Japan's Squid Fishing Industry

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Introduction

Dried-squid (surume) has been an item of commerce, ceremony, and diet in Japan for hundreds of years, and squid is caught and is a popular food throughout the island nation.

Immediately after World War II, food shortages, a surplus of labor, and the low capital investment required for squid jigging stimulated the rapid development of the fishery. In 1952 squid landings reached 646,730 tons and, at 15 percent of the total, became Japan's most abundant landing.

Until the mid-1960's most landings were dried and much of the product was exported to China. Since then domestic markets have been developed for a wide variety of fresh, frozen, and processed products and demand has increased.

The main cause of worldwide developments in squid fisheries within the past decade has been the inability of Japan's squid fisheries to continue to meet this demand from waters adjacent to Japan. The overseas extension of Japan's squid fisheries and the rise of foreign squid fisheries to supply Japan's markets attests to this. Today squid resources are depleted in Japan's waters and the nation's overseas squid fisheries are increasingly restricted. Consequently, Japan's squid imports are increasing and its squid fishing industry is actively seeking and participating in joint ventures overseas.

What opportunities does Japan's squid market offer the U.S. fishing industry? Unlike salmon and crab, the major U.S. exports to Japan, squid is a relatively low-value item and it is widely available in the waters of nations with fishing costs considerably lower than those of the United States. Korea, Thailand, and Taiwan have established squid fisheries, a quality product, and good access to Japan's markets, and many other nations are actively developing squid fisheries to compete for that market. Consequently, increases in supply may hold squid prices down (Rodgers, 1979).

Also, Japan prefers frozen to processed imports and this discourages processing and the investment opportunities it offers. Furthermore, Japan is more interested in joint ventures or other access to foreign fishing grounds than in merely purchasing squid, and some nations are more disposed to such arrangements than is the United States. Thus the United States faces severe competition, and it will be difficult to establish squid markets in Japan. The following discussion attempts to introduce Japan's squid fisheries and markets and to provide some background against which to evaluate strategies for developing the U.S. squid fishing industry.

The Fishery

Japan's domestic landings have been decreasing since reaching a record high of 773,777 tons in 1968, and although *Todarodes pacificus* (Steenstrup) predominated until 1970, the composition of the landings has changed markedly since then (Fig. 1). Depletion of the *T. pacificus* resource was influenced by oceanographic changes, but it is now widely attributed to overfishing.

Increased catches by Japanese boats overseas have characterized the past 10 years. In 1977 this figure reached about 18 percent of Japan's total squid landings of 490,000 tons and continues to rise. Squid imports have been increasing since initiated in 1971, and in 1978 achieved a record high of about 100,000 tons, or 10 percent of the volume of total fishery imports.

In 1978 over 85 percent of the landings in Japan's waters consisted of *T. pacificus* and *Ommastrephes bartrami* (LeSueur). *Loligo pealei* (LeSueur) and *Illex illecebrosus* (LeSueur) from the northwest Atlantic, *Illex argentinius* (Castellanos) from Argentine waters, *Nototodarus sloani gouldi* (McCoy) from Australia, and

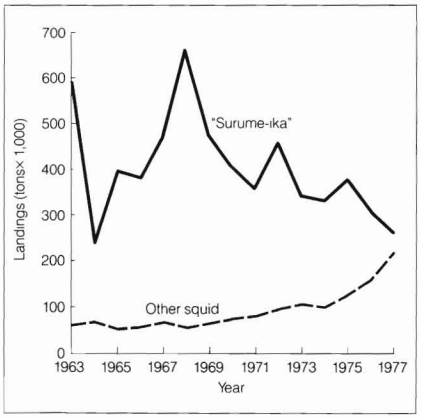

Figure 1.—Japan's squid landings, 1963-77. Solid line = "Surume-ika" (*Todarodes pacificus*, *Nototodarus sloani sloani*, etc.); dashes = other squid (*Ommastrephes bartrami*, *Loligo* spp., etc.).

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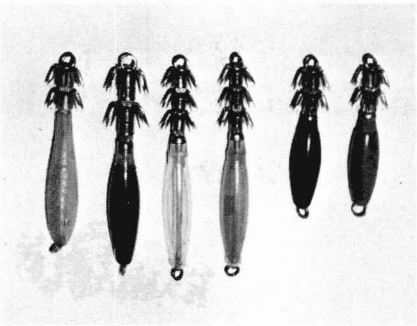
Nototodarus sloani sloani (Gray) from New Zealand constituted most of Japan's overseas landings. Imports were dominated by the same species with the exception of *O. bartrami*.

About 70 percent of Japan's squid landings are caught by jigging, a simple mechanized method which usually takes place at night when bright overhead lights attract the squid. Jigs, 6-cm lures with clusters of unbarbed hooks, are secured at 90-cm intervals on a monofilament line which is continuously lowered and raised with a jigging motion at depths of 30 m to more than 140 m. Squid, attacking the moving jigs, ensnare their tenacles on the hooks. The jigs shift to a horizontal position when reeled aboard, and thus the squid readily become disengaged.

