

Tuna markets and farming: Japan and Australia

By E Gasataya

As a result of changing market needs, tunas have assumed a position of major importance in commercial fisheries throughout the world. From 1977 to 1994, Japan was the overall top importer, getting 30% of the total world imports by value. Japan is also the top importer, and the single largest market, of fresh or chilled and frozen tunas. In 1994, almost US\$2,000 million was spent in tuna imports (Hassan 1997).

Tuna: important species

Tuna is one of 13 species of fish that belong to the tribe Thunnini within the family Scombridae. The commercially important tuna species are the following:

Common name	Scientific name	Size	Weight
Yellowfin	<i>Thunnus albacares</i>	160-200cm	40-130 kg
Bigeye	<i>Thunnus obesus</i>	90-180 cm	20-80 kg
Bluefin			
Northern bluefin	<i>Thunnus thynnus</i>	160-200 cm	40-130 kg
Southern bluefin	<i>Thunnus maccoyii</i>	160-200 cm	40-130 kg
Skipjack	<i>Katsuwonus pelamis</i>	48-80 cm	3-6 kg
Albacore	<i>Thunnus alalunga</i>	40-90 cm	4-15 kg

Source: ADB/INFOFISH. 1991 Global Industry Update: Tuna

Tuna size is important in the Japanese market because only larger fish have the deep color and high fat content desired for a good *sashimi* and *sushi*. Yellowfin and bigeye tunas have specific minimum market sizes -- 25-30 and 30-40 kg, respectively. Prices vary greatly and depend on many factors including supply and demand, amount of *sashimi* fish held in reserve, amount and type of arriving tuna, season and time of year, and quality of the fish.

Tuna products

Sashimi and *sushi* are Japan's major tuna products. *Sashimi* is more than "raw seafood" since it denotes an eating experience, which includes appearance, freshness, presentation, texture and flavor. *Sashimi* is popular during the summer months (June and July). Fishes with red meat, especially tuna and bonito, are commonly used for *sashimi*.

Sashimi is usually uncooked, chilled at 12°C, and served thinly sliced with shredded Japanese radish (*daikon*), a small amount of pungent green paste made from horseradish (*wasabi*), and soy sauce (*shoyu*). It is a popular treat for special occasions like New Year, public holidays, and other festivals.

Sushi is another delicacy made from raw seafood. *Sushi* means snack made with rice (*sushi-meshi*) seasoned with vinegar and salt, and sugar. There are many types of *sushi* depend-

ing on the way they are made. There are *makizushi* (raw seafood or pickled vegetable rolled up in a cylinder of rice, wrapped in a dark-green seaweed); *nigiri-zushi* (a ball of rice with a topping of raw seafood); *chirashi-zushi* (raw seafood, rice, and vegetables tossed together); and *chakin-zushi* (raw seafood wrapped in omelette and tied with a thin strip of seaweed).

Sushi is usually served as a complete meal at the counter in restaurants (*sushi-ya*), and often comprises a "set" of different kinds of *sushi* (such as *nigiri-zushi* and *maki-zushi*) served with green tea, grated ginger, and a "special" soy sauce made of closely-guarded recipe.

The main tuna species used for these products are the northern bluefin, southern bluefin, bigeye, and yellowfin. The preference of this species varies from area to area. In Tokyo for example, the bluefins are generally considered superior to bigeye and yellowfin while Osaka and Nagoya prefers yellowfin.

Other than *sashimi* and *sushi*, a new, processed product called "Negitoro" has been developed. This is bigeye or yellowfin tuna meat pasted with vegetable oil. Other products are the "Toro-Katsuo" (*Toro*-skipjack) and "Toro-Bin" (*Toro*-albacore); these are new names for fatty skipjack and albacore that used to be eaten only at certain localities in Japan. The above three are good examples of marketing success.

