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Government promotes shellfish culture in Turkey

Sunday, 1 March 2009

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Considerable development potential for Mediterranean mussels



Several systems have been used to culture mussels in the Aegean Sea. The main issue for mussel aquaculture in Turkey is insufficient

local consumer demand, which forces producers to export their products.

Turkey has a coastline of 8,333 km and is surrounded by the Black Sea on the north, the Mediterranean on the south and the Aegean Sea on the west. In the northwest lies an important inland sea, the Sea of Marmara, between the straits of the Dardanelles and the Bosphorus, important waterways that connect the Black Sea with the rest of the world.

Large quantities of mollusks are grown in Turkish waters, but the extensive coastline is not yet effectively used for bivalve mollusk culture. People who live near the sea eat only a few species, and much production is exported abroad.

Production

Shellfish production is largely based on natural stock collection. The most important species are clams such as *Venus (Chamelea) gallina* and *Ruditapes decussatus*, which are collected from intertidal areas, and *Rapana* species veined whelk. Total bivalve production (wild and farmed) has been somewhat unstable since the mid-1990s (Table 1).

Lok, Total shellfish fishery production, Table 1

Year	Bivalves Oysters	Bivalves Mussels	Bivalves Clams	Bivalves Scallops	Gastropods Veined Whelk	Total Bivalve	Total Shellfish
1995	1,836	6,042	11,864	23	1,198	19,765	20,963
1996	1,140	3,500	10,925	52	2,447	15,617	18,064
1997	1,495	6,450	7,150	95	2,020	15,190	17,210
1998	1,050	3,880	3,550	50	4,000	8,530	8,530
1999	840	1,800	3,585	68	3,638	6,293	9,931
2,000	150	1,200	10,000	570	2,150	11,920	14,070
2001	10	1,500	7,500	150	2,650	9,160	11,810
2002	70	5,000	10,000	470	6,241	15,450	21,780
2003	120	8,915	19,700	1,300	5,500	30,035	35,535
2004	130	5,734	16,899	1,576	14,034	24,339	38,373
2005	105	12,362	10,847	259	12,600	23,573	36,173
2006	31	9,234	49,610	30	11,613	58,905	70,518
2007	31	27	48,622	–	13,791	48,680	62,471

Table 1. Total shellfish fishery production (metric tons) in Turkey, 1995-2007.

The latest statistics on shellfish production revealed a total shellfish production of 63,570 metric tons (MT) in 2007. Of the total 2007 harvest of 66,706 MT of mollusks (including the cephalopods octopus, squid and cuttlefish), about 70.0 percent was striped Venus clams. Cephalopod production made up only 4.1 percent of the total mollusk fisheries in 2007.

The principal species collected along Turkish coasts on a regular basis are the bivalve striped clam, *V. gallina*; Mediterranean mussel, *Mytilus galloprovincialis*; European flat oyster, *Ostrea edulis*; carpet shell clam, *Ruditapes decussates*; Manila clam, *Ruditapes philippinarum*; and truncate donax, *Donax trunculus*. Veined whelk, *Rapana venosa*, is the main gastropod species.

Although there have been several scientific studies on bivalve culture in the Aegean Sea, Marmara Sea and Black Sea, commercial activities are developing slowly. Only two bivalve farms are presently operating in Turkey. They use natural waters and culture only the Mediterranean mussel.



In Izmir, clusters of mussels cling to lines suspended from rafts.

Mussel culture

Shellfish farming in Turkey began in the early 1990s with Mediterranean mussel production at a farm in the Dardanelles region on the Marmara Sea. This raft culture operation used two 20- x 20-m and 12- x 12-m rafts with 1,000 and 250 12-meter ropes, respectively. The farmers collected the mussel spat from adjacent waters. Unfortunately, this farm was active for only a few years.

A second farm established in the Ayvalik region of the Aegean Sea 1996-1998 used the “bouchot” bag netting culture technique. The farmers used 4- to 5-cm mussels under market size for three to five months of grow-out to a market size of 7 cm. After this farm closed, no farm since has used the bouchot technique in the country. This farm’s bivalve depuration units are still operating, however.

A farm that started mussel production using raft and long line culture systems in Mersin Bay in 2000 is still active, with a production capacity of 1,000 MT/year. The farm has 42, 6- x 6-meter rafts with 150 ropes on each raft.

