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Reducing overgrazing by sea urchins by market development

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Abstract: Overgrazing by sea urchins has turned algal beds barren on many coasts of Japan. When sea urchins are removed, the algal beds recover. However, There are problems with the importation of cheaper sea urchins from overseas and labor shortage work against the removal of sea urchins by domestic fishermen. On the other hand, a local market for the excess sea urchins could be developed to expand consumption. Problems remain in increasing the catch of the sea urchins and selling them rapidly, but fishermen producers could increase both the catch and markets gradually.

Key words: economic approach, imports, local production for local consumption, sea urchin, urchin barren

Introduction

The world's main sea urchin producing countries are Chile, Japan, the United States, Russia, China (mainly by culture), and Canada (FAO-Production, 2000-2006). The main exporting countries are Chile, Canada, the United States, and Korea (FAO-Commodities, 2000-2006). Japan is the largest importer and consumer of sea urchins (FAO-Commodities, 2000-2006).

In the ecological view points, sea urchins are the important herbivores which determine the structure of seaweed communities. Over populational sea urchins bring about barrens and an increase of worthlessly thin sea urchins after depleting the available seaweeds. Moreover, the denudation by sea urchins resulted in the loss of breeding or nursery beds for fish and shellfish.

The removal of sea urchins allows the seaweed beds to recover, but commercial productivity of sea urchins remains low because fishermen have to improve the thin gonads (roes) when collected from urchin barrens. The situation is ironical: an excess of sea urchins is damaging the fishing grounds so that fishermen expected the decrease of the population, while buyers import sea urchins from overseas. Why the domestic sea urchins cannot be collected and eaten?

This author examined the impediments to commercialize the excess sea urchins and why Japan imports sea urchins. The report describes the development of a new market in Iwate Prefecture that takes advantage of the abundant sea urchins.

Materials and Methods

Data were collected by interviewing to members of fisheries cooperatives in northern Japan, principally Iwate prefecture and at a wholesale market as well as their records and statistics published by the Ministry of Agriculture, Forestry, Ministry of Finance and Hokkaido pref. and by Fish stat Plus (FAO). A case study refered to the report of Miyata (2007).

Why Japan imports sea urchins

From the investigation, three main reasons were extracted to suggest the sustainable imports of sea urchins from all over the world (Table 1).

The first reason is the high price in the domestic market, The price of imported sea urchins (fresh

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Table 1. Values of imports by country
(Unit : us $1000)

	2004	2005	2006
Canada	534	400	288
Japan	218,197	200,402	190,138
Korea	227	166	174
USA	7,388	8,707	7,113

Source : Fishstat Plus (FAO).

or chilled) in Japan was 2.7 times higher than that in the USA in 2006. The high price is due to the high wages in the fishing and processing industries, and the labor-intensive nature of processing sea urchins: breaking shuck, picking out gonads, washing, removing contaminants with tweezers, and displaying the gonads on wooden plates. All of the process need skills not to damage gonads for fear of loss of market value.

Second, Japanese consumers have come to expect yearround availability of sea food though production of domestic sea urchins are limited in summer (Fig. 1). Thus, the industry depends on imports of raw materials out of the season (Fig. 1),

Finally, sea urchins are eaten not only as high-priced sushi and sashimi, but also as canned, bottled, and pouched products, and as low-priced sushi. These lower-priced commodities are made from frozen sea urchins imported mainly from Chile.

Factors preventing use of abundant sea urchins

Interviews to the fishermen also revealed that several factors inhibit the collection of abundant sea urchins on urchin barrens. First, overfishing can exhaust the resource of sea urchins as was in some parts of Hokkaido Pref. the most productive region in Japan. Some fishermen consider that persistence of urchin barrens with thin-gonad sea urchins are better conditions for them than exhaustion of resources.

