845	3 500	1 647
Romania	--	--	--	1 304	1 000	977	1 000	832	500	--
Spain	--	934	--	3 070	4 500	4 013	4 300	3 560	5 950	4 820
USSR	15 000	16 900	15 000	18 953	10 000	9 471	10 000	9 313	7 660	6 774
OTHERS	3 000	2 827	3 000	--	6 500	48	7 000[a]	804	--	--
Total	28 000+	41 767	28 000+	87 977	100 000	95 639	119 800	160 249	140 860	66 786

[a] Allocation for EC

[b] Total Japanese catches were 16 744 tonnes 12 189 tonnes caught under charter to Canadian interests but landed in Japan as products of Japan.

Source: ICNAF, Serial No. 5492; Sum. Doc. 79/VI/31 and preliminary 1980 FLASH statistics, Department of Fisheries and Oceans, Ottawa.

TABLE 10

Canadian squid allocations

Allocations	Allocated-1979	Caught	Allocated-1980	Caught
Offshore domestic	5 000	--	10 000	1 413
Inshore domestic	45 000	87 703	65 000	32 932
Developmental charters	12 000	11 772	--	--
Industry development	5 000	4 336	--	--
Other special projects	8 000	7 853	--	--
Foreign allocations	44 000	44 545	40 860	32 033
Reserve	1 000	--	34 140	--
Total allocated catch(TAC)	120 000	156 209	150 000	66 378

Source: DFO Worksheets.

TABLE 11

Average landed prices for Illex squid (¢/lb)

1976-1980

	Maritimes	Newfoundland
1976	10.0	4.0
1977	10.5	5.5
1978	11.0	9.0
1979	14.5	11.0
1980	9.0[a]	5.5[b]

[a] Small volume of sales related to high-priced bait and direct sales arrangement with Spain and Portugal.

[b] Price negotiated by August 1980 was 5¢/lb with an escalator clause in the agreement based on the value of eventual sales. This escalator lead to a final price to fishermen of 5.5¢/lb.

Source: DFO Worksheets.

TABLE 11

Canadian squid production 1977-1980
(tonnes)

Total Production	1977		1978	
Product Form	Product Weight	Round Weight Equivalent	Product Weight	Round Weight Equivalent
Fresh and frozen round	7 800	7 800	38 100	38 100
Fresh and frozen tubes	7 900	15 800	12 600	25 200
Fresh and frozen bait	4 500	4 500	4 700	4 700
Dried squid	28	140	361	1 850
Total	20 228	28 240	55 761	69 805

	1979		1980	
Newfoundland	Product Weight	Round Weight Equivalent	Product Weight	Round Weight Equivalent
Frozen round	30 436[1]	30 436	6 859	6 859
Tubes	15 193	30 386	6 408	12 816
Dried	1 360	6 800	1 150	5 750
Bait	6 540	6 540	5 957	5 957
Other	401	1 171	342	342
Fresh bait	--	--	349	349
Rejected for poor quality	1 811	1 811	249	249
Total	55 741	77 144	21 314	32 322
Maritimes				
Frozen round	5 014	5 014	--	--
Tubes	1 263	2 526	435	870
Dried	150 (est)	750	--	--
Bait	1 873	1 873	529	529
Total	8 300[2]	10 163	964	1 399
Total production	64 041	87 307	22 278	33 721

1) Includes 400 tonnes IQF onshore pursuant to devleopmental chrter arrangements.

2) Includes 3 804 tonnes processed onshore pursuant to developmental charter arrangements.

Source: DFO Worksheets.

TABLE 12

Canadian squid exports, 1978-1980
(tonnes)

	1978*	1979	1980
Whole, fresh or frozen (incl. round)			
France	4	43	7
West Germany	189	277	18
Iceland	885	300	301
Italy	379	850	202
Norway	601	1 952	106
Portugal	--	807	608
Spain	740	2 501	2 079
Bulgaria	2 893	5 222	2 617
South Africa	--	--	3
East Germany	--	300	300
Cyprus	--	--	33
Hong Kong	135	8	128
United Kingdom	14	--	35
Japan	27 662	19 342	15 463
Denmark	259	--	36
Taiwan	350	59	709
Spanish Africa	--	--	709
United States	1 114	1 422	1 150
Sweden	289	--	722
Others	1 414	57	--
	36 928	33 140	24 596
Tubes, fresh or frozen			
Italy		472	633
West Germany		--	8
Spain		273	953
UK		--	16
Japan		1 798	2 350
Spanish Africa		--	55
United States		150	301
Sweden		--	1 172
Other		82	3
		2 775	5 491

* Until 1979 official statistics published by Statistics Canada did not include squid products as direct elements. These exports were contained under the category of fresh and frozen shellfish NES. The figures listed under 1978 are mainly squid exports, both round and tube, but also include some other shellfish products.

Source: Statistics Canada (1980 preliminary)

TABLE 13
Exports of Canadian Illex
July 1, 1979 to December 30, 1980

Squid, Whole, Fresh or Frozen (incl. Round)

	July 1 to To December 31, 1979		January 1 to June 30, 1980		July 1, 1979 to June 30, 1980 TOTAL		Average cost/tonne (Volume/Value)	July 1 to December 30, 1980	TOTAL Jan.-Dec. 1980
	Tonne	$,000	Tonne	$,000	Tonne	$,000		Tonne	
United Kingdom			35	15	35	15	429	--	35
France	43	73	--	--	43	73	1 698	7	7
Germany, West	277	206	17	14	294	220	748	1	18
Iceland	300	173	--	--	300	173	577	301	301
Italy	838	540	202	1 059	1 040	1 599	1 538	--	202
Denmark			2	1	2	1	500	34	36
Netherlands	19	12	--	--	19	12	632	--	0
Norway	1 897	1 147	106	64	2 003	1 211	605	--	106
Portugal	807	837	369	66	1 176	903	768	239	608
Spain	2 501	1 063	1 081	2 555	3 582	3 613	1 010	998	2 079
Cyprus	--	--	16	9	16	9	563	17	33
Sweden	5	4	5	4	10	8	800	717	722
Bulgaria	5 222	2 249	2 617	892	7 839	2 941	375	--	2 617
Germany, East	300	209	--	--	300	209	697	--	--
Poland	12	4	--	--	12	4	333	--	--
Hong Kong	35	233	--	--	35	233	6 657	128	128
Japan	15 771	12 154	14 839	14 687	30 610	26 841	877	624	15 463
Korea, South	21	137	--	--	21	137	6 524	--	--
South Africa								3	3
United States	1 364	1 023	440	403	1 804	1 426	790	710	1 150
Spanish Africa (Canary Island)	--	--	709	354	709	354	499	--	709
TOTAL	29 412	20 064	20 438	20 123	49 850	39 982		5 376	24 217

Squid, Tubes, Fresh or Frozen

United Kingdom	--	--	16	7	16	7	438	--	16
France	--	--	3	10	3	10	3 333	--	3
Italy	472	537	19	21	491	558	1 136	614	633
Germany, West	--	--	3	7	3	7	2 333	5	8
Norway	18	12	--	--	18	12	666	--	--
Spain	273	417	711	766	984	1 183	1 202	242	953
Sweden	13	15	20	25	33	40	1 212	1 152	1 172
Singapore	17	133	--	--	17	133	7 824	--	--
Spanish Africa (Canary Island)	--	--	55	30	55	30	545	--	55
Japan	512	536	2 038	1 605	2 550	2 141	840	312	2 350
United States	1	1	1	7	29	19	655	294	301
TOTAL	1 306	1 651	2 866	2 478	4 199	4 140		2 619	5 491

Source: Statistics Canada, Exports by Commodity, Ottawa 1980.

US east coast squid fishery

The US domestic squid fishery is minimal in relation to the potential catch in the country's waters. The government is currently attempting to encourage development of a domestic fishery by the use of grants to operators willing to participate.

TABLE 14

US 1980 foreign allocations of Atlantic squid
(tonnes)

Country	Illex	Loligo
Bulgaria	233	125
Cuba	234	125
Italy	2 070	2 790
East Germany	234	125
Japan	1 500	4 300
Mexico	1 800	1 800 (held back)
Poland	850	619
Romania	233	125
Spain	4 450 (9 000)*	6 831 (10 035)*
Unallocated	396	1 160
Total	12 000	18 000
Held in reserve	13 000	19 000

* 1979 allocations to Spain.
Source: US Dept. of Commerce, Fishery Statistics, (NMFS) Washington DC, 1980.

The reserve was further allocated in late September 1980 with Spain getting the major share. Due to US dissatisfaction with the pace of progress with Japan on entry of US fish products into its market Japan did not get a significant proportion of the reallocations.

US west coast squid

The California fishery for Loligo opalescens continues year-round with maximum catches in summer when the squid move inshore in vast numbers to spawn. This fishery began in the 1860's with the establishment of a Chinese fishing village at Monterey. Squid were taken in small purse seines, dried

and exported to China. In 1905 lampora nets were introduced by Italian fishermen, who took complete control of fishing, although the Chinese and Japanese continued to dry and market part of the catch.

Canadian west coast

Over the past two years scientific surveys off the Canadian west coast have intensified in a search for commercial squid stocks. In May 1980 a Preliminary Report on the Potential Commercial Squid of British Columbia by Dr. F.R. Bernard was published as No. 942 of the Canadian Technical Report of Fisheries and Aquatic Sciences. Dr. Bernard found that four species of British Columbia squid may be of commercial interest. The opal squid (Loligo opalescens) is found at times in dense schools, but may be too erratic for a sustained fishery. The nail squid (Onychoteuthis borealijaponica) known in Japan as tsume-ika, is present in the surface waters adjacent to the continental shelf and on the high seas, possibly in sufficient number to permit a jig fishery. The flying squid, Japanese red squid (Ommastrephes bartrami), a summer offshore migrant from the subtropics, is readily caught with gillnets, but it is not known if it enters our latitude annually. The red squid (Berryteuthis magister), called dosu-ika by the Japanese, is a common near-bottom species and may support a seasonal trawl fishery. These resources are probably insufficient for a specialized fishery but may allow some diversification of effort. Both Tsume-ika and dosu-ika, although known in Japan, are not well received in the market place.

5. Other major squid fisheries

Argentina

Catches of Illex argentinus off Argentina and Uruguay ranged from 8 266 tonnes in 1976 to 2 349 tonnes in 1977. Bulgaria moved in to exploit the fishery in 1977, followed by Japan and Spain mounting significant operations in the next two years. The USSR and other Easten European nations also established a larger presence in the southwestern Atlantic.

Landings exceeded expectations, at 55 000 tonnes in 1978 and 84 000 tonnes in 1979, with about 25 000 tonnes of the 1979 landings taken as an allocation to Japan. Catches were made both within and outside the Argentine 200-mile zone (near the Falkland Islands).

Then in 1980, the situation deteriorated to the point of disaster, with a squid catch that plummeted to less than 15 000 tonnes. Contributing factors were problems within the Argentine fishing industry, a souring of relationships between Argentina and Japan, and a diminished squid resource. The Argentine/Japanese relationship in the fisheries field ceased in 1980. With strong demands on the Argentine side for purchase commitments and joint ventures (i.e. turnkey operations) the Japanese decided not to fish in Argentine EEZ and pursue their catches outside where there had been successful catches the year before. The relationship now appears to be improving and future co-operation is possible.

While the biological characteristics of Illex make estimates of catches in future years very hazardous, it is clear that the potential of the southwest Atlantic is considerable. One earlier estimate made by Argentine authorities put catches at 35 000 tonnes annually, but this figure was exceeded in 1978 and 1979. Clearly this resource provides considerable competition for Canadian Illex and if both areas produce large harvests in the same year, the Canadian marketing problem will be exacerbated.

New Zealand

In recent years, substantial supplies of squid have come from New Zealand waters, and the major harvesting nations have been Japan and the USSR. Anticipated catches for 1980 were set at 100 000 tonnes, but landings in previous years fell short of this amount, with less than 50 000 tonnes caught in 1979.

In 1981 the New Zealand governments will allow up to 91 000 tonnes of squid to be taken from the country's 200-mile zone. Of this, 48 000 tonnes has been allocated to a jig fishery and 43 000 tonnes to a trawl fishery.

The mainland jig fishery runs from mid-December to March/April, and the trawl fishery from October to May/June. In the Auckland fishery trawling takes place in February and March, with jigging between December and June.

TABLE 14

Total squid catch from New Zealand EEZ

unit-tonne

Year	Domestic	Joint venture	Japan	USSR	R. of Korea	Total
1977	556	380	40 924	26 800	1 480	70 140
1978	784	1 683	17 298	7 976	517	28 258
1979	414	9 203	21 944	14 960	1 073	47 594

	1979		1980	
Method	1.9.78 to 31.8.79	1.4.78 to 31.3.79	1.9.79 to 31.8.80	1.4.79 to 31.3.80
	Jigging	Trawling	Jigging	Trawling
Domestic fleet			Not Available	
JV fleet	7 383	1 820	15 384	9 928
Licensed Fleet				
- Japan	18 220	3 724	25 091	15 198
- Korean	251	822	403	289
- USSR	--	14 960	--	8 449
Licensed Fleet - Total	18 471	19 506	25 494	23 936
Total - Excluding Domestic Catch	25 854	21 326	40 878	33 864
Total - Including Domestic Catch	47 594		74 606+	

Source: New Zealand Ministry of Fisheries, 1979.

The jigging quota is based on 210 vessels - 108 domestic, 98 Japanese and four from the Republic of Korea, each is expected to catch 2.2 to 2.3 tonnes per day for 100 days. Jiggers can fish anywhere within the 200-mile zone but outside the 12-mile limit.

The trawling quota is split into three areas: the southern part of South Island, the Auckland and Campbell Islands to the south, and the rest of the zone.

TABLE 15

New Zealand squid trawling allocations, 1980-81

	Stewart and Snares Island (Area F)	Southern Islands	Main Island and Remainder of Zone (Area E)	Total
Domestic	--	--	3 000	3 000
Joint venture	3 000	1 300	2 600	18 600
Japan	1 500	7 000	1 400	9 900
Soviet Union	--	9 500	1 000	10 500
S Korea	500	500	--	1 000
	5 000	18 300	8 000	43 000

Source: N.Z. Ministry of Fisheries, 1979.

The smaller quota, reduced by about 10 000 tonnes from 1980 allocations, reflects concern for the squid stocks around the Auckland and Campbell Islands. In 1979, 50 000 tonnes was set as the maximum catch in the area, but catches failed to reach that level. It has been suggested that the squid stock may be smaller than originally thought and to protect the resource a maximum of 30 000 tonnes was set for 1980.

TABLE 16

New Zealand 1980-1981 squid catches all methods to March 24, 1981

Domestic	Not available (expected to be about 2 000 tonnes)
Joint Venture	14 230
Japan	21 664
USSR	2 572
Korea	810
Total	39 276+

Source: N.Z. Ministry of Fisheries, 1979.

It should be noted that the joint-venture catches made by Japanese vessels were landed in Japan in 1980 as a product of Japan. These joint venture products will again enter Japan without the necessity of import quota (IQ) in 1981.

Soviet catches are not being sold to Japan. Much of the USSR catch is landed in Singapore, where a Singapore/USSR joint venture company, MARISSCO, markets the product.

Australia

The Australian squid fishery is a relatively new one, being developed mainly by the Japanese. This is illustrated in the fact that in the 1978-79 season 24 foreign vessels, most of them Japanese, took 3 387 tonnes, while domestic landings totalled 583 tonnes. And while the domestic catch has been increasing in recent years in response to better prices, foreign fishermen still dominated the fishery. In 1979-80 there were 62 foreign vessels involved, 42 of them Japanese, and foreign landings were 7 914 tonnes, against domestic landings of around 800 tonnes.

The situation changed in 1980-81, when there were no joint operations in Australian waters. Until then, vessels from Japan, the Republic of Korea and Taiwan had access through joint feasibility fishing arrangements. This dramatic change came about because the Government of Australia increased licence fees and demanded more landings and processing in Australia of squid caught through joint-venture operations. Another factor was a downturn in world markets.

There is not as yet an established processing industry for squid in Australia. Domestically caught squid are graded and sold fresh in local wholesale markets. It was hoped that joint squid operations would have contributed to expansion of the processing sector.

It is estimated that there is a domestic market for about 3 000 tonnes of squid per year in Australia. Most is imported loligo for food, and some is used for bait.

Europe

Squid, cuttlefish and octopus are widely caught in the Mediterranean and around Madeira, for both human consumption and bait. In Norway there is a fishery for Todarodes sagittatus in September and October, north of the 62nd parallel, for longline fisheries bait. Squid has also been used for meal and oil, and more recently for human consumption. In 1980 and 1981 Spain was allocated 5 000 tonnes from Norwegian waters. The annual landings of squid from waters off Norway over the past five years have increased from nil in 1975 to 1 146 tonnes in 1979.

C. JAPAN, THE WORLD'S MAJOR SQUID MARKET

Japan is by far the most important market in the world for squid and cuttlefish with more than 600 000 tonnes (live weight) being available for consumption annually. It is estimated that this represents an annual product weight consumption of 2.8 kilogram per capita comprising 2.3 kilograms fresh and frozen, and 0.5 dried and prepared.

Squid is eaten raw, fried, boiled, frizzled, canned, dried, smoked and as a paste. Very little is wasted, as processed forms of entrails, eyes, liver and ink sac are all produced for various purposes.

1. Production

Squid and cuttlefish are caught by Japanese fishermen in many of the world's major producing areas. Most of the catch comes from the northwest Pacific, the most important species being Todarodes pacificus, or Ommastrephes sloani pacificus, known locally as surume-ika. This Japanese squid is similar to the Nototodarus and Todarodes species found in Australia and New Zealand. Production fluctuates somewhat depending on the sea currents and water temperatures but the number of Japanese vessels has remained largely unchanged and production has averaged around 200 000 tonnes annually since 1970.

2. Market requirements and handling procedures

Squid change colour from white to reddish-brown, soon after catching. The more handling and/or mishandling, the greater the loss of this colour and the greater the loss of appeal to buyers. A set of handling procedures have been recommended in order that squid can best meet Japanese market requirements.