The percentage of squid landed by jigging is declining; other fishing methods include use of drift gillnets, set nets, and bottom trawls. Most of Japan's squid fishing off North America, Argentina, and Africa, and some of that in home waters, is by trawlers. That off New Zealand is by a combination of trawlers and jigging boats. In 1979, jigging on a limited scale began off eastern Canada.

Trawling endangers both squid and other resources because it catches everything without discrimination and seems to damage small squid which escape through the mesh. Jigging catches only squid and exerts less pressure on the resource per unit of effort than does trawling. Therefore, as a resource management measure, the Canadian Government has reportedly considered encouraging the foreign boats fishing for squid within Canada's 200-mile zone to shift to jigging (Watanabe[1]).

Japanese squid jigging boats are divided into three classes: Small-scale, 1-30 ton; medium-scale, 30-100 ton; and large-scale, 100-500 ton. However, the Japanese system computes fishing boat tonnage at one-half to one-quarter of the value which would be assigned by standard classification



Typical Japanese squid jigs. Photo courtesy of the *Yamaha Fishery Journal*.

schemes. Most smaller boats are made of either wood or ferro-reinforced plastic while steel hulls predominate in those over 50 tons.

Since 1963, the proportion of landings made by jigging has changed markedly by size of boat. The percentage of landings by boats less than 3 tons and by 10-50 ton boats has decreased almost two-thirds and that of 3-10 ton boats has remained constant. The large-scale and 90-100 ton boats made less than 5 percent of the landings in 1963 and now account for over 50 percent of the total. These changes reflect the increase in the scale of the boats, the shift in the focus of the fishery from coastal to offshore waters, and the development of Japan's overseas jigging fisheries.

Of the approximately 30,000 small-scale boats which jig for squid, 86 percent also fish for other species. However, 42 percent of the medium-scale boats and all of the large-scale boats fish only for squid. The number of medium-scale boats has decreased to 2,300 in the past 6 years, but the number of 90-100 ton boats has increased. Of the latter, 646 or 77 percent are highly efficient, specially designed squid jigging boats. The number of large-scale boats has been fixed at 212 since 1973, but through license transfer their average size has increased annually. Most of these boats are former tuna long-liners, but recently several such boats have been designed and built specifically for squid jigging.

One of the most important pieces of equipment is the electric generator which, because of the high power demand of the squid-attracting lights, may have a capacity of as much as 300 kW on a 30-ton boat. However, many feel such bright lighting is unnecessary and wastes precious fuel. There are unenforced limits on the power of lighting, but gross violation is reportedly common. However, the Kudo Fisheries Cooperative Association in southern Hokkaido, the northernmost of Japan's main islands, has for 10 years limited its 10-ton boats to 15 kW, and this cooperative has one of the best landings and income records in the region.

Most boats over 90 tons and some of the smaller ones have freezing equipment on board. The 90-100 ton boats usually have a freezing capacity of 8-12 tons and the larger boats 10-17 tons per day, and an experienced crew must work a hard day plus overtime to freeze this amount. Virgin grounds with a limited number of boats could yield catches in excess of these quantities, in which case access to large-capacity shore-based freezing and storage facilities or other arrangements would have to be made. However, the catch per unit effort (CPUE) on the Japanese and New Zealand fishing grounds is not sufficient to make this a problem.

One of the 99-ton boats jigging experimentally off eastern Canada has been specially equipped with expanded freezing capacity. However, limited storage space on this size boat necessitates frequent trips to shore, thus reducing time on the fishing grounds and, in turn, efficiency.

The high costs of large-scale boats discourages their use by the coastal nation. Therefore a barge-mounted, highly automated freezing plant might be considered for use in conjunction with small- and medium-scale boats for the offshore fishery. Another application for a barge might be for preliminary processing at sea to avoid expensive land-based waste-water treatment and disposal problems. Some Japanese processors feel that this would require such a large barge and would entail so many logistical and other problems as to be unfeasible; however, one U.S. company is considering it.

[1]Hidenobu Watanabe, Managing Director, Ogura Fisheries Company, 2-7 Bandai Shima, Niigata-shi, Niigata-ken, Japan 950. Pers. commun.

Hokkaido has traditionally been a major focus of Japan's squid fishery, and the squid fishing industry is still centered in northern Japan. The Tsugaru Strait runs betweek Hokkaido and Aomori, the prefecture at the northern extremity of Honshu, Japan's main island, and connects the Pacific Ocean with the Sea of Japan. Strategic location on this waterway provides access to the major squid fishing grounds and is an important factor in the prominence of this area in the industry (Fig. 2). Hokkaido and Aomori, home of 38 percent of the medium-scale and 55 percent of the large-scale squid jigging boats, accounted for well over half of Japan's squid landings in 1978. Some 2,000 companies scattered throughout Japan process squid and it is the main product of 200 of these. However, production is concentrated in and around Hakodate, a port in southern Hokkaido; Hachinohe, Aomori's major port; and Ohata, an Aomori port on the Tsugaru Strait. Leading manufacturers of squid processing equipment and the major producer of automatic squid jigging machines are located in Hakodate and adjacent areas.