Second, the target species in Hokkaido are mainly kita-murasakiuni (*Strongylocentrotus. nudus*) and ezo-bafununi (*S. intermedius*), which are sympatric in most habitats Because the latter fetches higher prices, the fisheries cooperatives stock the fishing grounds, in spite of the abundance of the former species, which is more likely to cause urchin barrens. Third, demand: Brand products are in high demand by consumers, but they are not needed in quantity. The distribution of large quantities of a brand reduces the price in the market and alleviates the scarcity, so that some fisheries cooperatives and fishermen hesitate to increase the catch. Therefore,

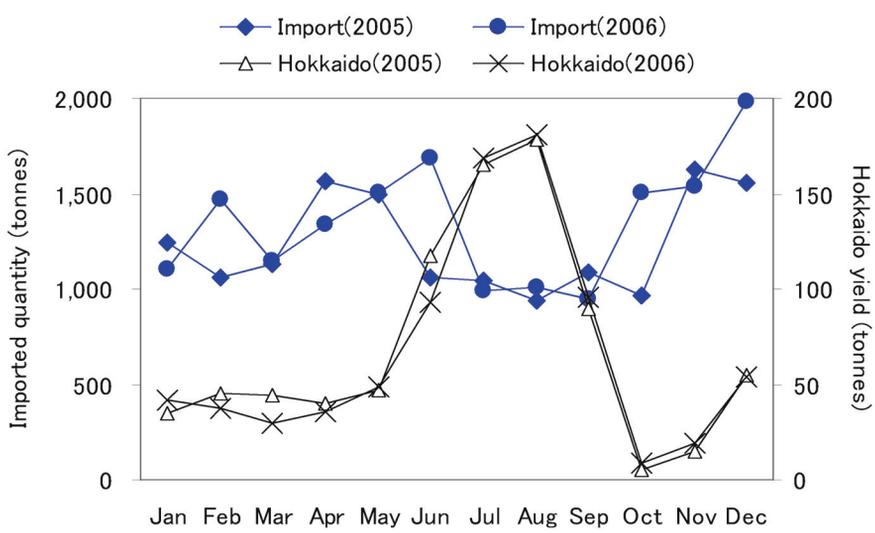

Fig. 1. Monthly imports of live sea urchin and catch in Hokkaido
Import data, live sea urchins only. Hokkaido data, shucked sea urchins.
Source: Trade Statistics of Japan; Hokkaido gyogyou gensei.

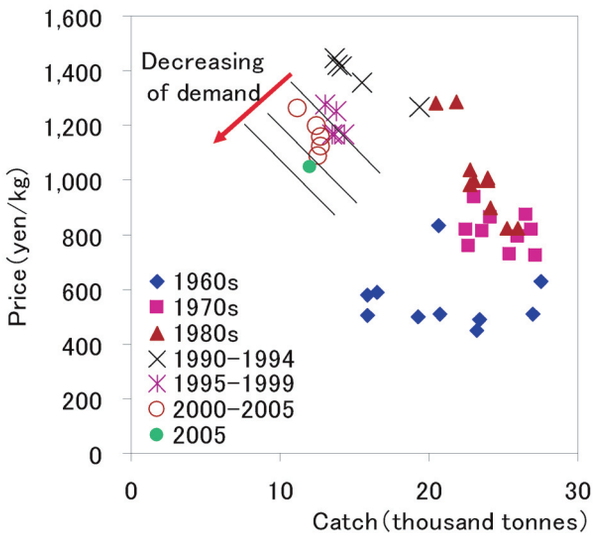

Fig. 2. Trend of demand for sea urchin caught in Japan
Catch data = weight with shell. The price is deflated by consumer price index. Source: Annual statistical report of fisheries and aquaculture production (MAFF)