Immediately after catching, the squid should be thoroughly washed in sea water, then be carefully packed in stackable containers in such a way as to facilitate draining, and stowed in a chiller. Storing the fish in large, deep bins may reduce their value considerably if they are crushed or damaged.

If the boat is to be at sea more than one night, the squid should be covered with parchment paper or plastic and a layer of ice before stowing. It is important that the fish do not come into direct contact with ice, as this causes discolouration and "pitting" of the skin and flesh.

On landing, the squid should be washed and graded for size and quality and those for export packed in 8.5 kilogram lots in trays for freezing. Again the method of packing and placement of fish is important.

On Japanese vessels, the squid are washed, packed in 8.5 kilogram lots with careful attention to arrangement, and frozen rapidly at a temperature of -30°C to -40°C. The blocks are then removed from the trays, dipped in fresh water for glazing to improve appearance and reduce dehydration, and then deep-frozen in the holds at -25°C to -30°C.

At shore-based plants the frozen blocks should be placed in polythene bags and then cartons, and the size and number of squid contained marked on the outside of the box.

Almost all imported squid is used for processing although a small quantity of the larger sized grades is consumed as sashimi and tempura or sold through retail outlets for home consumption. Squid for raw consumption brings a higher price, but must be very fresh and of the highest quality as well as being the right size.

Freshness

Experience indicates that squid loses its freshness much more rapidly than other species of fish because it contains many water-soluble extracts that promote the breeding of bacteria. Bacterial and enzymatic action increase with the passage of time, and the squid soon begins to decompose. If left for even 30 minutes at normal temperature after being caught, the product can no longer be designated top quality.

There is a mistaken impression that, after freezing, a slight loss of freshness will go unnoticed. But the highly professional Japanese distributors and processors can tell at a glance if the product is not

fresh. This is an essential skill as freshness determines the price.

Sizing and grading

Appearance is an essential element in meeting consumer requirements. There is a wide range of uses, with circumstances sometimes calling for larger, and sometimes smaller sizes of squid, whether it is for bait, for processing or for direct retail sale to consumers. Thus the procedure known as "sizing" is an important part of the processing sequence. It is by packing to a uniform size and grade that the best price can be obtained for the product.

TABLE 17

Sizing table

Species	Category	Size of fish (g/fish)	Approximate Number per case
Illex	8L	700 & up	12
	7L	700 - 600	12 - 14
	6L	600 - 500	14 - 17
	5L	500 - 400	17 - 21
	4L	400 - 300	21 - 28
	3L	300 - 250	28 - 34
	2L	250 - 200	34 - 43
	L	200 - 150	43 - 57
	M	150 - 100	57 - 85
	S	100 - 70	85 - 121
	SS	70 - 50	121 - 170
	3S	50 & under	170
Loligo	LL	250 g & up	34
	L	250 - 150	34 - 57
	M	150 - 100	57 - 85
	S	100 - 50	85 - 170
	SS	50 - 30	170 - 283
	3S	30 g & under	283

Source: Japanese Deepsea Trawlers Association.

3. Market prices

Prices vary considerably by size with the highest value usually in the 21-30 count per block range (405-283 grams per piece) which is most suitable for table food and for dried squid. Larger squid are worth less per kilogram at trade level because the retail price per piece cannot rise sufficiently to take account of the greater weight and because the body recovery in processing drops if the larger sizes contain eggs. Smaller sizes diminish in price except for the very smallest, which are worth slightly more for preparations such as "sugata-yaki" (a packaged, whole roasted squid).

Prices vary from ship to ship (according to quality) and from port to port (according to supply and demand). Ship arrivals are staggered over a period and spread over many ports to avoid supply congestion, which would push prices down. As the market price levels move over time, it is difficult to get an accurate picture of "best ports" or "best ships" for prices. Zengyoren and Dogyoren (industry co-ops) have the job of trying to read the markets in different ports and adjust deliveries to maximize prices to the producers.

The Japanese surume-ika and New Zealand arrow squid are fully broken down by size grade and count per block, but other competing species, used entirely for processing, are not. Japanese murasaki-ika is split into size grades to some extent but Canadian and Argentine Illex are sold at one price for all sizes. Closer attention to the size requirements of the end user may lead to higher prices.

For the purposes of market price comparisons among species, marketing experts of Zengyoren suggested the following prices and end uses as representative of market values at the end of May 1979.

Japanese surume-ika (jigged) : Y620 per kg (table foods/processing)
New Zealand arrow squid (jigged): Y480 per kg (table foods/processing)
Japanese murasaki-ika (jigged) : Y390 per kg (processing)
Canadian illex (trawled) : Y350 per kg (processing)
Argentine illex (trawled) : Y350 per kg (processing)

Buyers react by offering a high price for food-quality squid and correspondingly lower prices for poorer products. As a consequence, Japanese buyers will suffer economic loss if they fail to market products that have been carefully sorted by quality, i.e. separate lots for top and lesser-quality fish.

Generally speaking, imports from Canada tend to mix both good and lower-quality fish in one frozen block. In such cases, the Japanese buyer treats the entire lot as lower quality and pays the lower price.

Even with Japanese packed products, this sort of problem sometimes arises. If there are five or six bad fish in a 100-fish lot, prices for the entire lot are set on the basis of the lowest quality fish. In extreme circumstances, a third grade label may be affixed.

For this reason, while it is, of course, desirable to exert every effort to produce top-grade fish, it is vital, to avoid problems with customers and in the suppliers' own economic interests, to carefully segregate top-quality from lesser-quality fish.

4. Grading

Listed below are the conditions that must be completely met for frozen fish to be classified as top-quality according to the Japanese trade. If even one of these conditions is not met, the lot will not be considered top-grade. There are always other competitive products on the market that meet these requirements.

(1) Body colour unchanged.
(2) No blemishes to fish body or meat section.
(3) Fish not dried out.
(4) Completely uniform lengths and weights in one block.
(5) No slow freezing.
(6) Completely frozen.
(7) No refreezing after thawing.
(8) Good appearance and style.

The above conditions generally relate to product quality, but the final condition, attractiveness, should not be overlooked. It is only natural that among products of equal quality, the best-looking item will be the one selected by the consumer, so it is essential that the fish be attractively displayed.

If Canadian processors wish to compete in the market, they should understand that they share an obligation with the Japanese distributor to meet the demands of consumers. Extraordinary labour and effort must be expended to produce a superior fish product for this market.

TABLE 18

Grading guide to evaluate the quality of round squid

Grade	Point	Quality	Skin colour	Texture	Mantle	Odour	Taste
A	5	Excellent	sheen, red-brown	elastic, firm	sheen, off-white	squid odour	sea water flavour
	4	Good	red-brown	firm	slight sheen, no stains	squid odour	slight cabbage flavour
B	3	Acceptable	grey-white	reasonably firm	few yellow stains	slight fishy odour	stronger cabbage flavour
C	2	Unacceptable	some pink spots	slightly soft	some brown green stains	offensive odour	unpleasant ammonia flabour
	1	Spoiled	pinkish brown	very mushy and curdy	brown-green	offensive odour	very bitter and cheesy flavour

Source: Ke, Woyewoda and Fierheller, 1979.

5. Recent Japanese market conditions

Serious difficulties were encountered in 1980 in Japan for everyone associated with squid -- producers, importers, and distributors. Carryover inventories from 1979 were the largest in history, estimated from 120 000 to 160 000 tonnes. By early spring, with reports of a large New Zealand harvest from Japanese allocations and joint-venture (Japan-New Zealand) vessels, there was concern about oversupply.

Domestically as well, for the first time in many years, a bumper catch was landed by medium to large vessels fishing in the Japan Sea. There were in addition, continuously high catches of Pacific Japanese common squid (from waters off eastern Hokkaido and the Sanriku coast in the northeastern part of Honshu) in quantities of nearly 1 000 tonnes per day from late July through the end of August. Landings of 700 tonnes a day continued to pour into Kushiro and other eastern Hokkaido ports. Landings were in the order of 300 tonnes per day at Hachinohe and other Sanriku ports.

Even after the summer squid supply began to recede from the late August peak, autumn red squid, aka-ika, immediately took up the slack. As a consequence, both the fresh and frozen squid markets were weak, with prices down at times as much as 50% from the previous year.

TABLE 19

Japanese squid inventories
(unit 1 000 tonnes)

1977		1978		1979		1980	
June	December	June	December	June	December	June	December
29	42	28	46	29	65	51	85

Source: Japanese Ministry of Agriculture, Forestry & Fisheries, MOAFF.

Inventory survey covers 64 producing areas and 10 large cities sampled by the Japanese Fisheries Agency. It covers 47.9% of total cold storage in Japan.

Low prices for domestic fresh and frozen squid created a difficult situation for imported squid in the Japanese market during 1980. Processors who in previous years had been using imported squid or squid caught by Japanese vessels in overseas waters switched to Japanese common squid in response to its high availability. As a consequence, movement of imported squid came to a virtual halt, with a sharp drop in import prices from the previous year. The Japanese Fisheries Agency reported inventories of squid and cuttlefish at 205 000 tonnes as of January 1, 1981. Processors found themselves very much in a buyer's market, so held back on new commitments and was probably the major factor preventing a recovery in the Japanese squid market.

The order of marketability of various squid species, by area of origin, on the Japanese squid market are:

(1) Domestic (from Japanese waters)
(2) New Zealand and Australia
(3) Argentina
(4) Canada and the US

TABLE 20

Japanese inventory of frozen squid and cuttlefish
(Unit: tonne)

	1978				1979				1980			
	Squid		Cuttlefish		Squid		Cuttlefish		Squid		Cuttlefish	
	Stock	Ratio 78-77	Stock	Ratio 78-77	Stock	Ratio 79-78	Stock	Ratio 79-78	Stock	Ratio 80-79	Stock	Ratio 80-79
Jan.	38 732	91.2	20 494	106.5	43 009	111.0	19 940	97.3	61 539	143.1	22 070	110.7
Feb.	34 439	90.7	20 315	110.3	37 371	108.5	18 445	90.8	55 627	148.9	21 875	118.6
Mar.	29 845	93.2	19 310	110.4	30 362	101.7	16 459	85.8	51 461	169.5	19 948	120.4
Apr.	35 962	113.2	20 752	122.0	24 217	67.3	15 567	75.0	46 317	191.3	17 596	113.0
May	31 431	95.4	19 317	113.6	25 345	80.6	15 845	82.0	51 797	204.4	15 541	98.1
June	27 504	94.2	19 936	113.6	25 345	104.7	17 073	85.6	51 181	178.9	15 169	88.8
Jul.	27 178	92.3	19 103	93.6	33 525	123.3	26 995	109.9	54 957	163.9	15 344	56.8
Aug.	31 411	98.6	19 518	93.6	43 891	139.7	22 636	116.0	72 972	166.3	15 319	67.7
Sep.	36 653	99.5	19 603	86.0	52 662	147.7	25 447	129.8	87 966	167.0	15 080	59.3
Oct.	36 871	90.2	19 031	86.8	58 191	157.8	24 614	129.3	88 504	152.1	14 050	57.1
Nov.	42 621	96.5	18 543	82.3	63 681	149.4	23 457	126.5	92 160	141.6	14 386	61.3
Dec.	46 451	118.2	19 230	90.7	64 567	139.0	23 569	122.6	85 000	131.6	NA	NA
Ave.	34 842	97.2	19 596	99.2	42 134	120.9	20 346	103.8	66 623	158.1	NA	NA

Source: Monthly Report of Statistics produced by Fisheries Product Marketing Branch of MOAFF, Japan.

Note: The coverage of these inventories represents 47.9% of all cold storage capacity in Japan.

TABLE 21

Japan Import Association statistics on cuttlefish and squid fresh, chilled or frozen imports

Quantity: Tonnes Value: 000 000 yen

Country of Origin	1976 Quantity	1977 Quantity	1978 Quantity	1979 Quantity	1979 Value	1980 Quantity	1980 Value
Afghanistan	--	--	14	--	--	--	--
Argentina	753	27	9 825	22 294	5 689	4 858	1 351
Australia	--	--	10	35	12	--	--
Bahama	--	--	23	--	--	--	--
Bulgaria	--	--	644	156	33	--	--
Cameroon	15	--	--	--	--	--	--
Canada	3 116	7 423	27 156	15 483	3 400	18 478	4 694
Canary Islands	406	10	21	53	26	--	--
China	338	117	236	567	168	91	16
Cuba	--	--	--	2 845	1 586	4 101	725
DPR Korea	846	14	--	--	--	--	--
FR Germany	--	--	24	2	2	--	--
France	734	2 439	1 778	1 865	401	1 740	452
Greece	1 847	2 890	1 213	3 089	1 692	1 543	881
Guineau	35	--	75	--	--	--	--
Hong Kong	1 656	198	549	964	766	824	923
India	990	740	248	999	896	554	547
Indonesia	449	329	300	427	316	201	114
Ireland	2 756	3 035	2 111	2 951	810	355	100
Iran	--	--	573	500	269	28	15
Italy	1 052	234	1 751	1 936	1 014	482	316
Ivory Coast	9	--	--	--	--	--	--
Libya	--	--	49	485	366	573	431
Macao	--	--	7	100	63	--	--
Malaysia	1 960	1 445	1 318	1 538	1 384	442	332
Mauritania	251	341	486	242	88	382	220
Mexico	1	--	--	1 177	205	1 813	443
Morocco	768	800	3 247	4 086	3 172	4 121	3 227
New Zealand	--	332	153	6 789	2 417	64	10
Pakistan	24	--	--	--	--	--	--
Panama	1 614	1 313	2 012	2 481	1 586	2 205	1 270
Philippines	247	273	473	548	676	424	602
Poland	--	--	--	8 435	2 086	3 390	899
Portugal	--	--	--	--	--	43	27
P. Yemen	3 207	5 280	2 168	2 487	1 713	5 219	3 444
R. Korea	21 760	19 935	27 488	31 719	17 308	17 768	9 819
R. Viet Nam	293	592	387	397	416	195	211
Sabah	52	--	--	--	--	5	3
St. P. Mon	--	1 205	434	218	45	--	--
Senegal	1 991	1 751	1 350	1 295	688	1 573	873
Singapore	1 207	3 041	1 353	5 310	1 795	69	47
S. Africa	--	1	3	--	--	--	--
Spain	7 691	7 780	13 592	15 103	10 932	9 874	7 093

TABLE 21 (cont'd)

Quantity: Tonnes Value: 000 000 Yen

Country of Origin	1976 Quantity	1977 Quantity	1978 Quantity	1979 Quantity	1979 Value	1980 Quantity	1980 Value
Sri Lanka	118	69	82	148	120	136	114
Sweden	52	300	9	--	--	--	--
Thailand	7 524	8 250	10 121	10 637	9 658	8 085	5 922
Taiwan	2 034	1 579	3 858	3 799	3 401	1 379	1 645
U Arab E	--	2	9	--	--	--	--
Uruguay	299	110	881	714	197	315	94
US	1 123	2 439	1 909	3 025	761	1 591	445
USSR	--	200	183	--	--	--	--
Venezuela	--	--	7	158	116	7	6
Others	983	235	24	308	154	1 448	613
Total	68 201	74 729	135 237	155 365	74 427	94 376	47 924

Source: Japanese Marine Products Import Association, Japan.

TABLE 22

Japanese monthly imports of squid
(Unit: tonne)

		Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1978	Total	5 196	15 060	8 899	4 995	6 792	6 424	7 850	11 916	8 416	12 979	10 385	19 235	118 147
	Canada	1 492	8 686	3 460	372	141	21	28	--	863	2 049	1 100	8 944	27 156
	Republic of Korea	1 589	1 519	2 387	1 795	2 622	2 117	1 899	2 937	1 430	3 232	2 003	3 958	27 488
1979	Total	15 253	10 565	12 028	6 407	10 424	12 114	18 305	16 200	18 464	18 048	7 995	10 064	155 867
	Canada	3 986	2 228	1 394	666	133	49	28	202	133	2 245	2 326	2 094	14 284
	Republic of Korea	2 920	2 110	4 071	1 948	4 954	4 364	2 046	1 796	4 260	1 621	910	718	31 718
1980	Total	13 588	16 316	10 604	5 872	7 035	6 169	8 855	4 840	3 442	4 580	6 597	3 788	91 686
	Canada	4 645	4 645	3 489	1 341	2 607	1 327	248	7	61	107	50	20	18 547
	Republic of Korea	2 191	2 339	2 024	991	1 163	1 073	1 626	701	352	1 450	1 060	870	15 840

Source: MOAFF, Japan.

6. Japanese import systems and quality standards

In order to maintain Japan's inshore fishing industry, import controls are imposed on fish species which can be caught in large quantities off the coast of Japan. Along with sardines and mackerel, squid and cuttlefish are placed under import quota; however imports of mongo-ika, cuttlefish, were liberalized on April 1, 1978, in order to increase imports to Japan.

Consequently, import controls on squid and cuttlefish are limited only to squid and cuttlefish which are live, fresh, frozen, chilled, salted in brine or dried. Processed squid and cuttlefish which has been boiled, broiled or processed in any other way, seasoned with soya sauce (shoyu) or with any other condiment can be imported freely. In other words, squid and cuttlefish which are canned, smoked fermented, kneaded, or seasoned in any way can be imported in unlimited quantities.

Import duty

Import duty on squid and cuttlefish, fresh, chilled or frozen is currently 8.8% on the CIF price. As a result of the last round of multi-lateral trade negotiations (MTN) the tariff will be gradually lowered to 5% by 1987.

Japanese authorities observe the following classifications for imports of squid and cuttlefish and products produced from them:

TABLE 23

Japanese import classifications for squid and cuttlefish products

Description	Code	1981 Tariffs (apply to all items regardless of quotas)	Quota Applicability
Fresh (live or dead) Chilled Frozen	03-03-212	8.8%	IQ except mongo-ika
Salted in Brine Dried	03-03-221	15%	IQ except mongo-ika
Prepared or Preserved Smoked	(See Note) 16-05-120*	12%	AA (Automatic approval)
Other - Airtight containers	16-05-231	15%	AA
- Other	16-05-239	15%	AA

NOTE: Scallops and adductors of shellfish are lumped together with squid and cuttlefish in statistics covering this item.

* The determining factor differentiating this category from the others appears to be whether sufficient heat has been applied to cause irrevocable change in the proteins.