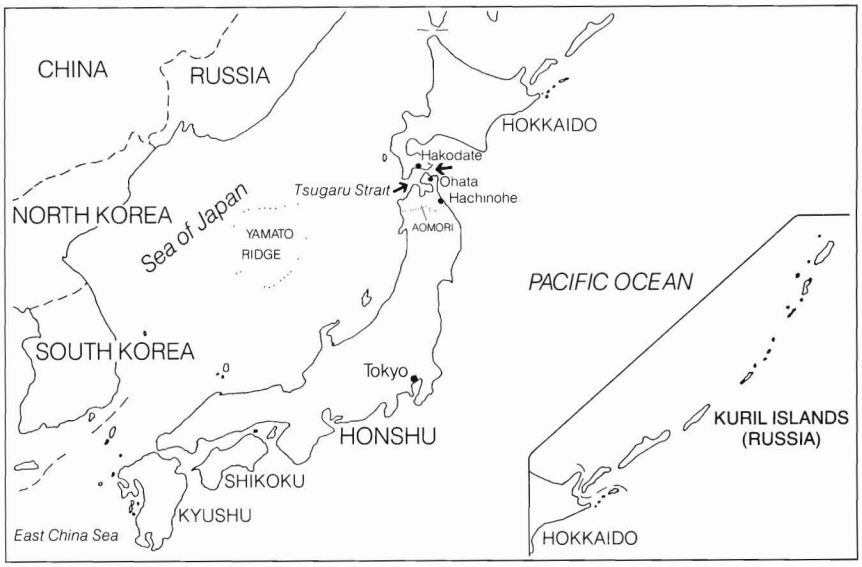


Figure 2.—Japan and adjacent areas.

The fishery for *T. pacificus* begins in May with fishing for small squid off western Kyushu and gradually moves northward as the growing squid swim toward the nutrient rich waters off northern and eastern Hokkaido. Areal differences in fishing seasons lead to interregional friction and competition as many boats from various parts of Japan follow the migrating squid. However, this practice is threatened by the difficulty of obtaining fuel supplies, especially for boats away from their home port.

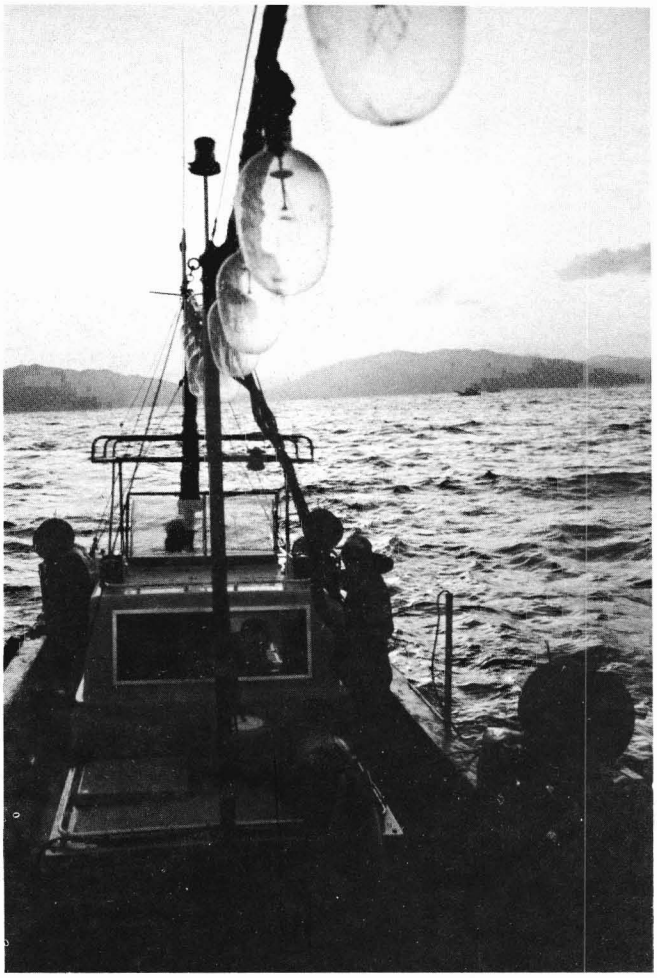
Initially, the squid jigging fishery was primarily a nearshore fishery by small boats, but with the automation of jigging and increases in the value of squid, boats were enlarged and fishing grounds extended. Until the late 1960's most of the larger boats fished in the Pacific southeast of Hokkaido. However, landings declined precipitously after 1968 and the focus of the offshore fishery shifted to the autumn subpopulation of *T. pacificus* in the central part of the Sea of Japan. In 1975 a jigging fishery for *O. bartrami* developed in the northwest Pacific east of Hokkaido and northeast of Honshu, and in 1978 this species accounted for almost half of the squid caught in Japan's waters.