The tuna market is expanding. This is attributed to countries like Taiwan and China that have large numbers of fishing vessels and that have changed their operations to land fresh tuna. In addition, the distribution, transportation and retail sectors have become more efficient, playing a central role in selling huge quantities of fresh tuna in retail and as bargain or brand products. Katsuo (1995) also noted that the Japanese market has become diversified and segmented. Because of this, imports of low-priced tuna products would increase.

Although most of the tuna is landed by commercial fisheries (nearly 300,000 tons in 1994), aquaculture has started in Australia and Japan with some success.

Tuna farming in Australia

One of the most successful companies in tuna farming in 1996 was MG Kailis, one of Australia's largest and most diversified fishing company. The company is well known for its involvement in the pearl industry in western Australia.

MG Kailis established the tuna farm off Boston Bay. The 30 ha site is situated in more than 20 m deep water. The company started with two pens -- both second hand, 40 m in diameter, double-ring Polar-Cirkel design. The next season, another pen was ordered, this time a single ring design. The pens were used for both towing and grow-out culture. The company wanted the

The pompano



By **MB Surtida**

The pompano *Trachinotus blochii* is a high-value fish by virtue of its tasty meat and appealing appearance. Fry production was started in 1989 in Taiwan. Since then, culture of pompano has been carried out continuously and profitably not only in Taiwan but in China and Singapore too. In the Philippines, the culture of pompano is not popular. Although literature points to the usual aquaculture management, no commercial operation is known, except for one corporation that has recently started to test its market after producing several crops for export with fry imported from Taiwan. This is not surprising because catch from the wild finds its way to the domestic market, thus its culture and market potential is virtually unexplored. Besides, its availability in the local market for everyday use does not yet label pompano as exclusively high-value as in other countries. This makes pompano culture a lucrative possibility especially when export is considered.

The following culture method is described from literature based in Taiwan as actual culture in the Philippines is not documented.

Pompano is highly valued in Hong Kong, Singapore, and Taiwan. It is abundant in the Philippines from wild catch. Hatchery and growout methods have now been developed in Singapore and Taiwan because of the high demand in Asian markets. In Philippine markets, it sells for more than P120 per kg

In 20-30 days, fry attains a total body length 2.5 cm that can be stocked in grow-out ponds, and in 7-12 months, attain market size of 400-600 g. Fry produced during summer are stocked directly into ponds but those produced in winter are stocked in the nursery for overwintering. After hatchery stage, grading is done to avoid growth disparity and cannibalistic behavior. Custom-sized sinking dry pellets are fed throughout the culture period because the pompano's pharynx is small and its feeding behavior is voracious. Although chopped trash fish can be given, it has been found that it causes increased growth difference among individual fish. Feeds can be made available to the fish by an automatic feeder one hour in the morning and one hour before sunset. Feed conversion ratio is 1.6-2.0:1.

Stocking density is 2-3 fish per m² and production is 10-15 tons per ha per crop. Pompano is euryhaline and may be cultured in salinities of 3-33 ppt. Fish grow fast in salinities below 20 ppt and poorly in full seawater. Pompano are not tolerant of low temperature. Minimum water temperature for survival is 14°C and when temperature drops for 2 days, mortality occurs.

The tiger shrimp *Penaeus monodon* has been found to be an effective water quality stabilizer in pompano ponds. Pompano ponds can be stocked with 60,000 tiger shrimp per ha because leftover feeds can be efficiently consumed, harvested with a trap net and becomes an additional aquaculture product 3-4 months after stocking.

(From a conference proceedings; 8-12 Aug 1994; Honolulu)

pens in a standard size to allow easy management.

The Badinotti mesh netting is used as culture and predator control nets, and has 22 cm mesh size. The nets are changed from black to white every year. The net is hung from the ring and can reach up to 17-18 m deep at its center.

The tuna are fed 25 kg blocks of frozen feed in the morning and fresh feed in the afternoon. Grow-out culture is 4-6 months.