Source: MOAFF, Japan.

Import standards and inspection

As foodstuffs, frozen squid and cuttlefish require particular attention to quality and hygiene standards. Like other imported foodstuffs, they cannot pass through customs without a permit issued by the food sanitation inspector of the Ministry of Health and Welfare, as stipulated in the Japanese food sanitation law. (See Appendix III)

A sudden increase in food imports has brought about new concern for public health. Since frozen squid and cuttlefish are imported from many parts of the world, including the sub-tropics, particular attention is paid to hygiene control.

The Ministry of Health and Welfare inspects all imported foodstuffs at food sanitation inspection offices located at 13 major seaports and airports. If the inspection is passed, permission for import is granted, but if it is failed, the director of customs is informed in writing and an import permit is not issued.

Squid and cuttlefish should meet the following sanitary inspection standards:

Classification		Standards
Number of bacteria	:	5 million or less per gram
E coli	:	Negative
Volatile basic nitrogen	:	25 miligrams or less per 100 grams

Domestic Import Quota Allocation

Import quotas are divided among processors' associations, trading companies (including some fishing companies), and fishing companies engaged in "approved" joint ventures (over 40% Japanese equity). The final 1978-79 quota was broken down as follows:

"User" quota to processor associations	Quota (tonnes)	
Zen-sui, Zenkoku Suisan Kakigyo Kyodokumiai Renogaki (National Federation of Processed Fisheries Products Co-operatives)	10 400	
Zen-suru, Zenkoku Surume Kakogyo Kyodokumiai (All Japan Dried Squid Processing Co-Operatives)	8 280	
Zen-chin, Zenkoku Chinmi Shogyo Kyodokumiai Rengokai	7 800	
Zen-cho, Zenkoku Chori-shokuhin Kogyo Kyodokumiai	5 640	
	32 160	
Cannery association, Nihon Suisan Kanzemu Kogyo Kyodokumiai (Japan Fish Manufacturers' Co-op)	720	
	32 880	(55%)
"Traders" quota to trading companies	32 600	(36%)
"Development" quota to approved joint-ventures	5 520	(9%)
Total	60 000	

Importing practice

Trading or fishing companies that do not hold their own import allocation (known as waku) or wish to import beyond their allocated quantity must "acquire" allocation from another party and import nominally on that party's behalf.

The processor associations, which administer quota allocations on behalf of their members do not actually carry out the importing procedure themselves but transfer this function to trading companies. Nominally and theoretically, imports under processor allocations are conducted by traders on behalf of the associations.

The practice has become established, however, of trading companies paying fees to the processor associations to acquire import allocations for the trading companies' own entrepreneurial purposes. The licences held by other trading companies can also be bought for a fee.

The fee paid to acquire rights to import allocations rises and falls with supply and demand for the allocations. In 1979-80, allocation charges were said to range from Y35-40 per kilogram.

As the importing is done nominally on behalf of the official allocation holder, the performance record (jisseki) for imports is ascribed to the holder. Allocations each year are made on the basis of import performance record, so the same holders continue to be given allocations whether they actually use them for their own purposes or whether they sell them off to other parties.

There are more than 200 importers holding squid import quotas. Squid processors, who hold about 55% of total quota, work closely with traders to establish import requirements. Names of import quota holders are confidential. Many general traders who have offices in Canada import squid. In most cases these imports are handled by their head offices in Japan. (See Appendix VI)

Prospective Canadian suppliers should understand that in the squid importing arena not all importers are equal. Some companies have much larger trader allocations of their own than do other importers and some companies have established track records with the processor associations that give them priority in purchasing the associations' allocations. Enquiries have been received by Canadian processors from some importing companies that have neither an allocation of their own nor access to the associations' allocations, but just a relationship with one of the real squid importers. Canadian exporters should continue to establish trading relationships with Japanese companies that have the real importing power in order to maximize our sales price.

Import price conversions

Imports are generally landed at the main ports in the major cities. Sizes and qualities that are satisfactory as table food are marketed locally, while other grades are trucked to processing plants.

The following formula for squid price conversion calculations is that in use by a major company.

i) CIF price (duty plus importing costs) x exchange rate

ii) plus Y10/kg for storage in port area for up to 1 month (add further Y4/kg for additional month)

iii) plus fee for import allocation

iv) plus margin: 5% - 10%

= Importer selling price ex-warehouse that city (e.g., to wholesaler)

For squid being sold to processors in the Hachinohe area a further Y15 per kg is added to cover transport by truck from Tokyo to Hachinohe. This, then, gives the selling price delivered to warehouse door in Hachinohe, which corresponds approximately with the auction purchase price for produce landed in the Hachinohe market.

Japanese imports

Apart from the 1980 oversupply situation that was noted earlier, Japan's imports of chilled or frozen squid and cuttlefish have been growing annually, increasing nearly threefold in quantity from 19 871 tonnes to 58 500 tonnes and about sevenfold in value from US $14.2 million to US $98.6 million between 1971 and 1975. In 1979, imports peaked at 155 868 tonnes.

The average import price per tonne stood at C$1 684 in 1975, C$1 962 in 1976 and C$1 886 in 1977. A decline of 4% in the price in 1977 is attributable to an increase in imports of relatively low-priced Illex illecebrosus and a decline in those high-priced mongo-ika cuttlefish. The drastic price drop in late 1979 and all of 1980 was due to an oversupply in the market.

In the past, the Republic of Korea was the largest supplier of squid and cuttlefish to Japan. Korean fishing boats operate off the coast of Africa, catching cuttlefish for export to Japan. In addition, that country is also active in exporting squid and cuttlefish from its own waters to Japan. Thailand, historically the second largest supplier, exports mainly squid and a limited quantity of cuttlefish. Imports from European countries such as Spain, France and Greece as well as Yemen, Morocco and the Canary Islands, are of the Sepia (cuttlefish) variety, which are caught off the coasts of Africa and Aden. From 1974, Japan has been importing increasing quantities of squid and cuttlefish from Argentina.

In 1977 Canada was able to score an outstanding increase in sales of Illex, which was very much in demand in Japan for processing.

In addition to chilled or frozen cuttlefish, Japan imports squid and cuttlefish preparations, which are not subject to any import quota system. By item saki-ika (seasoned, cut squid or cuttlefish), noshi-ika (rolled squid or cuttlefish) and maruni (boiled squid and cuttlefish) account for the bulk of imports from the Republic of Korea. These undergo further processing in Japan.

Among salted or dried squid and cuttlefish, originally only surume (dried squid) was imported from the Republic of Korea, but since 1974 Japan has started importing other types of salted or dried squid and cuttlefish from Thailand, Singapore, Malaysia, the Philippines, Taiwan, Viet Nam and elsewhere. Salted squid and cuttlefish are now imported partly or fully dried for further processing in Japan.

In 1977, Japan imported 1 347 tonnes of salted or dried squid and cuttlefish, up 88.7% over the 714 tonnes for the preceding year. During 1979, Japan imported 1 602 tonnes of salted or dried squid and cuttlefish. In 1980, 85% of the import quota of 2 200 tonnes was imported amounting to 1 869 tonnes (82 tonnes from Canada).

Distribution channels

The distribution process begins with consignments by trading houses or big marine products companies, to wholesalers. Efforts are made to eliminate risks, to shorten the time required for physical distribution, and to expand the sphere of business in the complex squid and cuttlefish distribution channels.

Wholesalers play an important part in the distribution process, and even more so, given a trend toward larger cold storage facilities, since the capacity to assemble and dispatch goods has become more concentrated in the hands of wholesalers.

Some changes have taken place, but existing distribution patterns continue to exert a strong influence on the flow of goods, because retailers, including small specialty stores and supermarkets, still have a significant impact on consumption patterns.

As for the distribution of squid and cuttlefish for processing, those in small-sized grades are used in preparing kirimi (chopped meat) delicacies and canned foods and are delivered directly from big marine products companies and trading firms to processors. In some cases, brokers are involved.

TABLE 24

Japanese annual imports of squid and cuttlefish
(Unit: tonne)

	1976	1977	1978	1979	1980	Remarks
Republic of Korea	21 760	19 935	27 488	31 719	17 768	Includes cuttlefish
Argentina	753	27	9 825	22 294	4 358	
Canada	3 116	7 423	27 156	15 483	18 478	
Spain	7 691	7 780	13 592	15 103	9 874	Mostly cuttlefish
Thailand	7 524	8 250	10 121	10 637	8 085	Mostly cuttlefish
Poland[1]	--	--	--	8 435	3 390	
New Zealand	--	332	153	6 789	64	
Singapore	1 207	3 041	2 353	5 310	69	Includes cuttlefish
Morocco	168	800	3 247	4 086	4 121	Mostly cuttlefish
Taiwan	2 034	1 579	3 858	3 799	1 379	
Greece	1 847	2 890	1 213	3 089	1 543	Mostly cuttlefish
US	1 123	2 439	1 909	3 025	1 591	
Cuba[1]	--	--	--	2 845	4 101	
Others[2]	21 310	20 236	17 227	23 254	19 554	
Total	68 533	74 732	118 142	155 868	94 375	

1 Much of this squid was caught in Canadian waters as part of these countries' allocations from Canadian surpluses.

2 There are approximately 50 countries that supply squid and cuttlefish to the Japanese market.

Source: Monthly Report of Japan Exports and Imports, MOAFF, Japan.

If Canadian processors want to participate more actively in the production of the more highly processed products, they should consider ways of using the Japanese distribution system to achieve their objectives.

Use of squid and cuttlefish

About 60% of Japan's squid and cuttlefish catch is processed with the remaining 40% being consumed fresh, chilled or frozen. Fresh squid and cuttlefish bring in a high price as sashimi (raw) and tempura (lightly batter-fried). Consequently, freshness is rigorously demanded. Government officers frequently inspect for freshness at retail outlets.

TABLE 25

Production of squid products in Japan

	1960	1965	1970	1975	1978
Dried squid	37 796	27 375	11 113	12 235	7 596
Smoked squid	--	2 030	496	615	3 823
Salted squid	381	1 084	--	935	896
Dried squid boiled in soy sauce	22 173	14 132	9 861	3 664	3 792
Fermented squid meat	--	7 652	9 631	13 275	16 116
Seasoned squid	--	--	48 173	44 696	66 958
Canned squid[1]	381 017	417 718	278 094	245 696	168 268
Imported squid products	--	--	--	852	1 594

1 Number of standard round cases
Source: MOAFF, Japan.

In 1978, home consumption in Japan of fresh squid was 1.8 kilograms per person for a total national consumption of 200 000 tonnes. In addition, 300 000 to 400 000 tonnes of squid were consumed in the restaurant market in fresh and frozen and processed form.

There are numerous uses for squid and cuttlefish species, covering a wide range of processes, forms, tastes and values from raw to cooked. One of the more popular ways of consuming squid is as Sashimi, in the raw state, but there is also a great variety of other products that are fried, grilled, broiled, salted, canned and smoked. (See Appendix IV).

Usage varies according to size and quality, and so does price. As price relativities between different sizes change according to distribution of catches and imports, there is some shifting in uses by size.

A significant market for Canadian Illex in Japan, and the major squid processing sector in terms of production volume, is the demand for "seasoned preparations" and smoked products.

Various products are produced, but the most important are saki-ika (flavoured, roasted and shredded squid) and smoked squid. New product variations are being developed to meet the conceptual marketing category of taisho chinmi which are consumed as the Japanese equivalent of our potato chips and salted peanuts.

For these processes, lower quality squid and sizes can be used. Price is important as processors seek the cheapest possible supplies.

In recent years intermediate processed forms from which saki-ika and other products can be produced have become established as a separate processing category. It is now common for bulk processing to take place to an intermediate stage, with the semi-processed product then being distributed to individual specialized producers of final products. Some final product producers still carry out the complete processing cycle themselves. It is this intermediate process which should be of interest to some Canadian producers. It must be noted, however, that while the semi-processed stage may be carried out by those other than the final product producer; the links between the semi-processed product producer and final user are very close, both by tradition and through financial links to trading companies and banks.

D. SQUID MARKET OUTLOOK

1. Japan

As the world's largest market for squid, Japan faces the problem of how to maintain security of supply at reasonable cost.

It is difficult to predict the future world market picture or to forecast what squid stocks may exist from year to year. This uncertainty obviously leads to higher risks for all parties when it comes to developing government policies or decisions to invest in plant, equipment and services, whether in Japan or in supplying countries.

To examine some of the possibilities that the Canadian squid industry might pursue, one needs to obtain a view of how the long-term potential for squid markets is perceived. There are many ways to view this future demand.

One view is based on a trend analysis that Japan will face a shortfall in supply over the long term. Another holds the position that there is a good chance of fluctuating supply resulting in a boom-and-bust situation, with Canada having a market potential in Japan for anything ranging from zero to upwards of 50 000 tonnes for peak years.

There are four major variables that could influence the supply outlook, as follows:

a) Japanese domestic landings - The trend to 1980 showed a decline, particularly in the catch of common squid. Some of this deficit is being offset by substitution of aki-ika or Japanese red squid. The long-term supply picture cannot be determined accurately, because no one can predict what stock might be available year to year.

b) Development of new squid fisheries - It cannot be assumed that New Zealand and Canada have an inside track as suppliers of squid to Japan. Argentina is expected to take a significant share of the export market in years when stocks are abundant. If high prices for squid return, there would be a major incentive for other countries,

TABLE 26

Japanese squid and cuttlefish consumption

Year	Previous year-end inventory	Total Japanese Landings	Imports	Total supply available	Current year-end inventory	Exports	Domestic consumption
1975	42 000	537 838	58 580	638 418	62 000	15 075	561 343
1976	62 000	501 869	68 533	632 402	60 000	16 123	556 279
1977	60 000	512 665	74 732	647 397	67 500	7 463	572 434
1978	67 500	519 713	118 142	705 335	93 900	6 076	605 388
1979	93 900	520 000	155 868	769 768	150 000*	20 573	599 195
1980	150 000	640 000	94 400	884 400	205 000*	16 000	663 400

N.B. 1) cuttlefish landings are between 16 000 tonnes and 20 000 tonnes per annum.

2) average cuttlefish imports over past few years have been approximately 40% of imports.

* As inventory statistics in Japan are based on a survey of 47.9% of cold storage, actual year-end inventories are not exact figures. Actual inventory figures from survey are given in Table 20 on page 32.

Source: MOAFF, Japan.

such as Mexico and Australia, to promote their squid fisheries and contribute to the creation of a highly competitive seller's market.

c) Unpredictable annual fluctuation of stocks - Neither Canada nor the consuming countries can count on assured levels of supply in any given time and in any given area. There is simply not enough known about the biology of squid. Fluctuations in supply will occur from year to year.

d) Effect of price on supply - There can be little doubt that adjustments in the price of raw squid could affect the incentive for supply. For example, Canadian fishermen refused to fish for squid when prices dropped by almost 50% in 1980. When prices were high in 1978 and 1979, there was an incentive to harvest squid and the result was an oversupply.

Given the unpredictability of the Japanese domestic and foreign-water catches, any estimate of potential market is highly speculative.

2. Spain

Annual consumption of squid in Spain is approximately 60 000 tonnes. Domestic landings used to account for 40 000 to 42 000 tonnes but may be declining, due in part to political differences with Mauritania and other countries. Imports were 12 000, 20 000 and nearly 30 000 tonnes in 1978, 1979 and 1980 respectively. Part of the imports come from Eastern European and EC countries selling Illex caught in the Northwest Atlantic. Canada's exports to Spain were 740 tonnes in 1978, 2 774 tonnes in 1979, and 3 796 tonnes in 1980, according to Statistics Canada. An increasing volume of Canadian squid is entering Spain through Spanish Africa, the Canary Islands, and the US and this is not included in the above figures.

With bilateral relations problems in 1981 sales were drastically reduced. Spain did not consider Canada's offer of access to Canadian waters and the terms of such access as acceptable and refused to accept them. At the same time in March 1981, the Spanish closed their market to all Canadian exports of cod and squid products.

TABLE 27

Japanese squid catch in foreign waters, 1980 and estimates for 1981

	Type of operation	1980	1981
New Zealand	Jigging	36 875	27 500
	Government-to-government allocation	25 212	27 500
	Charter	11 663	5 500
	Trawl	23 811	15 000
	Government-to-government allocation	13 820	6 000
	Charter	9 991	9 000
	Total	60 686	42 500
Australia	Jigging	8 908	0
Canada	Trawl	16 633	17 000
	Jigging	0	0
	Total	16 633	17 000
US	Trawl (Atlantic)	8 444	8 000
	(Pacific)	5 222	5 000
	Total	13 666	13 000
Argentina	Trawl	6 096	6 000
South Africa	Trawl	1 149	2 000
	Total	107 138	80 500

Note: New Zealand, Australia - September-August
All other areas - January-December

Source: MOAFF, Japan.

Spanish consumption is expected to reach 65 000 tonnes by 1985. Depending on the development of the Argentine fishery and the success of continued Spanish joint ventures there, the proportion of domestic demand landed by Spanish vessels may increase. Therefore, no significant change is expected in supply purchased from Canada.

The Spanish squid processing industry is protected, by an import licensing system, and an 8% ad valorem duty making it particularly difficult

to sell processed squid. In addition, a compensatory tax of 10 pesetas per kilogram was imposed on Illex and as of May 4, 1981, this tax had been doubled and a similar tax on Illex tubes have risen from 25 to 50 pesetas per kilogram (65-70 pesetas equal one Canadian dollar). These taxes are ostensibly to protect the Spanish fishing industry from lower-priced imports from Eastern European countries, but with bilateral problems with Canada developing in 1981, it can be assumed this doubling of tax on Illex is directed towards Canadian products.