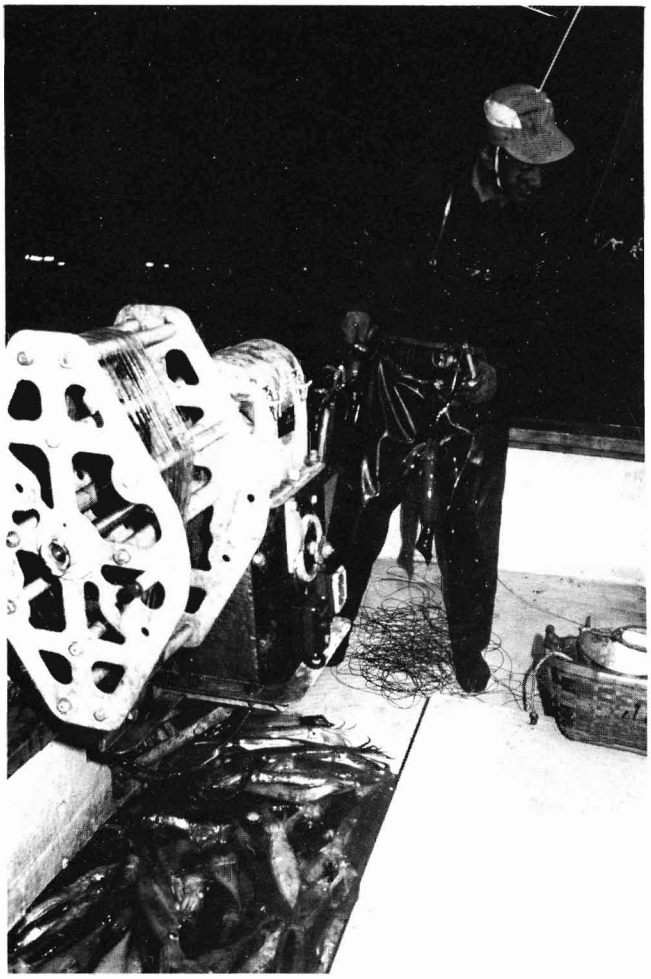
In 1978 a major drift gillnet fishery for *O. bartrami* rapidly developed in the northwest Pacific. Initially most of the participants were salmon drift gillnet boats after the close of their season, but many squid boats soon joined them. The efficient new method soon began to threaten the livelihood of the squid jigging boats and opposition mounted. Jigging interests argued that they have a prior claim to and are economically dependent upon the fishery. Furthermore, they maintain that drift gillnetting of squid is: 1) Too efficient; 2) threatens recruitment by catching spawning squid which are low in value anyway; 3) causes waste as much dead squid is lost from the net; and 4) is often used as a cover for illegal salmon fishing.

On 1 January 1979 the Fisheries Agency, a part of the Ministry of Agriculture, Forestry, and Fisheries, prohibited drift gillnet fishing for squid north of lat. 20°N and west of long. 170°E, and some squid jigging interests are now appealing for a total ban on the fishery. However, over half the violations within the restricted area have been by licensed squid jigging boats and many others are participating. This situation has arisen partially because most squid jigging boats are operating at a financial loss. The drift gillnet boats have catch rates about ten times that of the jigging boats and considerably lower fuel consumption (Anonymous, 1979a). However, drift gillnetting is applicable to only certain species of squid.

Today the medium-scale jigging boats concentrate on the offshore Sea of Japan fishing grounds during spring and summer and late in the season shift to the Pacific to fish for *O. bartrami*. Some of the large-scale boats fish for *T. pacificus* in the northern part of the Sea of Japan, primarily within the Soviet zone, but their main fishing grounds are in the Pacific.

Winter is an idle period for most jigging boats in Japan's waters. To extend the amount of time fishing during a year, over half the large-scale and many of the 90-100 ton boats fish squid in the Southern Hemisphere between December and May. During the 1979-80 season about 269 of these boats were to fish near New Zealand and Australia: 113 are licensed to fish in New Zealand waters, and the remainder were to be





Fishing, sorting, and drying squids. Photos courtesy of the *Yamaha Fishery Journal*.

involved in joint venture test fishing (Anonymous, 1979b). Other boats were to fish off Equador and Mexico.

Access to foreign fishing grounds has traditionally provided Japan's fishing industry with both landings and a means to reduce pressure on heavily utilized domestic waters. Consequently, it has permitted a disregard for management of the resource. However, by reducing such access, the establishment of 200-mile zones has encouraged an emerging awareness among Japanese fishermen and fisheries administrators of the need for fisheries resource management.