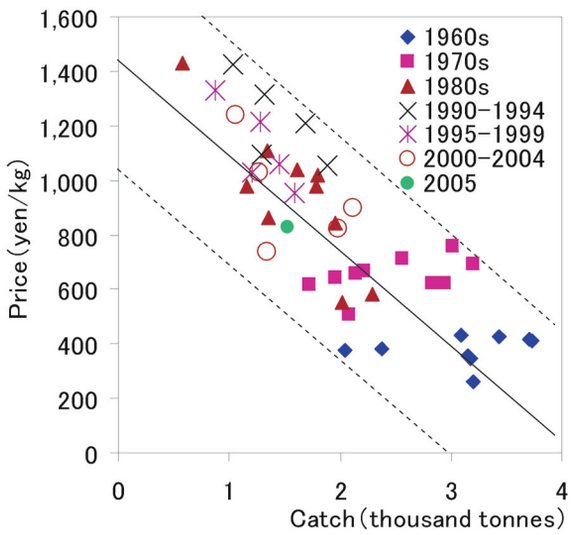

Fig. 3. Trend of demand for sea urchin caught in Iwate pref.
Catch data = weight with shell. The price is deflated by consumer price index. Source: Annual statistical report of fisheries and aquaculture production (MAFF)

maintenance of brand may perpetuate the urchin barren.

Fourth, the decrease of labour; as fishing efforts and labors have reduced, the labor force is insufficient in areas where fishermen process sea urchins by themselves. This decline in labor has allowed sea urchin populations to expand and thus enlarge and maintain urchin barrens.

Finally, after the sea urchins have eaten all the available seaweed and left urchin barrens, they are on the verge of starvation to be of little commercial value. These sea urchins can be reared by supplying kelp, but kelp-habitats are usually quite limited or far from the urchin barrens, so the cost to obtain kelp (transport or culture) is an obstacle.

Case study of successful market development

1. Background

The current demand for domestic sea urchins is at its lowest since the 1970s, owing to competition with imported raw and frozen sea urchins (Fig. 2). The supply of and demand for sea urchins caught in Iwate Prefecture is contrast with those of other domestic sea urchins (Miyata, 2008): the demand for sea urchins caught in Iwate Pref. has hardly changed (Fig. 3). This case study examined the reasons for the competitive ability of sea urchins collected in Iwate Prefectural coasts and the strategy used to maintain the demand.

2. Research site

The research site is Iwate Pref. with a population of 1.4 million (Fig. 4). The rural prefecture is famous for its agriculture and fisheries. The sea urchins caught in Iwate Pref. are sold locally according to thesea urchin processors in Iwate Pref..

Domestic sea urchin production is concentrated in northern Japan: Hokkaido Pref. produces 44% of the catch (mean of 1996－2005), Iwate Pref. 11%, Aomori Pref. 7%, and Miyagi Pref. 7%. In southern Japan, only Nagasaki Pref. comes third, at 9% (Table 2).

3. Increased imports favor sea urchins produced in Iwate

People in Iwate Pref. have traditionally eaten fresh roe of sea urchins in summer. They prefer very fresh roe of sea urchins caught on the coasts of Iwate Pref. However, since around 2000, fresh roe of sea urchins have been supplied mainly from Russia

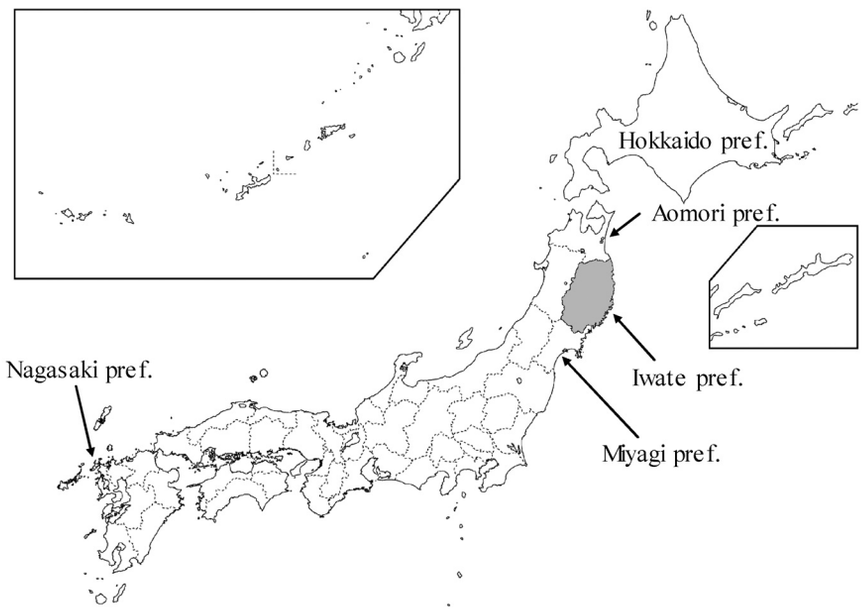

Fig. 4. Iwate Prefecture, Japan.