TABLE 28

Spanish Imports of Illex type squid

	1978		1979	
	tonnes	000 PTS	tonnes	000 PTS
Flying squid, frozen				
France	--	--	19	1 046
Italy	--	--	--	--
Poland	3 909	196 735	2 519	143 679
UK	--	--	150	9 037
USSR	1 269	59 310	510	25 198
Morocco	1	47	635	34
Argentina	7 754	662 214	5 246	373 559
Canada	742	69 484	1 485	78 476
US	--	--	426	33 394
Mexico	2 276	92 713	2 273	142 095
Uruguay	251	15 371	97	4 173
India	--	--	13	2 975
Singapor	59	7 374	479	25 112
Romania	1 292	52 275	--	--
South Africa	41	2 810	--	--
Spanish Peninsula total	17 598	1 158 338	13 239	839 438
France	--	--	111	6 037
Italy	--	--	29	1 261
Poland	--	--	539	35 699
USSR	734	27 672	38	834
Argentina	1 594	110 996	418	29 801
Japan	61	2 043	275	13
South Africa	26	1 425	--	--
Canada	267	8 717	--	--
South Korea	61	2 403	--	--
Canary Islands Total	2 694	151 672	1 158	73 647
Total	20 293	1 310 011	14 397	913 086

Source: Spanish Import Statistics, Madrid, 1979.

TABLE 29

Spanish imports of Loligo type squid

	1978		1979	
	tonnes	000 PTS	tonnes	000 PTS
Squid, frozen (03.03.83)				
France	114	20 070	43	11 894
Italy	--	--	93	16 008
UK	1	257	1	369
Belgium	24	4 564	--	--
Morocco	531	100 547	822	192 825
Tunisia	3	306	36	7 142
Mauritania	590	95 430	67	12 464
South Africa	10	1 457	474	93 191
Argentina	2 072	309 598	1 749	265 449
US	49	4 347	386	50 288
Mexico	435	35 870	1 706	235 142
Panama	1 446	306 395	2 009	467 757
Uruguay	37	6 187	400	76
People's Republic of China	3	631	--	--
Taiwan	525	75 725	59	10 089
South Korea	415	75 248	197	49 288
India	514	68 833	1 376	188 580
Japan	227	39 947	1 422	267 385
Kuwait	40	6 506	--	--
Malaysia	12	1 924	114	14 303
Singapore	611	83 188	226	34 620
Thailand	88	12 840	42	5 837
Ireland	33	5 858	3	888
Norway	--	--	42	7 039
Netherlands	--	--	11	418
Portugal	--	--	159	26 176
Libya	--	--	44	11 667
Senegal	--	--	6	1 599
Canada	--	--	98	11 272
Venezuela	--	--	13	2 867
Hong-Kong	--	--	20	3 365
New Zealand	--	--	28	2 990
Spanish Peninsula total	7 788	1 255 738	11 261	1 991 003
Libya	1	321	2	416
Libya	50	9 463	115	24 229
Morocco	241	48 484	229	29 598
Niger	2	295	1	181
Argentina	4	610	136	13 451
Chile	--	--	400	115
United States	--	--	136	17 816
Panama	186	39 790	135	31 046
Uruguay	--	--	1	153
Venezuela	--	--	9	2 125
South Korea	64	13 622	10	2 412
Japan	84	15 466	196	40 048
Greece	3	693	884	161 619
Mauritania	43	8 833	--	--
Philippines	015	23	--	--
Thailand	12	1 881	--	--
Canary Island	695	139 486	884	161 619
Total	8 483	1 395 225	12 146	2 152 632

Source: Spanish Import Statistics, Madrid, 1979.

TABLE 30

Spanish squid and cuttlefish imports-exports, 1978-1980

	1978		1979		1980	
	Imports	Exports	Imports	Exports	Imports	Exports
Flying squid	20 296	1 038	14 398	1 731	18 567	19
Squid	8 527	3 204	12 318	2 698	15 660	239
Cuttlefish	4 640	7 735	4 255	12 262	5 106	6 484

Note: Flying squid is ILLEX, while squid refers to LOLIGO.

Source: Ministerio de Hacienda, European Supplies Bulletin and the White Fish Authority.

3. Portugal

The Portuguese market is estimated at 7 000 to 8 000 tonnes with imports providing approximately 3 000 tonnes. The weak state of the Portuguese economy makes it difficult to allocate scarce foreign exchange for the relatively expensive Canadian squid, but there might be some potential for sales. Total catch of both squid types, Loligo and Illex in 1979 (the last year for which official data are available) was 2 746 tonnes, of which 1 845 were reported as being taken in Canadian waters. For 1980, the Portuguese Department of Fisheries estimates a catch of around 3 260 tonnes of which 1 866 were taken in Canadian waters. But local processors admit the figures do not mean very much, as during one month of 1980 some 5 500 tonnes were landed and most, if not all, of this catch was not statistically recorded.

No official consumption figures are available, but the Portuguese state fish purchasing agency, Comissao Reguladora Do Comercio Do Bacalhau (CRCB), reported that since mid 1979 consumption has shown some expansion, and may reach about 8 000 tonnes in 1981.

Squid taken by Portuguese in foreign waters is frozen on board and goes to processors and/or wholesalers in round form while that caught within Portuguese waters is mainly marketed fresh in round form. Preference is given to imported frozen-on-board squid, 10 to 22 centimeters in length, 150-200 grams.

Price of squid caught in foreign waters by Portuguese vessels is at present freely established by vessel owners and the imported product by CRCB (until January 2, 1981, price of squid was fixed by government) with fixed mark-ups as follows: wholesaler to retailer 15% plus transportation costs; retailer to consumer 20%.

Squid caught within Portuguese waters (almost all Loligo) is sold by auction with prices finding their own levels (in majority of cases two or three middlemen are involved before consumer gets the squid).

In 1979 total imports of Illex were 6 558 tonnes of which 5 869 tonnes were supplied by the USSR (the Portuguese trade believes this squid was caught in Canadian waters) and the remaining 689 tonnes by Canada. No precise figures of imports are available for 1980, but according to CRCB they should be not more than 1 522 tonnes. Statistics Canada reports 681 tonnes of squid exported to Portugal in 1980, indicating Canada may have been a major supplier that year.

Portugal also has vessels fishing squid in joint-ventures off Morocco, Mauritania, Guinea-Bissau and Argentina.

Portugal's squid exports have been of little significance in the past, but last year the government authorized the industry to import unlimited quantities of raw material to be processed and re-exported, and some quantities (mainly tubes) started to move successfully into European markets. This development is likely to bring about an increase in squid requirements and consequently to open new opportunities for Canadian suppliers. The industry prefers head-off squid. Total import requirements for Illex in 1981 were estimated at 4 000 tonnes (1 500 tonnes head-off and 2 500 tonnes round form).

4. Italy

Italy consumes 35 000 to 40 000 tonnes of squid a year, of which 20 000 to 27 000 tonnes is imported. About half is Illex and the other half Loligo supplied mainly by the USSR, Bulgaria and Poland. It has been estimated that the potential Italian market for Illex by 1985 will still be about

20 000 tonnes. The demand is for tubes (13-24 centimetres) and there is a preference for frozen-on-board product.

The 1980 and early 1981 Italian squid situation remained in a crisis of oversupply. The Italian Fisheries Association has appealed for government action against squid imported from Asian and East European countries at dumping prices. The association reported early in 1981 that Italian vessels fishing Illex and Loligo in US waters were expected to deliver some 8 000 tonnes to Italy in March making that total catch about 15 000 tonnes. This, along with inventories, is roughly equivalent to national requirements.

At the same time, imports were expected to total some 25 000 tonnes. Adding to already substantial unsold stocks held by Italian firms. In the meantime, six more ocean trawlers have been retired, bringing the number of active vessels fewer than 40.

Whereas the EC reference price for 1980 amounted to 950 lira per kilogram for Illex and 1 920 lira for Loligo, CIF prices offered recently from various countries have run around 450 and 1 250 lira respectively. The Fisheries Association is thus pressing Italian authorities to ask the EC to adopt a licensing system for imports from countries currently suspected of violating the reference price: Spain, Japan, Thailand, USSR, Bulgaria, Romania and Poland. Many of these "traditional suppliers" have for many years been fishing for squid in Canadian waters and dumping it onto the Italian market.

Canada's exports to Italy amounted to 1 325 tonnes in 1979 and 835 tonnes in 1980. The market collapsed in 1980 due to the dumping of low-price Canadian Illex caught by the USSR, Poland and Bulgaria which, together, exported some 9 000 tonnes in 1979.

5. Greece

Estimates of Greek squid consumption are 3 500 to 4 500 tonnes, with a strong preference for Loligo. Greece has not yet been a market for Canadian squid as Illex is considered too large and tough. However, one Canadian processor supplied samples of small Illex in 1980 and they were well received, so some small future business may be possible.

Squid is generally sold fresh or frozen whole in blocks. Total imports in 1978 (latest published statistics), was 3 885 tonnes. During 1980, according to the trade, suppliers were Taiwan, Singapore, Thailand and New Zealand.

Greeks prefer Loligo vulgaris, pealei (Boston) and opalescens (California), and other small squid species for deep frying. Desired tube length is 10 centimetres or 60-80 pieces per kilogram. California canned squid is also popular in this market.

6. Northern Europe (mainly F.R.G.)

Northern Europe is regarded by some as a potentially large market for squid. In the Federal Republic of Germany interest in the product has increased as a result of catering to Southern European workers and tourists but trade and government sources say the aversion of northern Europeans to eating suckers and tentacles of squid has greatly limited sales and they do not expect a significant increase in demand. It is stressed by importers in Germany that squid traded must be completely cleaned, boneless, headless and wingless. Imports are preferred frozen in five-pound blocks, six blocks to a carton. In 1977, imports of squid and allied products into the FRG totalled 1 650 tonnes.

7. United Kingdom

Squid is not consumed in large quantities in the UK. However, the growing population of ethnic people who eat squid as part of their every day diet, together with the infuence of Mediterranean holidays on Britons, is causing an increase in consumption and this trend is expected to continue.

In 1977, the UK imported some 375 tonnes of squid, most of which was of the Ommastrephes and Loligo species, from the US and Canada. The UK catch, at approximately 1 500 tonnes in 1977, is more than sufficient to meet local demand for fresh squid and the surplus is exported. However, there is interest in importing frozen squid and importers would appreciate samples for assessment. Price depends on the size of the squid, larger ones being preferred. Import duty is in common with other EC countries.

European bait market

This market depends on the availability of squid in the waters of the importing countries. Norway and Germany are good markets for early-caught small Canadian Illex.

8. Hong Kong

The market for frozen squid in 1980 was estimated at 5 400 tonnes of which 3 500 was caught locally. Imports were from Singapore, Thailand, Taiwan, Vietnam and Canada, which sold 46 tonnes.

Consumption of dried squid in 1980 was estimated at 2 650 tonnes including 674 tonnes re-exported to other countries. Domestic production is about 80 tonnes. Imports were from Canada 939 tonnes, while other suppliers were Thailand, China and the Philippines. Imports are not subject to duty or quota.

During 1979 there were too many sellers of dried squid, the market was oversupplied and prices therefore reduced. In 1980, the number of Canadian suppliers and prices fell and more control was possible in the market.

9. Singapore

Domestic production of squid in Singapore is small and demand far exceeds supply of both this and most other fishery commodities. Imports of squid have grown in recent years to some 11 000 tonnes in 1978, up from 5 700 tonnes in 1977.

Consumers in Singapore prefer fresh squid, but imported frozen products find a ready market as supplies of fresh fish cannot satisfy demand. This is particularly true with the increasing demand from the hotel and tourist trade, which is growing at a rate estimated at 10% per yer. Much imported squid and the lower-grade local product is processed for re-export. In 1979, more than 12 000 tonnes of squid and cuttlefish was exported from Singapore.

There are no duties or quotas on imports of squid into Singapore.

10. Other Asian countries

There might be room for increased sales of dried and frozen round squid, for further processing, particularly to Thailand, Taiwan and the Philippines.

11. North America

United States

The US catch of squid was about 13 000 tonnes in 1976, 90% of which was landed in California and was of the Loligo type. About 50% of the catch is canned for export, largely to Greece and the Philippines. A large part of the remainder is sold as bait for recreational and commercial fisheries and the rest is for human consumption through restaurants or retail outlets. Consumption of squid has increased in recent years but is still largely confined to ethnic and gourmet markets.

Imports of frozen and chilled squid into the US were some 2 300 tonnes in 1977 and rose in 1978 to more than 3 000 tonnes in the first seven months of the year. Most imports originate in Mexico, South Korea and Japan.

Canada

The domestic market for squid is currently very limited. There are some imports of squid products, primarily from Hong Kong and the US, serving ethnic markets mainly in Montreal, Toronto and Vancouver.

These products include frozen, round Loligo and such finished products as shredded, canned, powdered and dried. A package of shredded squid from Japan retails in Toronto at 90 cents per ounce. In Ottawa, frozen squid can be obtained on the wholesale market at $40 to $50 per case, a case having 18 boxes containing three pounds to the box. This works out to a range of from 80 cents to as high as $1.20 per pound. Most of this frozen squid is Loligo from California.

The size of the domestic market has been estimated to be about 5 000 tonnes of which half is supplied from domestic sources.

With the introduction of skinless squid tubes on the Canadian market, there are expectations that this clean and attractive product will find a market. Active promotion of squid snacks, fried rings or smoked tubes, may open new market opportunities at home and in the US.

E. CANADIAN EXPORT POTENTIAL

1. Japan

Japanese joint-venture squid fisheries off the coast of Argentina and in the waters around New Zealand and Australia (until 1980) may well be able to supply substantial quantities of squid to their market.

If the Canadian fishery is not developed properly, Canada may find itself continually as a residual supplier to the Japanese market. Another factor is the biological aspect of the east coast squid. The Japanese prefer their own domestic species, followed by those being caught off New Zealand.

The potential for squid exports is difficult to forecast because of the unpredictable nature of the squid fishery and the relatively large number of alternative suppliers. The challenge for Canadian industry is to move away from a position of residual supplier as in the case of world oversupply as in 1980, to a position where Canadian Illex has a reasonably secure share of the Japanese and other markets. Obstacles to these goals include:

- characteristics that make Canadian Illex less desirable than other available species;

- the timing of the Canadian squid fishery, which places it last in the yearly worldwide cycle;

- Japanese import quotas, which restrict our ability to penetrate the market;

- the Japanese preference for frozen-at-sea whole squid, which runs counter to Canadian development objectives.

2. Processing opportunities

Canadian interest in processing squid onshore into secondary or more valuable products was not initially very great. Except for a few companies with specific products in mind, the majority of processors participating in

the 1978 and 1979 offshore fishery (developmental charters) did not exceed the minimum requirement, to process at least 25% in 1978 and 50% in 1979, of the catch into value-added products. In the case of one company, its efforts extended only to landing the frozen-at-sea blocks and repackaging them in Canadian cartons.

There were various arguments put forward concerning the minimum processing requirement, particularly with respect to technical considerations such as the lower quality of products coming from squid frozen at sea, which had to be thawed for processing and then refrozen. However, some companies expressed considerable interest and expended substantial amounts of time and money in gearing up to produce shore-based products from Canadian squid. Several companies invested in drying equipment and in large processing cookers.

The economics of shore processing require further study. There is a cost differential between the various forms of processing based on a combination of labour usage and product yield between the various types. Based on Canadian processing experience, which should be viewed with caution due to the influence of many specific individual circumstances and conditions, the following obervations can be made:

(1) Processing into tubes, tentacles and heads as a finished product appears to be a marginal operation at best.

(2) While frozen tubes in 1980 were being sold at $650 US per tonne, compared with an average asking price of $850 US per tonne, it is almost half of what it was selling for in 1978 and 1979. The gap between frozen tubes and frozen round narrowed substantially and will likely remain close for some time to come.

(3) Prices in 1980 for frozen whole squid have ranged from around $400 to $450 US per tonne, still substantially below the 1978 and 1979 prices but relatively close to bait prices. Asking prices for Canadian Illex squid, FOB St. John's, was around $500 to $600 US, in the latter part of 1980.

(4) Bait market appears to be holding strong. In terms of volume, the bait market is not as significant as food; however, both domestically and in Europe there appears to be strong demand, particularly for first quality squid. Prices in 1980 appeared steady, ranging from $350 to $450 US per tonne, wich was in line with the previous two years.

(5) The market for dried squid has shown a slump. Generally, fishermen were receiving around $2 US per pound for dried squid. After it moves through purchasing agents and then through a second agent where it is graded, packaged and labelled, selling prices were about $3 US per pound in 1978 and 1979. In 1980, prices dropped to about $1.10 US per pound. In total, considering that the fishermen requires only a modest investment, excluding his time, the return is still fairly attractive relative to frozen whole or tubes.

(6) Some cooked products were processed. However, the aggregate nature in which the data on these products was submitted prevented determination of profitability.

Processed forms which are firming in demand in Japan are soft saki-ika (and therefore, the duruma intermediate form), soft smoked products, and the salted and fermented shio-kara category. Demand and production appear to be shrinking for dried squid and boiled and soy-seasoned tsukuda-ni products.

The daruma processing option is relatively simple technically and there is surplus machinery available in Japan in places such as Ohata where new cooperative facilities have been established. Several Japanese companies are now considering the establishment of plants in Argentina.

A major constraint on the processing of cooked squid products in Japan is the pollution produced by waste products and the subsequent high costs of effluent treatment. The Japanese government has placed limits on the volumes of processed products which can be produced daily in major metropolitan areas. These pollution problems should not be a significant concern in Canada, where the concentration of plants is not anywhere near as great.

In summary, it appears evident that certain developmental opportunities must be recognized and acted upon as soon as possible if the potentially valuable Canadian squid fishery is to be of maximum benefit to all sectors of the industry in the long run.

3. Future marketing strategies

Canadian experience with exporting squid for human consumption is still very limited, covering only the last few years. Because 1978 was a year of perceived supply shortages in Japan, no major difficulties were experienced in selling Canadian production. This may have generated an unwarranted degree of optimism in the Canadian squid industry, and when 1979 and 1980 turned out to be years of abundance, the squid market was vulnerable, particularly because it was so highly concentrated on the Japanese market.

The fact that the inshore component of the squid fishery is bearing the brunt of the market decline focuses on the importance of quality. On the basis of developments to date, it would appear that even in a year of oversuppply, a first-quality product - that is, equivalent to squid caught and frozen on board - is more likely to find a market at an attractive price.

This is not the case for most of the products of the inshore squid fishery, which enters the processing stream in Japan, and which competes with Japanese catches of red squid and catches from New Zealand, Australian, and Argentine waters.