Japan's squid fisheries are characterized by intensive fishing effort and thus by severe competition and marginal economic efficiency in both the domestic and international arenas. In the northwest Pacific, resource depletion, excessive competition, restrictions on operations and winter inactivity make a large number of Japan's 95-500 ton jigging boats eager to gain access to other squid resources. The round trip from Japan to Australia is 45 days and that from Japan to Newfoundland is 90 days, yet Japanese boats still seek access to these grounds. Some optimistic boat-owners dream of being able to jig off northeastern North America between July and December and off Argentina between January and June.

Regulation

The squid jigging fishery was unregulated until 1969 because the resource was abundant, but with declining CPUE, competition among the large number of boats gradually became a problem. In 1969 the large-scale, and 4 years later the medium-scale, boats were licensed by the Ministry of Agriculture and Forestry (it became the Ministry of Agriculture, Forestry, and Fisheries in 1978). Thus boats over 30

tons are regulated by the Fisheries Agency. In 1972, to reduce competition and interference between the various classes of boats, waters adjacent to Japan, including most parts of the Sea of Japan, were closed to the large-scale boats and jigging by medium-scale boats was prohibited in certain coastal waters.

The following year boats fishing in New Zealand were licensed. Also in 1973, as a conservation measure during the spawning season, jigging by boats over 30 tons was prohibited in Japan during March and April.

Since 1973 most boats between 5 or 10 and 30 tons have come under the regulation of prefectural Sea Area Fisheries Adjustment Committees or of the respective prefectural governors; the jurisdiction of these entities encompasses the coastal waters of the individual prefectures. Thus, in a pattern familiar in Japan's fisheries, regulations gradually forced the larger boats offshore or overseas in order to reserve the coastal waters for the smaller boats.

Unlike the Regional Fisheries Councils in the United States, Sea Area Fisheries Adjustment committees have neither the political power nor the geographic extent to enable them to become an effective instrument of fisheries resource management for most free-swimming species. Their main purpose is to arbitrate disputes concerning use of the fishing grounds. In other words, the function of these committees, and, incidentally, that of the Fisheries Agency as well, seems to be ''fisheries management'' rather than ''fisheries resource management'' (Keen[2]).

[2]Keen, Elmer A. 1979. Fisheries resource management — an assessment of the Fisheries Conservation and Management Act of 1976. San Diego State Univ., Dep. Geogr., San Diego. Unpubl manuscr., 19 p.

Equitable, unified management of the *T. pacificus* stock is difficult to achieve because, as the squid migrate far along Japan's coasts and through the offshore waters of the Sea of Japan and the waters of South Korea, North Korea, and the Soviet Union, political and geographic division of both domestic and international jurisdiction strongly discourages if not precludes unified policy. Moreover, fishing seasons and the nature of the fishery vary from place to place.

Thus there is little incentive for resource management on the part of the individual prefectures because, while its cost would be borne by the individual prefecture alone, its benefits would be shared by all prefectures in common. Similarly, although Japan makes over 70 percent of the landings of the species, resource management incentive is diminished on the national level as well.

Differences in the degree of dependence of the various boats upon the fishery and the wide range in their size and capabilities further complicate regulation. Although fishing effort is excessive, the lack of alternative fisheries resources or other appropriate employment, plus the intractable questions of responsibility, cost, and equitability, challenge both the will and the attempt to reduce it. Thus fishing effort remains excessive, the resource is in a critical state, and the majority of the boats operate at marginal or submarginal levels.

Government fisheries policy has emphasized development and the maintenance of employment to the neglect of resource management, and an excessive number of boats is one of the major problems of the fishery today. The belief that it does not matter how much squid is caught, because, as it has a 1-year life cycle, it will die anyway, has influenced this policy. Thus the availability of low-interest government loans for investment in boats encouraged increases in fishing effort. The licensing system was imposed only after the number of boats had become excessive, and the ability to transfer licenses makes it even more difficult to reduce their number. Furthermore, the long experience as a "free" (unregulated) fishery persists in both regulation and practice. Thus, even after the decline in the resource had become evident, there was little conceptual motivation to stem the increase in fishing effort.

Associations representing the medium-scale and large-scale squid jigging boats have considerable political influence, and the sheer number of small-scale boats makes them a strong vested interest. Furthermore, the large amount of social and economic investment in the squid jigging fisheries compounds this inertia. Thus even if the government was resolved to reduce fishing effort, it would be an extremely difficult task. The Fisheries Agency thinks it advisable to reduce fishing effort, but refuses to subsidize it, both because great cost is involved and because such support is no more justifiable in the case of the squid fishery than it is in that of other fisheries suffering from excessive concentrations of fishing effort.

Severe restrictions establishing catch quotas, allowable gear, and fishing areas have forced reductions in Japanese fishing effort within the Soviet zone. The Soviet restrictions cause hardship to Japan's squid fleet, but are positive resource management measures. However, such policy is possible because it is imposed by an external entity which bears no responsibility to the affected fishermen and because, although the regulating authority owns the resource, it derives little benefit from the regulated fishery.