The preferred market size is in excess of 30 kg with a fat score of at least 25%. The fish are taken by handlines and killed using a wire threaded up to the spinal column to destroy the nerves ("reaming"). Tuna are then gutted, and placed in an ice bath.

About 200 fish are harvested each day. Tuna are transported to the packaging facility, where they are packed in fresh ice. To

maintain a low core temperature, bags of ice are also put into the gill cavity and the gut. Then, they are placed in polystyrene boxes, sealed, labeled and trucked for an air freight to Japan.

MG Kailis attributed their success to the support of local residents.

Tuna mariculture in Japan

In Japan, two companies -- Maruha and Nihon Haigo Shiryou -- have succeeded in spawning and hatching the tuna in captivity. Maruha has started their breeding experiments since 1986, and they succeeded in June 1991. More than 3.5 million eggs were obtained in 1992. They also succeeded in rearing tuna eggs for

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such as salt-water crocodiles. With the influx of wild skins diminishing due to depleted numbers and protective legislation, the market for farmed skins is expected to be relatively strong in the future.

Japan and France purchase approximately 80% of the crocodilian skins marketed annually. The rest are purchased by Singapore, USA, West Germany and United Kingdom (listed in descending order). France dominates the African and American market while Japan predominates in Southeast Asia. Philippines, on the other hand, has long been exporting reptile and aquatic animal skins mostly to Japan.

Processed crocodile meat is a delicacy in some countries. In the United States, people are eating dishes like cojambalaya, 'gator steak, and croco-spiced Cajun. Crocodile meat tastes like chicken meat if properly cooked. Its meat is tender, juicy and deliciously good even if it's 18 or 80 years old. Its meat is also good for people with Asthma, according to some Chinese traditions. Soup made from the reptile's penis is believed to be an aphrodisiac. The meat can also be canned for export to Hong Kong, Japan and other Asian and European countries. Crocodile meat pegs at \$20 per kilo in the international market.

Oil derived from its flesh also has a big market abroad. The teeth, head and bones of crocodile are turned into jewelry, unique souvenir items or decorative products. The bones can also be processed into animal feed.

The international trade in crocodiles and crocodile products is controlled by the IUCN (International Union for the Conservation of Nature) through CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna). The IUCN encourages sustainable use of crocodiles for skins and meat production as it is a legitimate conservation tool provided the use is sustainable and it creates commercial or other incentives to con-

serve both the crocodiles and the wetland habitats they occupy.

Tourism is another aspect of this reptile's marketing. Crocodilians are interesting animals and many farms are open to the general public who pay to view these "ferocious" animals and their tiny hatchlings in clean, natural surroundings. Many farms capitalize on this potential.

On another development, a recent news report revealed that the Department of Environment and Natural Resources (DENR) has proposed the use of crocodiles for industrial purposes. They can serve as efficient cleaners of big farms by eating the dead animals, thus eliminating the use of incinerators. This proposal (the "Adopt a Crocodile Program") came with the implementation of the Clean-Air Act where incinerators would be phased out within a three-year period.

Indeed, crocodile farming is gaining popularity. Thanks to current captive-breeding programs, crocodiles are safe from extinction. But as with other endangered species, protection of the crocodiles' natural habitats is still the best course in the long run, since these lakes, rivers, and marshes are of critical importance to the stability of watersheds and marine fisheries.

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150 days, with the eggs weighing up to 50 g. In 1993, they obtained 100 million eggs and were able to rear 250 immature fish offshore. However, a storm hit their site; about half survived but later died. The young tuna were known to have grown to 1 kg.

The technology to rear wild-caught fingerlings has been successful to some extent. Tuna mariculture will be practical if the supply of farmed fingerlings will become stable. Fingerling size for stocking in offshore cages is 10-20 cm.

On the other hand, Japan's Fisheries Agency since 1993 has spent Y1.2 billion in establishing bluefin tuna parent fish rearing and spawning facility in Amami Oshima. The project has been rearing 200 yearlings for breeding stock.

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