As we have seen over the past three years, the annual variations in worldwide squid supply can create serious uncertainties for both buyers and sellers (importers and exporters). Under/or oversupply, and perhaps to a lesser degree unrelated economic developments, lead to wide fluctuations in price, making planning difficult for the catching, processing and distributing operations.

4. Canadian future production

The future of the Canadian squid fishery does not lie solely in the provision of frozen or otherwise unprocessed squid to the Japanese or

Spanish markets. Although there are substantial quantities of raw squid sold at the retail level in both those markets, it is important also to note that most of the squid imported into Japan is converted into secondary, more valuable products. The Japanese obviously have concentrated on purchasing squid which can help to make maximum use of their processing capacity. However, this is not consistent with possible Canadian processing aspirations or the opportunity to capitalize upon developmental opportunities, not only from a harvesting point of view, but also from a processing point of view.

The overriding concern in the development of secondary processing must be the ability of Canadian processors to market, at a realistic price, the production output. A considerable marketing impetus is required to break through the barriers which may be in our way. Some of these barriers, such as tariffs and quotas, can best be handled at the intergovernmental level. The main barrier, however, will have to be breached by the industry itself. That is the formidable task of convincing the ultimate consumers that Canadians can produce desirable products of a suitable quality at the right price and overcome the peaks and valleys of supply and demand. Canadian processors know the quality criteria of their markets. They must now ensure their production meets these standards in order to be seen as a reliable source of supply.

5. Squid market projections to 1985

World demand for squid products is expected to increase by 1985, but the potential supply cannot be accurately predicted. Estimates of world catches will be based on the extent of effort directed towards squid. Based on the unpredictability of effort (related to market demand) and abundance (related to hydrographic conditions) a guesstimate catch of 1.1 million tonnes is forecast for 1985.

Annual consumption of squid has to be related to supply. As supply cannot be forecast accurately, neither can the share of the market available from Canadian landings be projected with accuracy. It is estimated, however, that without significant new development of squid fisheries Canada could expect markets to average those of the last few years. Slight

increases in sales of tubes and processed products are forecast in the product mix. Sales of dried squid are expected to level off at about 1 500 tonnes per year or 7 500 tonnes round weight equivalent. Domestic requirements are expected to reach 10 000 tonnes for bait and food.

TABLE 31

Canada: squid sales, 1979 to 1985*
unit = 1 000 tonnes product weight

		US	EC	Other West. Europe	Japan	Eastern Europe	Other	Total
Whole, fresh	1979	1.4	1.2	5.6	19.3	5.5	0.2	33.2
or frozen	1980	1.2	0.3	4.5	15.5	2.6	0.1	24.2
	1985	1.5	1.7	4.5	18.0	2.0	0.5	28.2
Tubes,	1979	0.2	0.5	0.3	1.8	--	--	2.8
fresh,	1980	0.3	0.7	2.2	2.3	--	--	5.5
frozen	1985	0.5	1.5	2.0	3.5	--	--	7.5

* 1979 and 1980 figures from Statistics Canada. Figures exclude domestic and dried squid sales.

Source: DFO, Marketing Directorate, 1980.

F. SUMMARY AND CONCLUSION

1. For many years, Canadian fishermen, particularly in Newfoundland, have supplied squid to domestic and some foreign bait markets but it is only in recent years that the economic potential of a food fishery for squid has been recognized.

   Potential is the key word, because experience has shown the market is vulnerable and beset by uncertainties, and the world supply situation is quite unpredictable.

2. Japan is the largest single market in the world for squid, and other major markets include China, Hong Kong, Singapore, Italy, Spain, Greece and Portugal.

   It was the Japanese market and the declaration of 200-mile economic zones that spurred Canadian interest in squid as a food product. Demand exceeded supply in Japan in 1978, and Canadian processors had no trouble selling all they could produce at attractive prices. But in 1979 and 1980 the supply situation changed dramatically. Japan found itself with large and expensive carryover inventories, and the market was virtually closed to 1980 Canadian catches.

3. Conservative estimates suggest the waters of continental shelves and upper continental slopes could support a potential world catch of 8 million to 10 million tonnes a year. With the addition of stocks of open-ocean squid, about which not enough is known, the potential catch could be anywhere from 10 million to 100 million tonnes. But it would require an enormous effort to reach these potentials, as illustrated by the fact that current world landings are running at around 1 million tonnes.

4. Figures compiled by Statistics Canada indicate that Canadian exports of whole, fresh or frozen squid (including round) declined from 36 927 tonnes in 1978 to 24 217 tonnes in 1980. Exports of fresh or frozen squid tubes, on the other hand, increased from 2 775 tonnes in 1979 to 5 491 tonnes in 1980.

5. Catches of Illex squid off Argentina and Uruguay underline the uncertainties of the squid fishery. Catches in these waters were 8 266 tonnes in 1976 and 2 439 tonnes in 1977. Then Bulgaria moved into the fishery, followed by Japan and Spain, and the Soviet Union and other Eastern European nations established their presence in the southwestern Atlantic. Landings exceeded expectations, at 55 000 tonnes in 1978 and 84 000 tonnes in 1979, with about 25 000 tonnes in that year taken as an allocation to Japan. But in 1980 the bottom fell out, and the catch dropped to 15 000 tonnes, due to an apparent depletion of the resource, internal problems in the Argentine fishing industry, and a souring of relationships between Argentina and Japan.

   Nonetheless, the potential of the southwestern Atlantic is considerable, and as such represents a region that can offer significant competition to Canada as a source of supply for Illex squid.

6. New Zealand wasters also have the potential to compete with Canadian supplies, and in recent years the major nations involved in the fishery have been Japan and the USSR. Anticipated catches for 1980 were set at 100 000 tonnes, but landings in previous years fell short of this (50 000 tonnes in 1979). There is also some potential competition from the Australian squid fishery, a relatively new one being developed mainly by the Japanese.

7. Canadian suppliers must be prepared to meet the special needs of the major markets for squid. As for the huge Japanese market, the challenge for the Canadian industry is to move away from the position of residual supplier as happened when there was world oversupply in 1980, and establish a position in which Canadian Illex can have a reasonably secure share of Japanese and other markets. But there are problems to be overcome, such as:

   -- characteristrics that make Canadian Illex less desirable than other available species;

   -- the timing of the Canadian squid fishery, which places it last in the yearly worldwide cycle;

-- Japanese import quotas, which restrict the Canadian ability to penetrate the market;

-- Japanese preference for frozen-at-sea whole squid (which runs counter to development objectives of the Canadian industry).

8. The future of the Canadian squid fishery does not lie in the provision of frozen or otherwise unprocessed squid to the Japanese or Spanish markets. The important thing to note is that most of the squid imported into Japan is converted into secondary, more valuable products. Thus the main challenge facing Canadian processors is the formidable one of convincing world consumers that Canada can produce desirable products of a suitable quality at the right price and overcome the peaks and valleys of supply and demand. The bottom line for Canada is to gain the reputation as a supplier that knows the quality criteria of the market and ensure that Canadian products meet the standards in order to establish a reputation as a desirable source of high quality supply.

9. World demand for squid products is expected to increase by 1985, by the potential supply cannot be accurately predicted. World catches will depend on the fishing effort made by countries interested in catching squid. Based on the impossibility of predicting the fishing effort as related to demand and supply and given the uncertainty of resources, an educated guess is that the world catch in 1985 might reach 1.1 million tonnes.

10. Without significant new development of squid fisheries, the forecast is that Canada could expect markets to average those of the last few years. Forecasts for the product mix indicate slight increases in sales of tubes and processed products. Domestic requirements are expected to reach 10 000 tonnes for bait and food, and sales of dried squid are expected to level off at around 1 500 tonnes per year product weight.

APPENDICES

APPENDIX I

BIOLOGY, DISTRIBUTION AND ABUNDANCE OF SQUID

Class: Cephalopoda
Sub Class; Coleoidea
Order: Teuthoidea (Squid) [Sepioidae - cuttlefish / Octopoda - octopus]

Sub Order: Oegopsida
Family: Ommastrephidae
Genera: Illex, Todarodes, Nototodarus

Sub Order: Myopsida
Family: Loliginidae
Genera: Loligo

Of the over 450 species of squid many of the oceanic species (deep water) are very gelatinous, full of ammonia and have only half the calorific value of a muscular squid of the same weight found on continental shelves.

The two most commercially fished families of squid are the Ommastrephidae and a Loliginidae.

The loliginids are distinguished by a membrane covering the eye, which in ommatrephids is slit exposing the lense to the sea. Three quarters of the world catch consists of ommastrephids.

Loliginidae

Loliginids are distributed worldwide in tropical and temperate seas. Most important genus Loligo is composed of 5 main species: L. forbesei found in the Eastern Atlantic along the coast of Europe south to Madeira; L. vulgaris in the Eastern Atlantic from Europe and the Mediterranean south to the Gulf of Guinae; L. edulis in the Indo-West Pacific; L. pealii in the Western Atlantic from New England to the Caribbean; and L. opalescens off the Pacific Coast of North America.

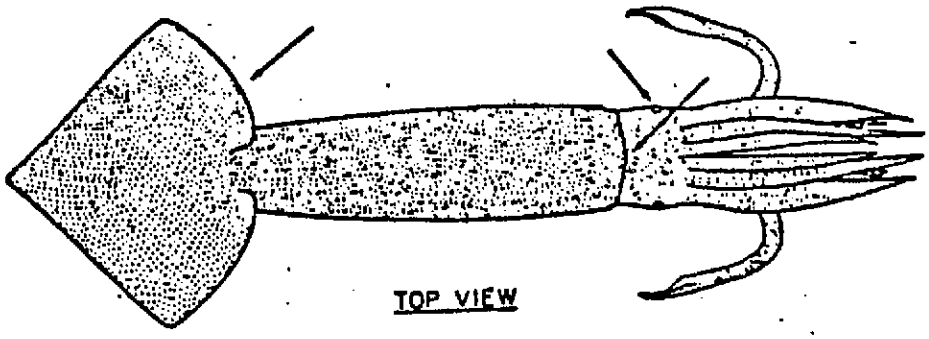
Ommastrephidae

Ommastrephid squid occur in all seas and while some are totally oceanic others migrate inshore during certain seasons.

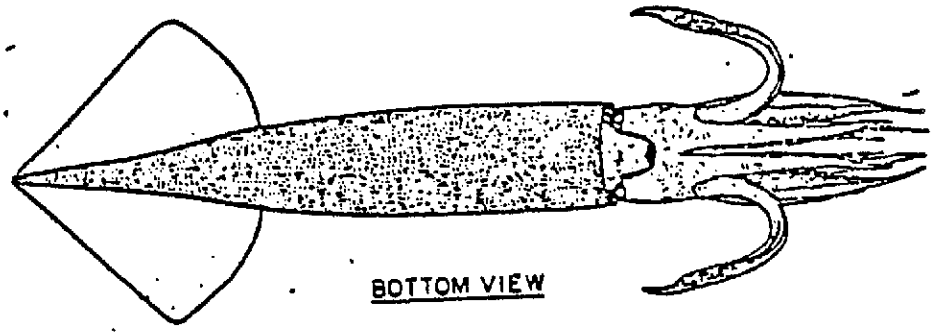
By far the largest fishery is for Todarodes pacificus by the Japanese. They take some 300 000 tonnes annually, this along with their other squid catches represents approximately 33% of the Japanese catch of pelagic organisms.

Illex illecebrosus, Canadian squid, is shorter than Loligo having a fin/mantle ratio of 1/3 compared to 2/3 for Loligo.

S Q U I D



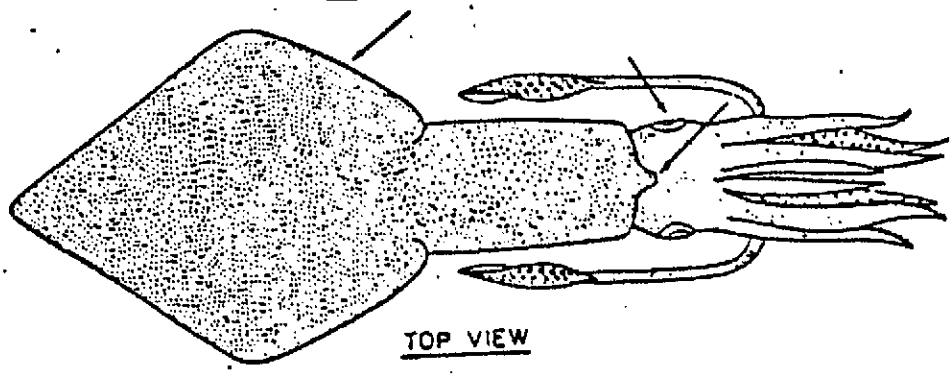
TOP VIEW



BOTTOM VIEW

ILLEX SHORT-FINNED SQUID

FINS ABOUT 1/3 THE MANTLE (BODY) LENGTH.
EYE OPENING SMALL.
DORSAL LOBE ABSENT.



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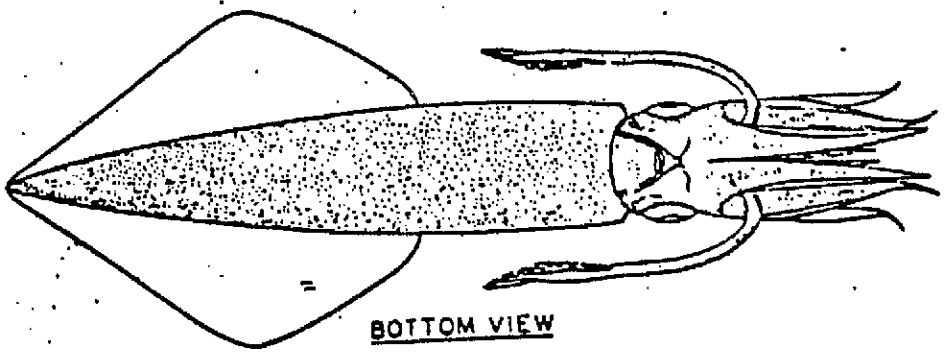

BOTTOM VIEW

LOLIGO LONG-FINNED SQUID

FINS LONGER THAN 1/2 THE MANTLE (BODY) LENGTH.
EYE OPENING LARGE.
DORSAL LOBE PRESENT.

World Distribution of Major Ommastrephids

Species*	Area of Occurance	Fisheries
Todarodes pacificus or Nototodarus sloani pacificus (Japanese common squid, surume-ika or ma-ika)	Waters adjacent to Japan	Japan 200-300 000 t/yr.
Illex illecebrosus	North West Atlantic (continental shelf & slope)	NAFO areas 3, 4 & 5 75-150 000 t/yr.
Nototodarus sloani sloani (New Zealand Arrow Squid)	Waters adjacent to New Zealand	Japanese & USSR fleet 70-100 000 t/yr.
Illex argentinus	Waters adjacent to Argentina & Uruguay	Japanese, Eastern Europe, Argentinian, Spanish fleets 30-60 000 t/yr.
Ommastrephes bartrami (Japanese red squid, aka-ika or murasaki-ika)	Waters adjacent to Japan and British Columbia	Japanese 100-150 000 t/yr.

Characteristics of Squid Life cycle and growth

Most squid grow very rapidly, are short lived and do not survive spawning which occurs when they are 1-3 years old. For a number of the more important commercial species, such as the Illex illecebrosus, most of the population spawns at 1 year old so that the bulk of the catch consists of only one age group. The Japanese squid Todarodes pacificus also spawns at 1 year old. Summer growth in these species is high with size doubling and weight increasing as much as five fold.

Unlike most marine fish, which spawn vast numbers of eggs to be fertilized and develop freely in the water, cephalopods lay fertilized eggs in a sack surrounded by a tough outer coating. Loliginid squid lay their eggs in large strings or clumps either directly on a sandy bottom or attached to submerged objects. Little is known of the spawning of ommastrephids, which apparently occurs in deep water on the continental slopes, perhaps at depths in excess of 1 000 meters.

It is known that Illex spawns offshore in deepwater when food is scarce and that starvation stimulates the growth of the ovaries. In captivity Illex illecebrosus lays spherical egg masses of 40-120 cm in diameter containing up to 10^5 ova. These masses are neutrally buoyant and do not attach to the bottom; in the sea they probably drift with the current.

Todarodes pacificus lay large adhesive egg masses on the sea bottom, some of these masses may disintegrate towards the end of their development and float upwards. This accounts for some eggs being taken in plankton hauls. Large masses of eggs of other, unidentified, oceanic squid have been seen on the surface of the sea on several occasions. Young squid are pelagic and subject to drift by tidal or ocean currents.

Food and predators

Squid are important members of marine food chains, the loliginids and ommastrephids both occupy approximately the same trophic level as mackerel. They are voracious predators feeding when young on macroplankton and subsequently on small fish. Larval squid are probaly important preditors of larval fish.

On the Newfoundland Grand Banks macroplankton and small crustaceans are the predominant food of small Illex illecebrosus (10-12 cm mantel length) but as these squid grow and migrate inshore crustaceans decrease in significance in their diet and fish such as capelin, redfish, cod, herring and haddock become the main constituent. A comparable change occurs in the diet of Loligo opalescens. The ratio of crustacea to fish is 3:1 in young squid, 1:1 in young-mature animals and 1:3 in spawning individuals.

This change in food is accompanied by a concomitant change in feeding behaviour. Young Illex move in well-defined evenly-spaced schools, each squid holding its arms and tentacles compactly together in a streamlined cone and travelling backwards at a steady speed.

When moving through swarms of small crustaceans, however, the arms are expanded, greatly enhancing the turbulence in the animal's wake and sweeping the prey onto the suckers of the arms and tentacles. This mode of feeding is accomplished without breaking up the school. When the squid begin to feed on small active fish, this is no longer adequate. Then the older Illex continue to swim backwards in schools but, on passing a potential prey or a jig, individual squid stop, reverse their direction of movement and make a rapid forward attack; this behaviour breaks up the school. The speed of attack is high, approximately 2.5 m/s in Todarodes pacificus, and the prey is seized in the centre of the arms; it is killed immediately by a bite which severs the spinal cord. In daylight in clear water Illex commonly reconnoitre fishing jigs, manoeuvering slowly to touch them with their arms and tentacles. Many then retire again without attack, having apparently reconized the jig as an inanimate object. Those that do attack blanch to a translucent white just before attacking. The attack is begun from a distance of about 1 meter and the colour change render the squid inconspicuous when viewed head-on. From the side, however, conspicuousness is increased. Attacks on jigs involve progressively more and more squid in bursts of frenzied activity.