Consumption

After 1960, new processing techniques and the development of frozen seafood distribution chains stimulated the demand for squid and facilitated both wider product lines and new markets. Since 1973, increasing relative price has resulted in a 15 percent decrease in urban consumption of squid, but it is still higher than that of any other species. In 1977 per capita consumption of squid was roughly 4.65 kg (10.23 pounds) (round weight equivalent).

About 40 percent of the landings are marketed fresh or frozen, and "sashimi," finely-sliced uncooked squid eaten lightly dipped in soy sauce flavored with "wasabi" (Japanese horseradish), and "sushi," uncooked squid on bite-sized portions of vinegared-rice, are very popular items which constitute a major part of this demand. Fresh and frozen squid is often purchased for home consumption in various fried, roasted, broiled, uncooked, sauteed, and dressed forms.

A Japanese meal usually consists of numerous different dishes served so that each person at the table partakes of each dish in the amount and order that he or she wishes. Consequently, there is a demand for a wide variety of items which can be marketed in very small quantities and can be served either as sold or with little additional preparation. Many processed products meet this criterion and are frequently sold in packs as small as 50-100 g (1.8-3.5 ounces). In the past 10 years the number of processed squid products has increased greatly. Imported squid is used to produce many of these and some sources claim that such products are partially intended to "camouflage" the taste of the unfamiliar species.

Several products in addition to those already mentioned include: ika-moromi, squid pickled in miso, yeast, and rice or wheat; ika-mirin, squid pickled with red pepper and soy sauce; yaki-ika, roasted squid; ni-ika, boiled squid; koji-ika, fermented squid; Korean style shiokara, salt-fermented squid with ground hot-peppers; uncooked squid with herring or sea urchin roe; diced, boiled squid with kelp; ika-tsukudani, various boiled, soy sauce-flavored items; smoked squid; lemon flavored squid; ika-kamaboko and numerous other products made from squid-based fish-paste and other ingredients. Minor amounts of total landings are canned, salted, and smoked, and in 1977 about 14,000 tons was marketed as shiokara, salt-fermented squid. These are but a selection of the major products available, and there are many variations on, and combinations of, these items.

Almost 50 percent of total landings

are processed into a wide variety of dried and flavored forms. Surume (dried-squid) is produced by slitting the mantle, removing the organs and drying the mantle and tenacles either artifically or naturally. It is widely used for ceremonial purposes such as weddings and shinto festivals and as a raw material for further processing. Lightly roasted, manually torn into thin strips and served with a mayonnaise-soy sauce dip, it is hard and chewy like beef jerky and is often eaten with alcoholic beverages.

Saki-ika, which was developed in about 1960 to utilize the abundance of squid then available, is essentially a further processed version of surume. To produce it, squid is boiled to remove the skin and is then roasted, mechanically torn into thin strips, flavored, and sold ready-to-eat in plastic bags. Numerous variations on this product are available and have become very popular. In addition to being an accompaniment to alcoholic beverages, these products are widely used as general party foods and snack items, and much of their success lies in the convenience with which they can be marketed and consumed.

The Japanese have the highest per capita consumption of seafood in the world and a long tradition as a fish-eating people. Thus their fish handling, processing, and consumption patterns are highly refined and the average Japanese is aware of and insists upon degrees of difference in taste which the consumer in the United States does not even seem to recognize. Hence, the Japanese market has very sensitive color, flavor, and quality requirements. Furthermore, the Japanese are habituated to the flavor of local species. Squid is considered most delicious fresh and uncooked and is preferred served in this manner. Consequently, fresh *T. pacificus* and *Loligo* spp. bring the choice squid prices.

In mid-September 1979, fresh, high-quality squid sold on the wholesale Tokyo market for $5.00 per kg ($2.27 per pound). However, for several reasons United States or other foreign suppliers would receive a considerably lower price. Imported squid is neither fresh nor does it have the most preferred taste. Thus most of it is purchased as raw material for processing and therefore brings a relatively low price. Additionally, squid caught by trawl is slightly misshapen and below standard quality, and it often sells at 20 to 25 percent less than those caught by jigging. Depending on the species and other mentioned factors, the price may be further discounted. The tax on frozen squid is 15 percent, shipment from the West Coast costs $0.27 per kg ($0.12 per pound) and insurance, customs clearance, and middlemen add further costs.

Two examples may help to explain Japan's market. In Newfoundland in 1978, *Illex* squid, much of which was to be exported to Japan, sold for $0.176 per kg ($0.08 per pound) at the dock and $0.44 per kg ($0.20 per pound) to packers. The same squid later brought $1.27 per kg ($0.58 per pound) on the wholesale market in Japan. Considerable amounts of squid purchased in Argentina sold in Japan in the autumn of 1979 at a 29 percent discount for $1.12 per kg ($0.51 per pound).