during autumn to spring (Fig. 1, Fig. 5), and the sea urchin have shifted from a seasonal item to the year-round one. Fast-food sushi and conveyor-belt sushi made of fresh imported sea urchins have formed a new market. Iwate fishermen are worried that local sea urchins will be expelled by imports from Russia.

On the other hand, processors continue to demand for sea urchins caught in Iwate Pref. because of their high ratio of roes, freshness, and a trend of local production for local consumption. Local consumers also prefer local sea urchins for their high quality. Therefore, producers in Iwate Pref. have been able to avoid the decrease of demand for local sea urchins seen elsewhere in Japan.

Sea urchins produced in Iwate Pref. are very fresh because they are processed as soon as they are caught. In contrast, as imported sea urchins are not as fresh as ones caught in Iwate Pref. because of transportation out of water for a few days Sea urchins from Iwate Prefectural coasts have the advantage of freshness.

Table 2. Share of sea urchin yield by district

(Unit : tonnes)

District	Quantity	Percent	Ranking in Japan
Hokkaido	5,664	44%	1
Iwate	1,442	11%	2
Aomori	938	7%	4
Miyagi	920	7%	5
Total	8,964	70%	
Japan	12,816	100%	

Source : Annual statistical report of fisheries and aquaculture (1996-2006) production (MAFF)

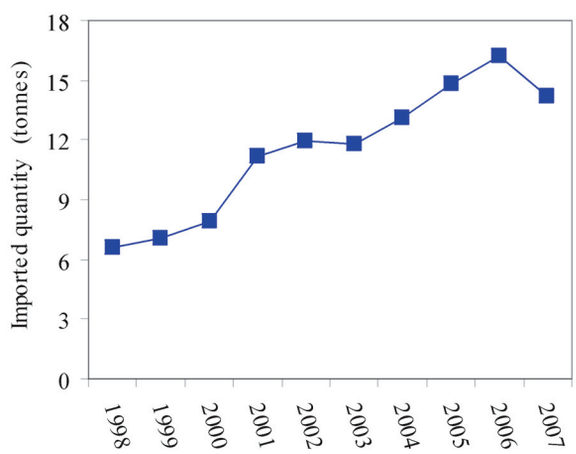

Fig. 5. Imported quantity trend of live sea urchin. Source: Trade statistics of Japan

4. Response to opportunity in Iwate

To meet the demand for local sea urchins and to increase production and sales, a fisheries cooperatives in Hirono Town, Iwate Pref., began stock culture of sea urchins. Stock culture makes it possible to ship sea urchins not only in summer, but in spring and sometimes winter. Maintaining the supply throughout the year thus meets the demand of local consumers to eat local sea urchins. Some processors have indicated their intention to buy stock-cultured sea urchins, so the fisheries cooperatives are planning to shift from the experimental stage to the practical stage. However, it is difficult to make rapid progress in the sock culture of sea urchins for commercialization, so the fisheries cooperative plans to expand gradually. As many fishing villages lack enough labor, the fishermen want fisheries cooperative to develop small-scale stock culture to improve distribution and selling.

Considerations

To resolve the problem of urchin barren, the support of fishers and volunteers of removal of sea urchins, as well as a local governmental subsidy are needed. Important considerations include the high price of sea urchins in Japan, which provides an opportunity for sales of the abundant sea urchins collected from urchin barren if the gonads are improved. This will not be easy, however. Impediments include the aging and depopulation of the fishermen and processors. The low price of year-round imported sea urchins is another problem.

However, local production for local consumption has begun to penetrate the local markets and the development of production and sales strategies will help to reduce the expansion of the urchin barrens. As a result, it will be possible to reduce the costs and labors of controlling the density of sea urchins on urchin barrens.

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