Squid also take a considerable toll of their own kind through cannibalism. In Illex illecebrosus cannibalism becomes progressively more important during the year. It appears likely that a significant portion of the late season (September-November) growth of the larger individuals is based on the consumption of smaller squid, when other prey is significantly depleted. However, their main pedators are other fish.

On the Grand Banks cod and mackerel are important predators of Illex illecebrosus and off California salmon, mackerel and tuna all prey on Loligo opalescens. Toothed whales, porpoises and seals are also major predators and flocks of seabirds have been observed feeding on debilitated squid, accessible at the surface after spawning. On the Grand Banks the pilot whale Globicephala melaena feeds almost entirely on squid and subsists on Illex illecebrosus for at least six months of each year. They feed at a rate of 4-6% of body weight per day; the average weight of a whale is 830 kg as found in herds examined in Newfoundland; and the preexploitation population size was 50 000, then consumption of squid by these pilot whales would be in the order of 600 000-900 000 t/yr. A conservative estimate suggests that at least 100 million tonnes of squid are eaten by sperm whales each year.

Seasonal migrations

The commercially exploited species of squid all make extensive migrations and the resulting distributions are governed largely by water conditions, i.e. salinity and temperature. Loliginid and ommastrephid squid alike appear in warm, shallow, coastal seas during summer and autumn.

Abundance

Squid fisheries are characterized by large fluctuations in catches. This is best exemplified by the Newfoundland inshore fishery of Illex illecebrosus. Records dating from 1879 and landing statistics from 1955 show that during the last two decades the catch has fluctuated over four orders of magnitude. Such dramatic differences can be explained by a combination of varying hydrographic conditions, which determine the availability in inshore waters, and fluctuations in year-class strength affecting overall abundance. Fishing effort, based on potential markets, have significantly increased landings. However, landing figures before 1977 do reflect the pattern of squid abundance found in other studies.

Research vessel surveys in the North-west Atlantic since 1968 have shown that squid abundance may fluctuate by a factor of several times from one year to the next and, clearly, the coincidence of a poor year-class and unsuitable hydrographic conditions will lead to a scarcity of squid. Conversely, a good year-class and high temperatures will, as in 1978 and 1979, lead to an abundance of squid in inshore waters.

Young Illex move onto the Grand Banks in early summer probably in the deeper layers with the influx of warm, saline Atlantic water, apparently at the same time making vertical feeding excusions into midwater, where the mixture of Atlantic and Arctic water produces a rich food supply of small crustaceans. The final inshore movement into the coves and bays of Newfoundland coast appears to be governed by water temperature, the availability of suitable food and also local weather conditions, since squid disappear rapidly from the jigging grounds with the onset of onshore winds.

When Illex arrive on the Shelf (sub-areas 3 and 4) in April-May, they have a mean mantle length of 150 mm, with females somewhat larger than males. By October-November, the mean length increases to 245 mm (225 mm for males and 255 mm for females). Average weight of squid in May was found to be generally 72 g, for males and 82 g for females. By November, the males weighed 269 g and the females 317 g.

TABLE A-1

Mean mantle length for female and male Illex (based on 1977 to 1979 data)

	Male		Female	
	Average Length mm.	Average Weight grams	Average Length mm.	Average Weight grams
April/May	72	72	160	82
October/November	225	269	255	317

Source: Ke, Wogewoda, Fierheller and Lemon, 1979.

While recent surveys suggest that there has been a pronounced increase in the relative abundance of both Illex illecebrosus and Loligo pealii in the NAFO area, coincident with a decline in the abundance of various species of fish occupying similar ecological niches, fluctuations in the biomass of Illex have nonetheless continued with periods of high abundance in 1955-67 and 1975-79 and low abundance in 1968-74. There is no evidence in the catch records, however, of any regular cycles of abundance.

FIGURE I

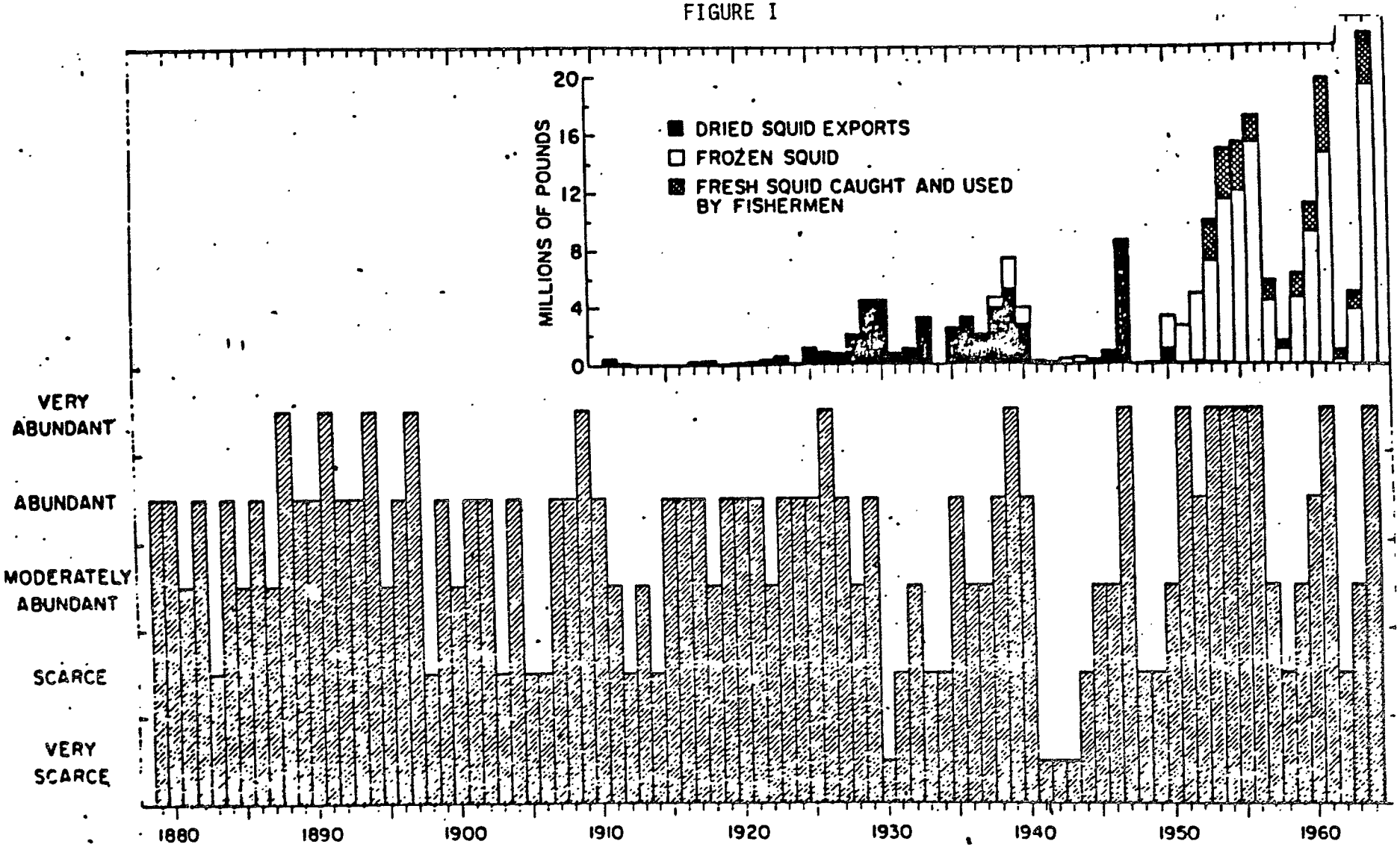

Fig. 1: Estimates of relative squid abudance in the Newfoundland inshore area, 1979-1984 and records and estimates of the Newfoundland catches (round fresh weights) 1911-64. (Taken from Templeman 1966; Fig. 62. p. 124).

Harvesting and Utilization

The edible portion of squid, which consist of the mantle (tube), tailfin, arms and tentacles, comprise some 60-80% of the body weight and is greater than that of most fish (20-50%) and shellfish (20-40%). Squid flesh is equal to fish meat in protein content (16-20%) and amino acid composition and has a food energy equivalent of 2-3 J/g of raw fish. (1 joule = 0.24 calories). The inedible part need not be wasted. The sepia or ink has been refined and used by artists, the viscera and pen can be processed to make a high grade nitrogenous fertilizer or animal feed supplement. The viscera are especially rich in vitamins B2 and B12.

TABLE A-2

Proximate composition of Canadian Atlantic squid (Illex Illecebrosus)

COMPOSITION (% wet weight)	Fresh Squid				dried squid	squid daruma
	whole	mantle	head/ tentacles	gut		
protein	17.0	18.0	19.0	15	72	64
fat	1.2	1.0	0.6	32	3	2
glycogen	0.8	1.0	0.4	--	--	--
water	78.0	79.0	79.0	49	20	40
mineral substances, etc.	1.3	1.0	1.1	2	4	3

Source: Ke, Woyewoda, Fierheller and Lemon, 1979.

Harvesting

At the moment, the offshore Canadian fleet has only a handful of vessels which can catch and freeze squid offshore.

The Japanese have two principal methods of harvesting squid, by jigger and trawler vessels. They use jiggers primarily in their domestic waters and both methods in their distant water operations. Both methods have been tried in Atlantic Canada with some degree of success. The economics and social considerations of both methods of harvesting are presently under investigation.

Trawling

The conventional type of squid trawler is a factory freezer trawler which can be used as a multi purpose vessel for other fisheries with very little conversion effort. These vessels are expensive to operate and have considerable crewing requirements. In the case of the Japanese fleet, they stay at sea for many months of each year with frequent changes of crew by air. The Japanese fleet which fishes off the Canadian East Coast is permanently based in the Canary Islands and does not return to Japan.

Depending on the size of a factory freezer trawl vessel, the new cost could be in the order of $7 to $20 million. The utilization rate of the trawl vessel would be much greater than that of a jigging vessel as the trawler could be used for other species. Due to the strict quality requirements imposed by the markets, substantial hauls of squid often result in considerable quantities being dumped because the processing section of the vessel cannot handle large volumes in a short time before the products start to deteriorate.

Jigging

In recent Canadian experience, one Japanese jigger was used during 1978 and 2 were chartered in 1979. In 1980 the Atmar owned by United Maritime Fisheries was refit to jig squid. Although Canadian experience with jigging vessels is very limited, it is a fact that jigger caught squid produces a superior product capable of commanding a higher wholesale price. However, it must also be recognized that catching costs may be higher as well. The limited available data from jiggers in Canadian waters shows catch rates which appear to indicate that on a catch/day/crew member basis, jiggers are less efficient (in some cases as much as 30-40 % than trawlers).

Jiggers, like trawlers, have to have the capacity to grade, wash, and freeze squid to certain rigid specifications. In times of heavy concentrations of fish, the jigger may have an advantage over a trawler by being able to control, to some degree, the amount of fish caught, thereby avoiding bottleneck situations in the processing room and therefore consistently maintaining a top quality product.

As a point against them, jigging vessels may not be usable in any other fishery. In the case of the Japanese jigging vessels, they move from one squid fishery to another but in the case of the Canadian owned jiggers, the relatively short squid fishing season will pose problems for vessel utilization for the balance of the year. The UMF vessel was a long-liner and can revert back to this fishing technique when the squid jigging season ends.

Inshore fleet

No discussion of Canadian harvesting would be complete without considering the inshore fleet. Substantial quantities are taken by the small boat fleet, most without any facilities for preserving the quality of the catch. While most of these boats fish close to fish packing plants and can deliver their catches to the wharf quickly, plants sometimes cannot handle all the squid delivered to them, and fishermen end up by losing their catch on having strict boat quotas placed on them which thereby limits their opportunities to fish.

The principal issues relative to the inshore fleet are therefore the ability to sell and the presentation of acceptable quality. The dilemma from an investment perspective vis-à-vis the inshore fishery is recognized in light of the unpredictability of the fishery and the marketing problems revealed over the years.

On board handling

Squid undergo rapid spoilage and are particularly susceptible to mechanical damage. Bulk icing, shovelling of the catch and dense packing lead to crushing, torn skin and broken ink sacs all of which detract from the quality of the final product. Squid therefore need to be carefully handled and preserved on board ship. Storage in circulating chilled sea water, fresh water ice with plastic or other protective material between the squid and ice, or refrigerated sea water could preserve the redfish brown colour for 45-6 days.* Longer range operations require deep freezing and cold storage on board.

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* For further information see: Fisheries and Marine Service Technical Report No. 855, May 1979, PRESERVATION OF RAW WHOLE SHORT-FINNED SQUID (ILLEX ILLECEBROSUS) DURING THE PERIOD FROM CATCHING TO PROCESSING; SKIN COLOR OF RAW SQUID AND SENSORY QUALITY OF THE SUBSEQUENTLY COOKED SQUID by J.R. Botta, A.P. Downey, J.T. Lauder, and P.B. Noonan.

Illex and Loligo both have excellent freezing characteristics and can be stored whole or cleaned for periods of at least 1 year. Squid frozen for 1 year can be thawed, cleaned and processed and refrozen with an expected shelf life of another 6-12 months.

For good quality the catch should be chilled or iced immediately after capture and shelved or boxed to reduce physical damage. A squid-to-ice ratio of 2:1 is recommended with the squid and ice well mixed. Alternatively, a chilled seawater system can be used with a 3:1:1 ratio of squid-to-ice-to-water. Only good quality squid should be frozen, the containers and cartons should be relativley thin to permit rapid cooling and plate or blast freezing is recommended. Storage temperatures of -18°C to -30° are necessary.

Quota determination and allocations

Canada's share of the total allowable catch of squid 1978-79 and 1980 was 65%, 63% and 67% respectively. It was the expectation in 1980 that Canada would gradually start to achieve a higher proportion of the TAC. The exploitation rate ranged from 40% to 65% of the biomass according to scientists with preferences towards a low exploitation rate. The TAC established in 1978 and 1979 were based on a 40% exploitation rate based on minimum biomass estimate for the previous years. Because of the short lifespan and large fluctuations in abundance and availability of squid, biologists find it extremely difficult to predict with any degree of certainty the biomass of squid. It should be noted that there are biologists who do believe that the biomass of the Illex stock is in the neighbourhood of 10 to 15 times greater than the current TAC of 150 000 tonnes.

Offshore allocations

It is fair to say that over the past two or three years the offshore squid resources have been used as a form of currency both by industry and government. The industry has generated substantial profits from developmental charters which have helped to restore the financial base of the industry which was seriously affected in the groundfish crisis. From the government perspective, squid has been used as a currency to achieve certain objectives and both of these usages

have stemmed from the undeveloped nature of the fishery. If the right balance can be truck between the sharing of benefits from the fishery, the need to use the resource as currency for these objectives will be diminished and order may be brought into the fishery.

APPENDIX II

DRIED SQUID

122. Dried squid for export shall be dried to a moisture content not exceeding 22 per cent and shall be graded as

(a) "Grade A", if it is whole properly split, clean uniformly shaped and free from all entrails, physical damage, foreign matter, slime, dun, mold and pink, but excluding squid from which pink or dun has been removed;

(b) "Grade B", if it is split, reasonably clean, free from entrails, foreign matter, slime, dun, mold and pink and whether or not it is irregularly shaped with slight physical damage, but excluding squid from which pink or dun has been removed;

(c) "Grade C", if it shows pink discoloration, including squid from which pink or dun has been removed and otherwise meets the requirements of paragraph (a) or (b).

Additional Information

The Inspection and Technology Branch will provide advice to packers on matters relating to quality and will monitor production for compliance with grade, condition of containers and labelling. Packers must ensure that employees are familiar with these requirements as the responsibility for compliance rests with the packer.

Sampling Procedure

Dried squid produced in a registered fish processing plant will be examined for compliance with requirements in accordance with Sampling Schedule 1. Dried squid produced by a fisherman-packer and subsequently packed by the exporter will be examined in accordance with Sampling Schedule II. In instances where a lot inspected consists of the production of more than one fisherman-packer additional sample units may be required to ensure that a representative sample is obtained.

Sampling Schedules and Acceptance Numbers*

LOT SIZE	SAMPLING SCHEDULE 1	ACCEPTANCE #	SAMPLING SCHEDULE II	ACCEPTANCE #
1-80	8	0	16	1
81-160	16	1	24	2
161-240	24	2	30	3
241-300	30	3	40	4
301-500	40	4	50	5
501-750	50	5	75	7
751-1000	75	7	80	9
1000 or more	80-1% over 1000	10	100-2% over 1000	12

* Acceptance Number - The number in a sampling plan which indicates the maximum number of defectives permitted in the sample in order to consider the lot as meeting the requirements of the regulations.

Examination

The sample will be examined for compliance with the labelled weight and grade. The squid in each sample unit will be examined individually. Any sample unit containing in excess of 5 percent (by weight) which fails to meet the requirements for the grade stated on the conatiner is considered defective. Any sample unit containing any squid which is tainted, decomposed or unwholesome is considered defective.

Weight Tolerances

Twenty percent of the sample containers withdrawn shall have the fish removed and weighed to confirm the declared net weight of the contents. If any container is found to be more than 2% under the declared weight, an additional twenty percent of the sample containers are checked for weight of squid. If any further containers are found to be underweight by more than 2% the lot fails to pass inspection.

Definition of Terms

The terms used in describing the grades of dried squid are defined in the appendix to this correspondence.

Labelling

All containers of dried squid must be clearly marked as follows:

- dried squid;
- net weight of contents;
- grade;
- name of exporter or distributor;
- day, month and year of packing.

DEFINITION OF TERMS

WHOLE SQUID

Squid that are split with all internal organs removed.

PROPERLY SPLIT

Squid that are split in a straight line through the centre of the belly from the neck to the tail. The head shall be split open in the middle, and the beak and eyes removed.

CLEAN

Squid that are throughly washed and soaked to remove all traces of natural slime, entrails and ink.

UNIFORM SHAPE

Squid that have been press piled or treated in any other manner to ensure that they are flat and smooth and the cut edges and corners are not rolled or curled.