The quality of the fresh and frozen product depends on careful handling from the moment the squid is caught until it is sold to the final consumer, and the Japanese market is far more demanding and rigorous than that of the United States. It took 3 years of negotiation, expensive mistakes, and mutual effort to establish effective squid handling practices in the export of Canadian *Illex* to Japan. Much training of and effort by U.S. fishermen and fish handlers will be required in order to meet the exacting Japanese standards. However, numerous trading, processing, and fish marketing companies, often working in combination, provide financial, technical, and supervisory assistance to a wide range of squid fisheries activities in other countries. Such efforts to insure a dependable supply of quality squid for Japan can provide markets, increase local prices, and stimulate fisheries development.

Certain sizes of squid are desirable, and shipments must be of similar-sized squid. Mixing of different sizes or slight deviations from the desired size lowers value, especially when selling on the fresh and frozen market. Furthermore, color, mantle-thickness, and degree of freshness determine value and potential use, thus both the type of squid and the stage of life when caught are important. High temperature rapidly spoils squid and rain discolors it, thus weather conditions at the time of harvest affect the quality and consequently the value of landings.

Differences between species traditionally landed in Japan and those domestic and foreign species which have recently come into prominence have forced changes in processing and consumption. Texture, flavor, size, and structure determine the potential uses of squid on both the fresh and processed markets. In the case of processing, it took expensive, major adjustments in technique and equipment to adapt saki-ika processing plants for the utilization of *O. bartrami*, and now that the transition has been effectively made, a large segment of the processor's market is dependent upon *O. bartrami* for raw material.

Similarly, horizontal alignment of mantle fiber is essential for such processing, but the *Illex* squid has vertical structure. *Illex* is also unsuitable for this type of processing because it does not yield the soft, fibrous texture and appearance which is required of the product. *Nototodarus sloani gouldi* from Australia has confronted marketing problems because of its large size, short tenacles, and poor yield when processed. Some of the Argentine *Illex* landed to date has been inferior because it was spawning or had spawned.

Squid consumption increases markedly in December and January in conjunction with Japan's protracted New Year's celebrations. Demand for surume is high at this time because of its traditional and ceremonial uses and, along with saki-ika and other items, because of the many parties and gatherings which occur during this festive period. Most of Japan's domestic landings are made between July and November and the amounts fluctuate widely between and within seasons and among the various species landed. Therefore, foreign suppliers must be

aware of the state and season of Japan's domestic market.

A distinctive feature of Japan's squid market is its ability to utilize both various kinds of squid and squid of different degrees of quality to produce a wide range of products. This enables successful use of several different sources of supply which yield both a variety of species and inconsistent quality. The highest quality product is sold on the retail or specialty market and a wide range of lower quality squid is processed. The very high unit price of one portion of a shipment enables the use of residual, low-quality squid for the production of low-value items. This helps explain why some imported squid sells at or below cost. However, the quality product usually brings a price sufficient to compensate for the extra handling costs involved.

Import Quota System

Squid imports were banned until 1970 because Japan's squid fisheries satisfied domestic demand until landings began to decline drastically after 1968. In 1971 a squid import quota system was established to permit limited imports. It protects domestic fishermen from foreign competition by regulating total squid supply in order to maintain a high market price.

Imported squid is classified into two categories and nine subcategories as follows: "Raw squid," which includes 1) live, 2) fresh, 3) frozen, 4) chilled, 5) salted, and 6) brine-soaked; and "dried-squid" which includes 7) dried, 8) smoked, and 9) prepared or preserved squid (canned, boiled, seasoned, salt-fermented, and preparations). Items 8 and 9 may be imported freely and import quotas have been established for items 1 through 7 (JETRO, 1979).

There are three categories of quotas, one each for processors, trading companies, and fisheries development. Their relative proportions vary each year and in 1979 were approximately 70, 25, and 5 percent, respectively. Although initially the quota was only for trading companies, the government later designated a quota specifically for processors in order to give them some control over supply and thus to preclude their domination by the trading companies. Thus the government controls both the amount and distribution of squid imports, and, to protect the business interests of those who deal in squid, it does not publicly disclose this information.

Altogether, 210 companies hold import quotas, sometimes as little as 10 tons apiece. However, major trading and fishing companies and their affiliates hold large blocks. As imports are limited, an import quota has value. Quota holders may realize this value through either control of that much of the market, sale (at about 5 percent of the sale price in Japan), or other transfer.

The Ministry of International Trade and Industry (MITI) administers the quota system and has the difficult and politically onerous task of establishing the amount of the quota. It attempts both to insure that the total supply will be sufficiently shy of demand to maintain a high value for domestic squid and simultaneously to recognize the interests of other participants in the market. The quota is set twice each year on the basis of estimated landings and may be adjusted subsequently as conditions warrant. The Trade Department of the Fisheries Agency's Marketing Division handles that proportion of the quota designated for processors and distributes it among their four national cooperative associations: One each for processors of dried-squid, delicacy foods, pre-cooked foods, and general fisheries products.

