Tilapia Aquaculture In Saudi Arabia

Farming With Seaweed May Improve Economic, Environmental Sustainability

A Ministry of Agriculture project is raising tilapia in full-strength seawater in a system where seaweeds absorb nutrients from the fish effluent to allow water reuse.

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Summary:
Saudi Arabia has a growing aquaculture industry that farms mainly tilapia, but also shrimp, grouper, sea bream, rabbit fish and mullet. Although aquaculture is a major source of supply for fresh fish, it has not grown fast enough to meet the country's growing demand. The use of multitrophic systems containing tilapia and seaweed could improve both economic and environmental sustainability. Rearing tilapia in highly saline waters would open further potential for Saudi fish farmers.

Saudi Arabia occupies 80% of the area of the Arabian Peninsula and is bordered by the Red Sea on the west and the Arabian Gulf, which is located between Iran and the Arabian Peninsula on the east. Although its aquaculture production is still smaller than that of the country's wild-capture fisheries, output has grown substantially from 2,696 mt in 1995 to 22,253 mt in 2008 – providing product with a value of U.S. $229 million. This volume represented about 24% of fish production in the kingdom.

Aquaculture Development

In 2001, there were 149 fish farms. Almost half of their 8,200-mt production was achieved by freshwater fish farms, most of which raised tilapia. Marine aquaculture ponds, particularly shrimp farms on the Red Sea coast in the region of Jizan and Tihama, accounted for the rest of the aquaculture production.

Among the marine fish species that have entered commercial production or are in the pilot phase include grouper, *Epinephelus coioides;* sea bream, *Sparus auratus;* net or rabbit fish, *Siganus caniculatus*; and mullet, *Mugilidae* species. There is also interest in the culture of lobsters, mollusks, seaweed and ornamental fish.

Rising Demand

Although aquaculture is seen as a major source of supply for fresh fish, farmed production has not grown fast enough to meet the growing demand. Therefore, Saudi Arabia will continue to be increasingly dependent on the importation of fishery products to meet its citizens' needs.

The average annual per-capita consumption of fish in the kingdom is 8 kg, while the World Health Organization recommends that people consume 25 kg/year. The gap between locally produced seafood from fisheries and aquaculture and even the small Saudi per-capita demand is still expanding from population growth and slow growth in fisheries landings. Fish and shrimp farming occupy an important position in ensuring seafood protein and achieving self-sufficiency in supplying seafood.

Table 1 shows the total Nile tilapia production for each region in Saudi Arabia for 2006 through 2008. Riyadh has been the most important region for freshwater tilapia, followed by Mecca, Qasim, Eastern Region and Tabuk.

Most tilapia farms in Saudi Arabia are private companies. They can reduce production if the economic returns look

Table 1. Tilapia production in Saudi Arabia, 2006 to 2008.

Location	Tilapia Production (mt)		
	2006	2007	2008
Riyadh	1,828	1,916	1,816
Mecca	722	627	433
Qassim	691	917	1,148
Eastern Region	160	30	0
Tabuk	24	10	0
Hail	0	19	16
	3,425	3,519	3,443

unprofitable. In addition, tilapia production is not considered important for a country which depends largely on oil production. Similar to the United States, Saudi Arabia is still considered an importing country for tilapia and most fish species.

Tilapia, Seaweed System

At the Ministry of Agriculture's Fish Farming Center near Jeddah, *Oreochromis spiluris* are reared in full-strength seawater with 42-ppt salinity from a seashore well. The fish are used in an integrated multitrophic aquaculture system utilizing the fish effluent to fertilize *Ulva* and *Gracilaria* seaweed, which in turn absorb the nitrogen, phosphorus, carbon dioxide and micronutrients from the water. This allows the water to be reused for aquaculture or discharged to the environment without detrimental impacts.

This work is conducted by a team from King Abdulaziz City of Science and Technology and the Ministry of Agriculture Fish Farm Center with expectations of distributing the technology to fish and shrimp operations in Saudi Arabia to improve both economic and environmental sustainability.

Perspectives

Tilapia reared sustainably in highly saline waters would open a huge new potential for Saudi fish farmers. The long seacoasts with moderate temperatures could support substantial new production. Polyculture with shrimp would also offer potential advantages through integration with the large shrimp farms on the Red Sea coast.

Saudi Arabia is poised to substantially increase tilapia production utilizing sustainable integrated farming in both freshwater and marine systems. In addition to Saudi consumers who are looking for additional supplies of high-quality fish, many of the immigrant contract workers in Saudi Arabia and the Gulf states have high traditional regard for tilapia and seaweed, and are important consumers of tilapia produced in Asia. Domestic production of tilapia would appear to benefit all, reducing transportation and retail costs, and providing additional economic diversification within Saudi Arabia.

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