The relatively simple long line culture system consists of a series of buoyed horizontal lines from which an extensive series of vertical substrates are hung. The horizontal lines are approximately 200 meters long, with 30-liter air-filled plastic drums attached at intervals for flotation. Each horizontal line is securely anchored at each end using suitable anchoring systems. The distance between horizontal lines is generally about 3 meters.

The vertical substrates are spaced at intervals of approximately 50 cm along the horizontal lines. The length of the verticals is standardized at 4 to 5 meters. Twelve vertical substrates are generally hung between each of the flotation drums.

The most recent farm was established in the Marmara Sea for culture of mussels and oysters using long line systems.

Natural spat

In the existing pilot culture operations, all mussel spat is collected naturally directly on the long line systems. The peak period for larval settlement for this area is late fall and early winter. Water depths in the region of these basins are generally less than 20 meters.

Mussels with ripe gonads can be found throughout the year, but the major spawning seasons occur in early spring and late autumn in the Aegean Sea. Mussel attachment is typically 5,000 to 10,000 spat per meter, but in some years exceeds 30,000 spat per meter. Spat of 10-mm length reach 50 to 55 mm in the Mersin Bay and Aegean Sea.



Wild-collected carpet shell clams are grown out in shallow lagoon areas of the Aegean Sea. The clams are harvested by shovel and separated from bottom material in sieves.

Clam culture

Wild-collected *R. decussates* clams under 22 mm can be extensively cultured to market size in six to eight months. This activity is typical in lagoon areas in Izmir on the Aegean Sea and Çanakkale on the Dardanelles. Culture sites are shallow waters or lagoon areas with appropriate bottoms for clam growth. They do not receive any special preparation before juvenile clams are "planted" and allowed to grow. When ready, they are harvested using shovels.

Sanitation

Turkish sea waters reportedly have no serious levels of pollution, and no significant sickness from shellfish poisoning has been recorded in the country. But sanitation and quality control programs are necessary due to the feeding mode of these organisms. Bivalves are filter feeders that can concentrate and accumulate undesirable compounds.

Naturally harvested bivalve species sometimes need to be processed by depuration. Turkey currently has 10 depuration plants. They mainly use filtered and ultraviolet-sterilized seawater for one or two days of depuration. Some plants simply use clean seawater.

Marketing, prices

Except for striped Venus clams, which are canned or frozen, almost all bivalve species produced are exported live or fresh to Italy, Spain, France and Greece. Frozen rapa whelk meat is exported to Asia, including Japan and Taiwan.

Locally, most shellfish products are consumed cooked at coastal and tourist areas. Unlike finfish, mollusks have generally not gained wide popularity among people in Turkey, which forces mussel producers to export their products. Mussels are typically consumed as fried or cooked with rice.

Bivalve prices are relatively low, determined by free market demand and not regulated by the government. There is considerable fluctuation in prices due to exports, local supply and seasonal availability fluctuations. Table 2 shows the average prices of some species.

Lok, Average prices of locally produced shellfish, Table 1

Species	Prices (U.S. \$)
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Carpet clams	\$5.00/kg
Manila clams	\$2.00/kg
Mussels	\$5.00/10-kg bag
Truncate donax	\$2.00/kg
Smooth scallops	\$2.50/kg
Mediterranean scallops	\$1.00/4 scallops
Rapa whelk	\$1.00/kg
Striped Venus clams	\$1.00/4 kg

Table 2. Average prices of locally produced shellfish in 2008.

Development needed

Since it is recognized that the mollusk industry in Turkey has considerable development potential, there should be more collective research and investment for the shellfish species in commercial aquaculture. The Turkish government is trying to promote sea farming and has recommended the following:

- The introduction and adaptation of culture technologies from countries with more-established culture traditions.
- Increases in research on export markets to enhance valuable foreign exchange and encourage entrepreneurs.
- Increased local consumption through more promotion and marketing.
- Production of high-quality shellfish backed by sampling and monitoring of pollutants and suitable site locations.
- Setting up research programs to monitor and interpret growth, mortality and condition data for mollusks.
- Reorganization of the statistical data collection on bivalve fisheries and culture in Turkey. The author believes that actual shellfish production is higher than stated in available statistical information.

For Turkey's mollusk culture industry to expand, culture areas must expand, and natural stocks must be protected to ensure a reliable supply of seed. In addition, artificial propagation techniques, as well as water pollution control measurements are two major topics which are receiving considerable attention.

(Editor's Note: This article was originally published in the March/April 2009 print edition of the Global Aquaculture Advocate.)

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8/22/2019

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