PHYSICAL DAMAGE

Any damage caused by improper handling methods which result in the loss or breakage of tentacles, fins and mantles, or damage that occurs during harvesting, e.g. bites which damage the mantle.

FOREIGN MATTER

Any matter or substance not normally associated with the species.

SLIME

A red or brownish viscous substance.

DUN

The presence of the mold Sporendonema epizoum, as barely-visible light to dark brown spots.

MOLD

Surface growths of varying colors.

PINK

A pinkish and/or reddish discoloration not associated with spoilage.

SPLIT

Squid that are unevenly cut toward the side or squid that have been cut through the back, with the beak and eyes removed.

REASONABLY CLEAN

Squid that show traces of ink in the head or tenacle section to the extent of 10% of the total surface area.

SLIGHT PHYSICAL DAMAGE

Squid that may have fins or tenacles missing or have cracks or bite marks on the mantle affecting no more than 10% of the total surface area.

APPENDIX III

ABSTRACT OF FOOD SANITATION LAW (JAPAN)

Caḥpter 2. Food and Additive

(Prohibition of Sale of Insanitary (sic) Food or Additive)

Article 4. The following food or additive shall not be sold (including the delivering other than sale to an unspecified person or to many persons, hereinafter referred to as "to sell"), collected, manufactured, imported, processed, used, prepared, stored nor displayed for sale:

1. That which is rotten, decomposed or immature; provided, that such articles as are generally deemed neither injurious to human health nor unfit for food shall be exempted from the application of this provision.

2. That which contains or is contaminated with a poisonous or harmful substance; except when the Minister of Health and Welfare designates such as not injurious to human health.

3. That which is or is suspected of being contaminated by pathogenic micro-organisms and may be injurious to human health.

4. That which may injure human health by reason of uncleanliness, contamination, addition of foreign matter, or for any other reasons.

Chapter 5. Examination

(Importation Report of Food, Additive, Apparatus or Container-Package).

Article 16.2 A person who imports foods, additives, apparatus, or container-packages to be offered for sale or for use in business shall report to the Minister of Health and Welfare each time importation is made in accordance with the provisions of the Ministerial Ordinance of the Ministry of Health and Welfare.

Chapter 6. Business

(Destruction of Food, Revocation of Business Permit, Prohibition or Suspension of Business)

Article 22 The Minister of Health and Welfare or the Governor of prefecture may, in case of violation of the provisions of ...(The regulations): (a) order destruction of the foods, additive, apparatus or container-packages by a person who conducts a business or official concerned; (b) order a person who conducts a business to take necessary steps to avoid the dangers on food sanitation, (c) revoke the permission granted under paragraph 1 of the preceeding Article; (d) prohibit the business in whole or in part; or (e) suspend the business operation fixing the term thereof.

APPENDIX IV
USES FOR SURUME - TYPE SQUIDS IN JAPAN

There are numerous uses for squid and cuttlefish species, covering a wide range of processes, forms, tastes and values. The main use categories are listed here for reference and are individually discussed in more detail starting on the next page.

Human Food Uses

1. Raw consumption ("sashimi")
2. Table-foods (cooking uses)
   eg: Tempura frying, grilling, broiling,
   squid balls, squid rings, squid legs
   Note: Some table food forms are prepared commercially as packaged frozen foods.
3. Dried ("hoshi-surume")
4. Salted ("shio-ika")
5. Salted & fermented ("shio-kara")
6. Boiled & soy seasoned ("tsukudani")
7. Canned
8. Smoked ("Kunsei")
9. Seasoned "Preparations" ("chomi-kako")
   eg: "Daruma" - an intermediate processed form also directly consumed broiled.
   Shredded, roasted ("saki-ika")
   Cured, fermented ("tsukemono")
10. Kneaded products ("neri-seihin")

Main Non-Food Uses

1. Fish bait ("esa") for large tuna, cod and yellowtail
2. Liver oil & solubles

Usage application varies according to size and quality. Therefore, price also varies according to size, reflecting suitability for different uses and the supply and demand for different sizes. As price relativities between different sizes change according to size distribution of catches and imports, there is some shifting in uses by size. Opinions on cut-off sizes vary within Japanese industry. The following indication of uses by size should, therefore, be taken

only as a general guideline to the normal pattern prevailing for "surume squid" types.

FIGURE 45

SIZES AND USE OF SQUID IN JAPAN

-10				
11-15		Raw	Tempura	
16-20	Daruma	(large)		Dried
21-25	Saki-ika	preferred	Other Table	(Sizes 21-30
26-30	Smoked		Food Uses	preferred
31-35	(170 gm +			but
36-40	preferred)	Shiokara	(Sizes 21-30	expensive)
41-45		(larger size	preferred)	
46-50		also if		Tuna
51-60		quality/price		Bait
61-70		low)		
71-80			Canned	
81-90			& Other	
91-up			Processing	

Lower quality products go to processing uses rather than direct consumption. (See p. 26 for more detail on sizing).

1 RAW CONSUMPTION ("Sashimi")

For this dish the mantle is split and the head, tentacles shell (pen) and viscera are removed. The outer skin of the mantle is removed by teasing it loose with a knife and pulling the skin away from the flesh. The triangular piece of flesh is then cut horizontally into 10mm wide strips. This flesh is served raw and is usually seasoned with a little soy sauce and green horse-radish (wasahi).

The principle species used for sashimi are best quality jigged Japanese "surume", "ma-ika", "mongo-ika" and "ko-ika"* (cuttlefish).

Where fresh chilled squid or cuttlefish is available this is preferred to frozen.

Prices for squid for this end-use are highest in Tokyo.

* See Appendix 1 for English and scientific names.

2 TABLE FOODS (COOKING USES)

Principal table uses (including packaged frozen prepared forms) from fresh or IQF squid include the following categories:

Boiling and grilling

The squid is boiled either whole or body only in water and soy sauce. The squid is then grilled over charcoal or gas.

Barbequed squid ("Yaki-ika")

Squid, whole or body only is also used at roadside stalls where it is brushed with soy sauce and broiled over charcoal.

Squid balls ("ika dango")

Chopped squid meat is mixed in a batter and cooked in a kind of waffle iron. The food is then eaten with hot mustard and fresh chopped ginger.

Squid rings

The squid body in a tube shape is sliced into thin rings. These rings are then dipped in batter and deep fried.

Battered legs

The same operation is performed with the legs as for the tube.

"Tempura"

Squid also finds favour with restaurants specializing in "tempura" which is a distinctive lightly battered, deep fried dish. Rings cut from the tubes or strips or legs are used for this dish.

Chinese foods

Many Chinese dishes cooked in homes and restaurants utilize squid bodies, legs or whole squid.

Good quality jig-caught squid is generally preferred for these end-uses. Sizes used range from 200 gm upwards. Large sizes are less favoured because a high unit price results.

The better quality trawl-caught squid and Canadian imports may be selected and partially defrosted for repacking in IQF form. This is known as "pakku-uri" and is sold in consumer packs distributed through supermarket chains and neighbourhood food stores.

Although squid deteriorates quickly prior to freezing it is not as susceptible to deterioration in freezing and thawing as most fish species. Frozen squid of good quality can be thawed and sold as fresh produce through supermarkets to consumers (not to trade professionals). Partial thawing for reshaping or repacking and refreezing need not unduly affect quality.

SELECTED "SEASONED PREPARATIONS" AND SMOKED SQUID PRODUCTS

This is the major squid processing category in Japan in terms of production volume and is also the most important processing category for Canadian Illex.

Various types of products are produced but the most important final processed forms are "saki-ika" (flavoured, roasted and shredded squid) and smoked squid. New product variations are being developed continuously. Most fit the conceptual marketing category of "taisho chinmi", namely "gourmet items for the masses", which are consumed with alcohol as sophisticated Japanese equivalents of potato chips or salted peanuts.

Both jigged and trawled squid are used for these processes. Poorer quality squid and sizes unsuitable for higher value uses are used. Price is important. Processors have a variety of techniques to compensate for poorer quality in freshness or colour and seek the cheapest possible supplies.

In recent years intermediate processed forms from which saki-ika and other products can be produced have become established as a separate processing category. It is now common for bulk processing to take place to an intermediate stage, with the semi-processed products then being distributed to individual specialized producers of final products. Some final products producers still carry out the complete processing cycle themselves. It is this intermediate process which should be of interest to some Canadian producers.

Intermediate Processing - "Daruma" & Other Forms

The intermediate processed product from which saki-ika is made is known as "daruma", which is a flat, yellowish, flexible, semi-processed form from the body of the squid. The tentacles (legs) annd fins are also semi-processed to the same state and are mixed in with the body again in certain proportions during some final processes in order to lower the costs. Tubes, which are uncut squid bodies, are also semi-processed the same way. This semi-processing (other than the cutting) is basically the same for each of these products and is summarized below. It is important to note that this process has subtle changes depending on the size and species of squid being processed.

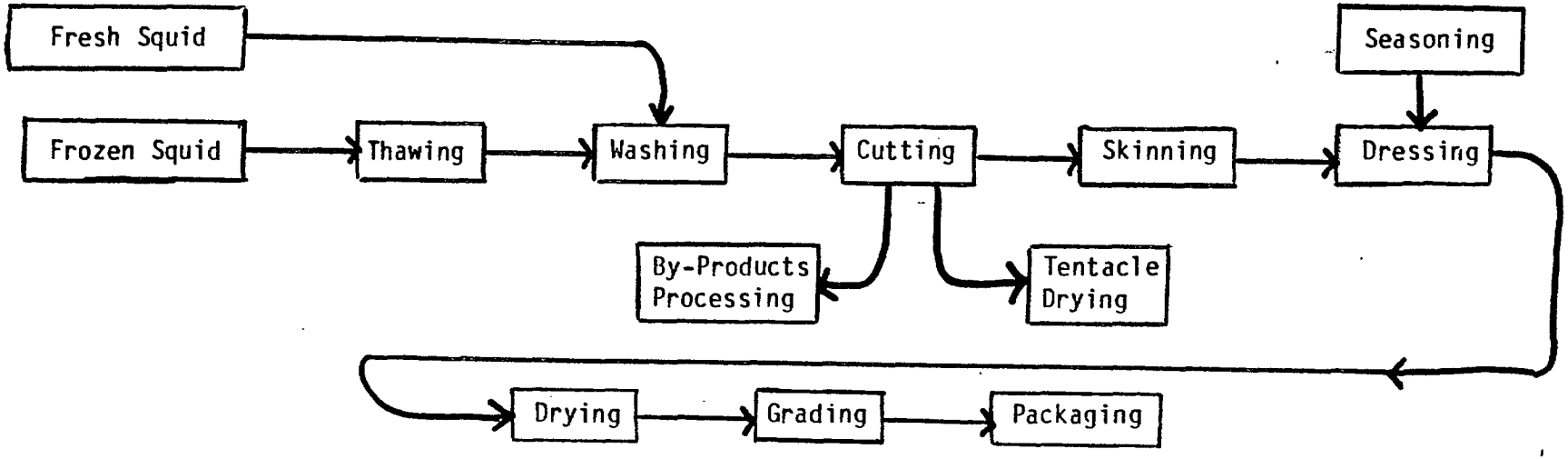
i) Whole frozen squid in (bare) blocks stacked on pallets is trucked to the processing plant in the late morning and left to thaw naturally during the afternoon and overnight.

ii) The next morning it is washed, split down the middle (except for tube production) and gutted, and the head and tentacles are removed as one unit. This operation is labour intensive and skilled.

iii) The body, fins and tentacles are cooked separately for up to 30 minutes at 50 - 65°C in large vats filled with water agitated by revolving stirrers. This process removes most of the skin and whitens the flesh. Any skin not removed is brushed off by hand when the squid is taken out of the vats and the flesh is washed and cooled in cold water. (The effluents from this skinning process are the pollution concern referred to earlier.)

Figure 46

Flow Diagram for the Production of Semi-Dried Squid (Daruma)



iv) The material then passes down a revolving screw where it is mixed with a measured quantity of flavouring agents (such as salt, sugar, sake, monosodium glutamate, acetic acid, etc.) which vary from processor to processor. In some plants a machine like a concrete mixer is used for this stage. The flesh is then left for about four hours to absorb the added flavourings.

v) During the afternoon shift the squid is placed on racks in a wind tunnel and dried at 38°C for about 10 hours until the moisture content is reduced to 42%.

vi) The squid is then packed in 10 kg poly-lined cartons for distribution to secondary processors.

"Daruma" processors may also buy their squid material after phase iii of the process. If the boiled squid is frozen and thawed (as it would be if supplied this form from Canada) the recovery at the daruma processed stage drops by about 3%. A technical concern in the Canadian industry is the requirement for hot water boilers as the daruma process requires significant amounts of hot water which cannot be reused in the daruma process.

The semi-processed daruma forms may be broiled for direct consumption. This product is usually brushed with soy sauce and broiled over charcoal. Consuming sectors are bars and clubs. The major end-use for "daruma" is for processing into "saki-ika".

"Saki-ika" Products

"Saki-ika" is the flavoured and roasted squid which is shredded into thin strips. There are numerous minor variations in product characteristics from processor to processor. Formerly saki-ika was developed from dried squid but more recently the growth has come in soft saki-ika made from daruma-type material. Soft saki-ika now accounts for about half of the "seasoned products" category.

Some plants buy unprocessed squid and process right through to the final saki-ika form, while others buy semi-processed squid such as "daruma", plain or seasoned, and process from that stage onwards. In either case the final processing stages are the same:

i) The semi-processed daruma, fins or legs are pressed between hot steel plates in a large machine and roasted.

ii) After roasting, the thicker pieces are sliced into two sheets and the cooked meat then passes through a roller to be stretched and flattened.

iii) The flattened material is split and shredded. The squid at this stage has a moisture content of 36-37%.

iv) The shredded flesh is reflavoured with powder, the exact constituents of which are closely guarded from maker to maker. The main ingredients, however are salt, sugar and monosodium glutamate. It is then left overnight to absorb the flavourings.

v) The next day the material is further dried under heaters while moving along a conveyer belt. This reduces the moisture content to 27 - 28%.

vi) The product is then packaged in poly-lined 10 kg cartons and distributed to wholesalers or large retailers for breaking down into 100 - 200 gm packs.

In this process the body, legs and fins are treated separately but at the final stages some product produced from the fins (usually up to 20%) can be mixed in with the body flesh to lower the cost. The proportions of each material type mixed in is determined by the buyer.

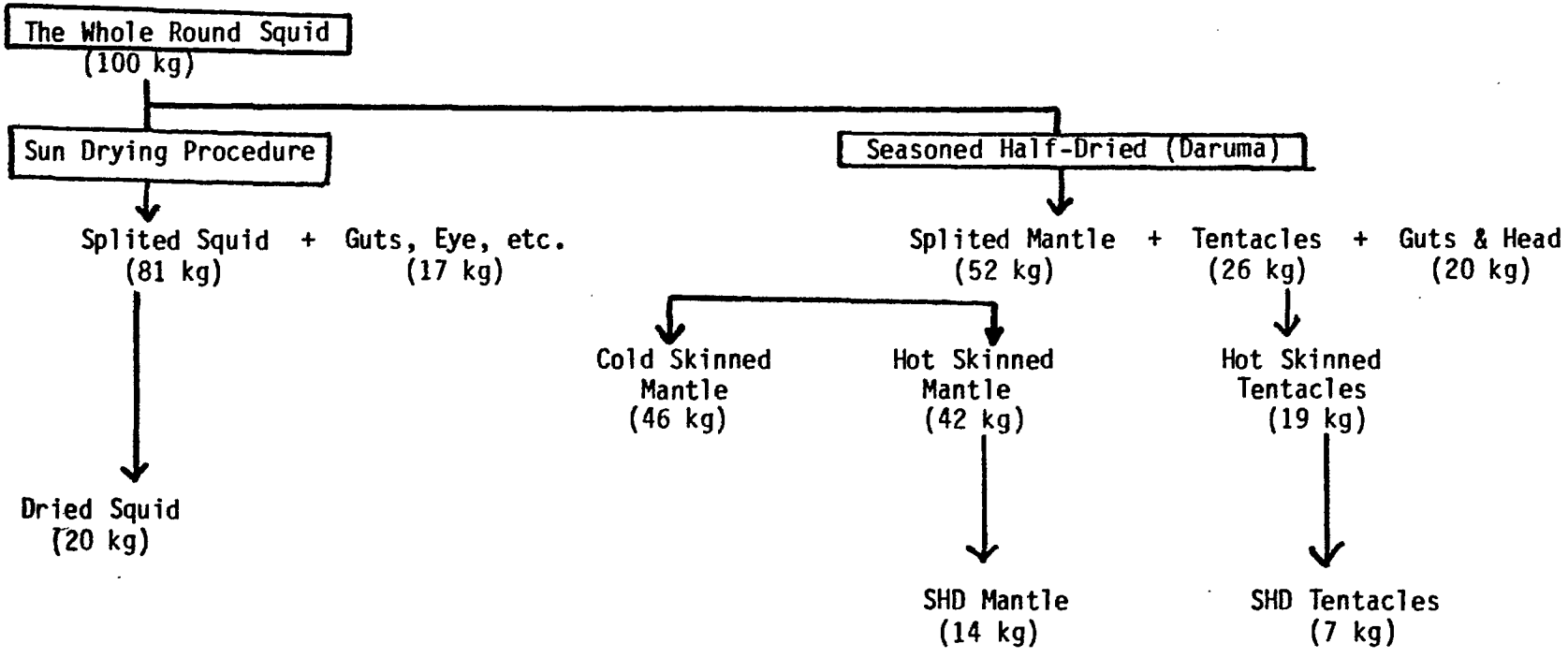
The final recovery rate for saki-ika from the original whole squid is said to be about 9%.