In administering the import quota system, the government weighs protection of the fishermen more heavily than the interests of the consumer. For example, in fiscal 1978, the estimated total domestic supply of squid, including the landings of Japanese-flag boats which fished overseas, was subtracted from estimated demand for the year and the import quota was set at less than 60 percent of the remainder (JETRO, 1979). Thus the planned deficiency in supply exceeded 40,000 tons, caused high domestic prices, and resulted in a decrease in squid consumption.

The United States and other countries on the one hand and processors and other groups in Japan on the other have been encouraging the Japanese Government to increase import quotas and to otherwise relax restrictions on squid imports. However, Japanese society traditionally protects established interests and the party in power derives political strength from a system of disproportionate representation in which the electorate in rural areas, including the fishing communities, plays an important part. Thus, although fishermen form but a small portion of the electorate, the present government is committed to protecting them and thus is reluctant to increase the quota enough to meet domestic demand. Hence, the import quota system supports a Japanese style modus vivendi whereby fishermen, processors, trading companies, and government administrators each participate in a regulated market. The consumer pays for the system and its administration through inflated squid prices and through taxes. Another factor in Japan which contributes to the high cost of squid and to the difficulty of changing the situation is the long, intricate network of middlemen between producer and consumer. Attempts to shorten and simplify distribution channels are meeting with limited success, but the impediments outlined above apply in this case as well.

Japan's import quota for squid has been increased for five reasons: 1) The *T. pacificus* stock has not recovered; 2) access to foreign squid resources has been restricted; 3) Japanese participation in joint venture squid fisheries overseas has increased; 4) the government favorably considers import quota requests from ventures involving Japanese boats; and 5) both foreign and domestic groups have been strongly pressuring the government to make such increases. However, the amount of the import quota is tied to domestic landings, and if landings increase sufficiently in the future, reductions in the quota could result.

In 1977, Japan's small import quota for dried squid was not all utilized, and therefore the amount was not increased the following year. The Fisheries

Agency's Trade Division reportedly would increase the quota and processors would purchase a competitively priced product if it were available.

Korea, Thailand, and Argentina and other countries export various dried squid products to Japan. Although dried squid produced in Newfoundland is exported to expanding markets in Hong Kong and Taiwan, exports to Japan have been limited, and in 1979 the poor dried-squid market in Japan foiled attempts to increase sales to Japan. However, various companies in Newfoundland are producing or planning to produce for the Japanese market, and several people on the U.S. East Coast are considering similar enterprises.

In 1978, Japan imported 118,000 tons of frozen and 4,000 tons of processed squid and cuttlefish. (Figures for the two items are frequently recorded together, thus individual values cannot readily be determined.) However, I estimate that about 80 percent of this amount is squid. The major exporters of frozen squid were Korea, Canada, Spain, Taiwan, and Argentina. United States squid exports to Japan totaled 1,909 tons and were almost exclusively frozen *Loligo opalescens* (Berry) from California. The United States ranked tenth among over 30 suppliers. Incidentally, in 1978, Japan caught 42 percent of the squid caught by foreign fishermen in the U.S. 200-mile zone, and 85 percent or 6,053 tons of Japan's catch off the U.S. East Coast was squid. Japan exported minor amounts of squid and squid products to the United States, mostly to supply ethnic markets in Hawaii and California.

Conclusion

Japan's international demand for squid is high and continues to grow, and traditional consumption patterns suggest that it might rise even further if some of the artificial price support mechanisms were removed. However, the combination of established suppliers, squid fisheries development by several nations which intend to export squid to Japan, and Japan's increasing overseas participation in joint venture squid fisheries make competition severe. Thus the extent and nature of international competition strongly recommend that development of a U.S. squid fishing industry should include the establishment of a domestic market to complement exports to Japan. If successful, this could insure sound development and future expansion of U.S. squid fisheries by providing accessible markets.

The preceding pages merely outline Japan's squid fishing industry, but plans to develop U.S. squid fisheries would benefit from detailed study of certain of its aspects. Several items might include: 1) Analysis of the advantages, disadvantages, and relative costs of each fishing method; 2) investigation of specific markets and marketing strategies for particular species of U.S. squid; and 3) evaluation of possible U.S.-Japan cooperative arrangements to develop the U.S. industry.

Joint enterprises with Japan might offer access to Japan's market and insure the cooperation of the Japanese Government; these two points are of paramount importance. Additionally, study of Japanese products and processing techniques might suggest ways to stimulate domestic demand in the United States.

Thus Japan's squid market offers an incentive to develop the U.S. squid fishing industry. Furthermore, over half of U.S. fisheries exports go to Japan and 88 percent of these are high-value items, but expansion of U.S. exports and, consequently, of the U.S. fishing industry depends upon exploitation of the underutilized species. Thus, attempts to export squid to Japan could yield valuable experience in marketing lower-value, underutilized species on our largest export market. This could later facilitate similar efforts with other available fisheries resources.

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