An important factor with saki-ika is how well the cooked strips fray out when shredded. This fraying out (keba-dachi) is desired to give the appearance of bulk in the finished product. One major saki-ika processor ranks the fraying qualities of various squid species as follows:

1. Japanese surume-ika
2. Murasaki-ika or aka-ika
3. New Zealand arrow squid
4. Argentine and Canadian Illex squids.

FIGURE 47

THE YIELD OF DRIED AND SEASONED HALF-DRIED SQUID PRODUCTS

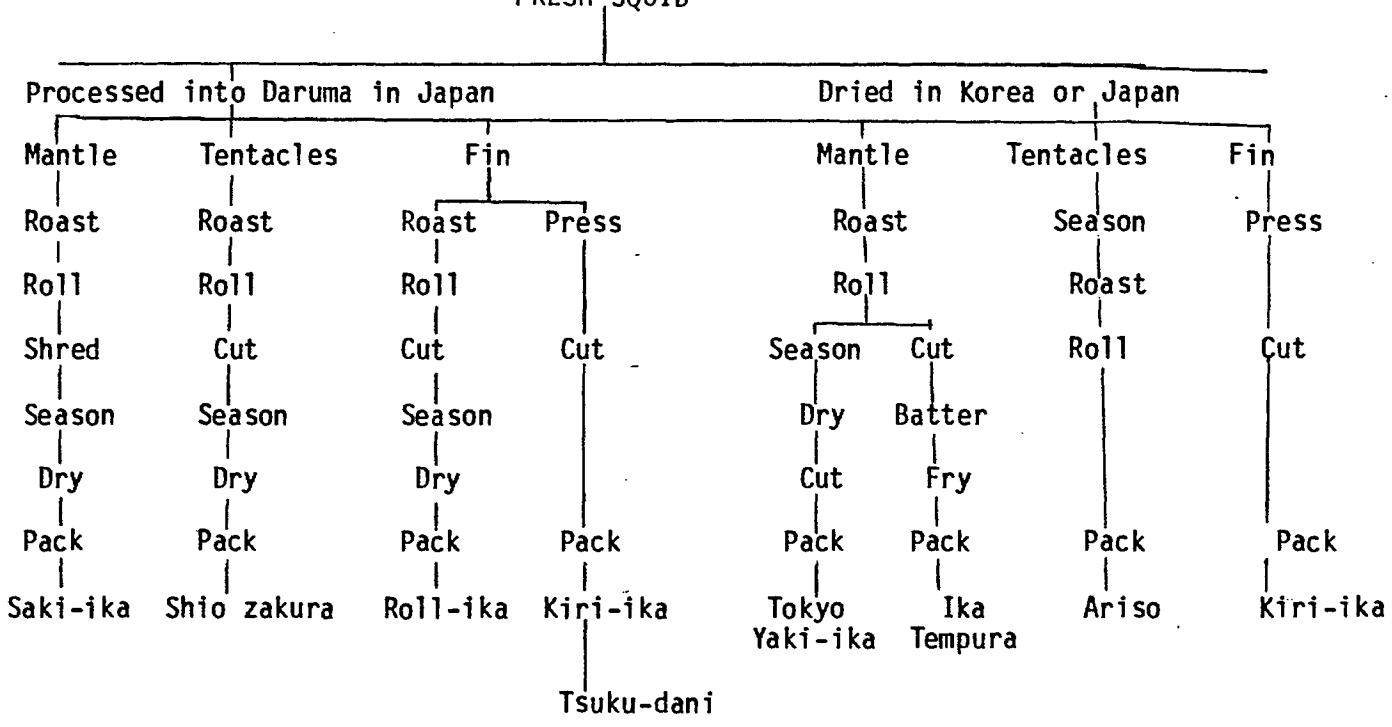


SOURCE: Squid Drying, Quality Assurance and Related Operations; October, 1979. Fisheries and Marine Service Technical Report No. 900.

FIGURE 48

USES OF DARUMA AND SURUME (Dried Squid)

(NATORI SHOKAI)



Smoked Products

Smoked squid products have been produced by various techniques but at the stage immediately prior to smoking the squid is in a form virtually identical to the daruma-type semi-processed products traded as material for saki-ika. The flavourings used vary according to the end use product and vary from processor to processor.

One manufacturer utilizes daruma, and tubes directly after the flavouring stage, for smoking. The flavoured body meat was hung on wires for 3 - 4 hours in a heated smoke chamber. Following this it was automatically sliced into rings (in the case of tubes) or chunks and strips or was shredded. It was then sorted and graded by hand before being placed in a machine like a concrete mixer where it was sprayed with alcohol or sorbic acid to preserve it and retard mould growth. The product was then packaged in plastic or cellophane for retail or in 10 kg cartons for bulk sale to wholesalers.

The recovery from this type of smoked product is said to average about 20% from the whole frozen form. Large sizes over 600 gm are preferred as the thicker flesh holds the smoked taste better.

Demand appears to be strong for soft-smoked products with a high moisture content (about 40%). Now that mould growth problems have been solved it is expected that production will increase.

Canned Squid

Japanese surume squid is canned in boiled forms and in a seasoned form, as follows:

i) Whole boiled squid

The legs, head and viscera are removed from the mantle cavity. The legs and mantle are washed and then heated at about 45°C in salt water (Bé 10°) for 15 minutes after which the skin may be readily removed. The peeled meats are boiled in another salt solution (Bé 3°) for 10 minutes. After this boiling the eyes are removed and the meat carefully washed and packed. The

legs are placed in the mantle cavity, and around three hundred grams of the meat is placed in a C-enamel lined, 1 pound, tall can, to which are added 40 gm of brine (Bé 4°) and 13 gm of a solution consisting of 8 gm of sodium glutamate and 2 gm of citric acid per litre of water. The packed cans are vacuum sealed and processed at 229.8°F, 6 pound pressure, for 85 minutes. After cooking the cans are rapidly cooled.

ii) Minced boiled squid

Initial preparation is the same as above. Peeled meats are ground in a chopper with a 1/2 to 1/3 inch mesh. The minced meat is packed into 3 pound tall cans and hot brine (Bé 2° - 3°) containing a small amount of butter or lard. The cans are processed at 232.4°F, 7 pound pressure, for 110 minutes.

iii) Seasoned squid

The peeled meat prepared as above is seasoned with a solution made up of 2 kg of "miso" (bean paste), 2.5 kg of sugar, 1 kg of salt, 25 litres of soy sauce and 10 litres of water. The legs are inserted inside the mantle cavity and around 300 gm of the meat is packed into a 1 pound, tall can together with 30 gm of the seasoning solution. The cans are vacuum sealed and processed for 60 minutes at 224.4°F, 4 pound pressure. Canadian Illex, smaller sizes, has proved to be most satisfactory for this product.

5 OTHER FOOD USES

The other main processed forms are grouped here in one section for convenience.

1. Combined Species Delicacies

Gourmet products have been developed which combine squid meat with such high value products as sea urchins or herring roes.

2. Kneaded Products ("Neri-seihin")

Before the "surimi" industry started to use large quantities of inexpensive Alaska pollock, quantities of cuttlefish (Sepia esculenta) and squid were used. Kneaded products made from squid meat, however, suffer from peculiarities in taste and odour.

3. Cured Fermented ("Tsukemono")

i) Pickled squid meat

The tentacles are separated from the mantle and the viscera is removed. The tantacles are cut into several chunks before being boiled together with the mantle for 30 minutes. They are then cooled rapidly and cut into small pieces. The pieces are placed in a barrel in a solution of acetic acid (500 qm) water (10 - 20 kg), and salt (500 gm) per 50 kg weight of squid meat. The resultant product is usually packed in small glass jars for distribution and sale.

ii) Cured in "koji"

The mantle is boiled, then cut into small pieces which are cured with salt and "koji" ("Koji" is substance formed by the growth of Aspergillus oryzae on steamed rice.) The salt and the "koji" are 20 - 30% of the squid meat weight. Salt increases the firmness of the meat and the flavour is developed by the protease of the "koji".

iii) Cured in bean paste ("miso-zuke") or "sake" lees ("kasu-zuke")

By similar processes squid meat is cured in pastes which impart flavour to the meat.

4. Salted

Only small quantities of salted squid are made on a commercial basis.

6 NON-FOOD USES

1. Bait

The main non-food use for squid is bait for distant water tuna operations. Small squid (150 - 200 gm) are used for tuna bait and reportedly return better prices from this use than if they were put to other purposes.

For bait use, regular block size (8.5kg), consistent size grading and neat packing are essential. The fishermen defrost a given number of cartons prior to fishing and need to have confidence that they are preparing the right number of squid. Inconsistent size grading can mean too many or too few squid defrosted. Neat layering is necessary so that the squid can be quickly and easily taken from the defrosted block.

Squid meat is also used as bait on cod long lines. Poor quality squid are used as food for yellowtail reared in fish farms.

Squid liver oil, fish solubles & other fertilizers

Visceral mass removed in the processing of fresh, frozen or dried squid is utilized to prepare squid oil, fish soluble and fertilizers.

The proteolytic action of squid visceral mass, especially of the liver which comprises the greater part of the visceral mass is very active. The visceral mass is put in a tank and autolyzed at 55°C for about 10 - 12 hours to liquefy completely. This liquefied visceral mass is then heated together with a small amount of added cold water. The resultant liquid is passed through a centrifuge system to separate out the oil. The water left from the oil separation is condensed by a vacuum evaporator to a predetermined concentration. This condensed water, or "fish soluble" is mixed with wheat bran, and the mixture is dried by means of a large rotary tube-type dryer. This mixture is used as animal feed.

A fertilizer known as "uro-kasu" can be produced from squid visceral mass also. The autolyzed and liquefied solution made from the squid visceral mass is led to a settling pond filled with sand. A sediment forms on the

surface of the sand and is sun dried. This dried matter (uro-kasu) is used as fertilizer after mixing with waste materials of tobacco drying. The chemical composition of this fertilizer is nitrogen 6.0%, potassium 2.5%, and phosphorus 1.0%.

The oil from squid liver can also be used for medicinal purposes.

APPENDIX V

MAJOR JAPANESE TRADING COMPANIES IMPORTING SQUID

1) Taito Seiko Co. Ltd.,
Imaasa Bldg,
1-21, Higashi Shimbashi 1-Chome
Minato-ku Tokyo 105
*51 Old Pennywell Rd. West
St. Johns.

2) Taiyo Fisheries Co. Ltd.,
1-2 Ohtemachi 1-Chome
Chiyoda-ku Tokyo 100,
*Taiyo Canada Ltd.
70 O'Leary Ave.
St. Johns.

3) Nippon Suisan Kaisha Ltd.,
6-2 Ohtemachi 2-Chome
Chiyoda-ku Tokyo 100,
*Toronto Dominion Bank Bldg.,
1791 Barrington St.,
Halifax

4) Nichiro Fisheries Co. Ltd.,
12-1 Yurakucho 1-Chome
Chiyoda-ku Tokyo 100
*C/O I.H. Mathers and Son Ltd.,
1525 Birmingham St.,
Halifax

5) Nippon Reizoi,
3-23 Misakicho 3-Chome
Chiyoda-ku Tokyo 101

6) Hanwa Co. Ltd.,
13-10, Tsukiji 1-Chome,
Chuo-ku Tokyo 104

7) Mitsubishi Corp.,
3-1 Marunouchi 2-Chome,
Chiyoda-ku Tokyo 100
*Mitsubishi Canada Ltd.,
Suite 1760
630 Dorchester Blvd. West
Montreal

8) Marubeni Corp.,
4-2 Ohtemachi 1-Chome
Chiyoda-ku Tokyo 100

9) Mitsui and Co. Ltd.,
2-1 Ohtemachi 1-Chome,
Chiyoda-Ku Tokyo 100.

10) Co-op Trade Japan Ltd.,
Seikyo Kaikan,
1-13 Sendagaya 4-Chome,
Shibuya-Ku Tokyo 151.

11) Daimaru Kogyo Kaisha Ltd.
10-9 Ginze 2-Chrome,
Chuo-Ku Tokyo 104.

12) Nichimen Co. Ltd.,
13-1 Kyobashi 1-Chome,
Chuo-Ku Tokyo 104.

13) Nichimo Co. Ltd.,
Nippon Bldg.,
6-2 Ohtemachi 2-Chrome,
Chiyoda-Ku Tokyo 100.

14) Eastern Products Co. Ltd.
Tokyo Kaijo Bldg.,
2-1 Marunouchi 1-Chome,
Chiyoda-Ku Tokyo.

15) Itoman and Co. Ltd.,
Sumitomo Seimei Aoyama Bldg.
1-30 Minami Aoyama 3-Chome
Minato-Ku Tokyo 107.

16) Suimitomo Corp.,
No. 2 Nishikicho Bldg.,
24-1 Kanda Nishiki-Cho 3-Chome,
Chiyoda-Ku Tokyo 100.

17) Tokyo Maruichi Shoji Co. Ltd.,
16-9 Uchikanda 2-Chome,
Chiyoda-Ku Tokyo 101.

18) Toyo Menka Kaisha Ltd.,
Iino Bldg.,
1-1 Uchisaiwai-Cho 2-Chome,
Chiyoda-Ku Tokyo 100

* Canadian Office

APPENDIX VI

MAJOR SQUID & CUTTLEFISH SPECIES

Recommended Japanese Name	Scientific Name	Other Japanese Names
KO-IKA-KA	SEPIIDAE	
1. Europe ko-ika	Sepia officinalis Linné	Waka-ika, monko-ika
2. Torafu ko-ika	Sepia pharaonis Ehrenberg	Monko-ika
3. Kaminari-ika	Sepia lycidas Gray	
4. Ami monko-ika	Sepia aculeala Férussac & d'orbigny	
5. Ko-ika	Sepia esculenta Hoyle	
6. Kobushime	Sepia latimanus Quoy & Gaimard	
7. Asia io ika	Sepia recurvirostris Steenstrup	
8. Australia ko-ika	Sepia apama Gray	
9. Yase ko-ika	Sepia bertheloli d'orbigny	
10. Usubeni ko-ika	Sepia lorigera Wulker	
11. Shiriyake-ika	Sepiella japonica Sasaki	
12. Minami-shiriyake-ika	Sepiella inermis Férussac & d'orbigny	
DANGO-IKA-KA	SEPIOLIDAE	
13. Mimi-ika	Euprymna morsei Verrill	
14. Bozu-ika	Rossia pacifica Berry	

Recommended Japanese Name	Scientific Name	Other Japanese Names
JINDO-IKA-KA	LOLIGINIDAE	
15. Jindo-ika	Loligo japonica Hoyle	
JINDO-IKA-KA	LOLIGINIDAE	
16. Hime Jindo-ika	Loligo Kobiensis Gray	
17. Asia jindo-ika	Loligo duvaucelii d'orbigny	
18. Surinamu jindo-ika	Loligo surinamensis Voss	
19. Hiraken saki-ika	Loligo chinensis Gray	
20. California yari-ika	Loligo opalescens Berry	
21. Europe coyari-ika	Loligo forbesi Steenstrup	
22. Europe yari-ika	Loligo vulgaris Lamarck	
23. Kansaki-ika	Loligo edulis edulis Hoyle	Mehikari-ika
24. Budo-ika	Loligo edulis budo Wakiya & Ishikawa	Shiro-ika
25. America kensaki-ika	Loligo pealei Lesueur	
26. America yari-ika	Loligo plei Blainville	
27. Yari-ika	Loligo bleeker i Keferstein	
28. Yase yari-ika	Loligo singhalensis Ortmann	
29. Aori-ika	Sepioteuthis lessoniana (Lesson)	Mizu-ika
30. New Zealand aori-ika	Sepioteuthis bilineata	

Recommended Japanese Name	Scientific Name	Other Japanese Names
31. America	Sepioteuthis sepioidea (Blainville)	
32. Australia	Sepioteuthis australis	
33. Togari-ika	Alloteuthis media Linné	
34. Panama nise-jindo-ika	Loliclopsis diomedeae (Hoyle)	
HOTARU-IKA MODOKI-KA	ENOPLOTEUTHIDAE	
35. Hotaru-ika	Watasenia scintillans (Berry)	
TSUME-IKA-KA	ONYCHOTEUTHIDAE	
36. Hon-tsume-ika	Onychoteuthis banksii (Leach)	
37. Tsume-ika	Onychoteuthis borealijaponicus Okada	
38. Hoso-tsume-ika	Ancistroteuthis lichtensteini (d'orbigny)	
39. Nyudo-ika	Moroteuthis robustus (Verrill)	
40. Minami nyudo-ika	Moroteuthis ingens Smith	
TAKAGI-IKA-KA	GONATIDAE	
41. Tako-ika	Gonatopsis borealis Sasaki	
42. Hokkai takagi-ika	Gonatus fabricii (Lichtenstein)	
43. Dosu-ika	Berryteuthis magister (Berry)	

Recommended Japanese Name	Scientific Name	Other Japanese Names
UROKO-IKA-KA	LEPIDOTEUTHIDAE	
44. Yawara-ika	Pholidoteuthis adami Voss	
DAIO-IKA-KA	ARCHITEUTHIDAE	
45. Daio-ika	Architeuthis japonica Pfeffer	
46. Daiko-ika	Architeuthis steenstrup	
AKA-IKA-KA	OMMASTREPHIDAE	
47. Canada illex	Illex illecebrosus (Lesueur)	Matsu-ika
48. Argentine illex	Illex argentinus (Lesueur)	Matsu-ika
49. Europe illex	Illex coindetii (Verany)	
50. America illex	Illex oxygonius Roper, Lu & Mangold	
51. Nise-illex	Todaropsis eblane (Ball)	
52. Yase-tobi-ika	Ornithoteuthis volatilis volatilis (Sasaki)	
53. Abura-ika	Nototodarus nipponicus Okutani & Uemura	
54. New Zealand surume-ika	Nototodarus sloani sloani (Gray)	
55. Philippines surume-ika	Nototadarus sloani philippinensis	
56. Surume-ika	Todarodes pacificus Steenstrup	Ma-ika
57. Europe surume-ika	Todarodes sagittatus sagittatus (Lamarck)	

Recommended Japanese Name	Scientific Name	Other Japanese Names
58. Suji-ika	Eucleoteuthis luminosa (Sasaki)	
59. Tobi-ika	Symplectoteuthis oualaniensis (Lesson)	
60. America	Dosidicus gigas (d'Orbigny)	
61. Aka-ika	Ommastrephes bartrami (Lesueur)	Murasaki-ika baka-ika
62. Nise-aka-	Ommastrephes pteropus (Steenstrup)	
63. Eurpoe aka-ika	Ommastrephes carole (Furtado)	
SODE-IKA-KA	THYSANOTEUTHIDAE	
64. Sode-ikaka	Thysanoteuthis rhombus	