

# The Measures for Sustainable Marine Aquaculture in Japan

Ikuo TAKEDA\*

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**Abstract** Marine aquaculture in Japan has developed steadily since the 1960s, and it occupies an important position in the Japanese marine fisheries at this stage. In 2004, it accounted for 21.4% of the total production and 29.0% of the total value. Accordingly, the achievement of sustainable marine aquaculture is one of the important issues when considering Japanese fisheries policy. This paper outlines several measures and a basic plan related to sustainable development of Japanese marine aquaculture..

**Key words:** sustainable aquaculture, regulation, seafood safety

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## Outline of Marine Aquaculture in Japan

Aquaculture has a very long history in Japan, beginning with nori seaweed culture in the 16<sup>th</sup> century. The artificial feeding of marine species was said to initiate in 1927 with yellowtail in Kagawa Prefecture. The aquaculture of yellowtail was suspended in World War II, but had come back in the decade following the War. And new aquaculture technologies were gradually applied to an increasing number of species. At present, it is said that about 30 species are cultivated in Japan; a part of those comprise most of the domestic production. In 2004, cultivated nori, oysters and coho salmon accounted for 100% of the domestic supply of those species, and cultivated yellowtail and red sea bream account about 70 or 80% of the domestic supply of those species. Aquaculture and fisheries production levels in Japan during 2004 are presented in Table 1.

In 2004, marine aquaculture production in Japan amounted to 1.2 million metric tons valued at 436 billion yen and represented 21.4% of the total Japanese marine fisheries in volume and 29.0% of the total in value (Table 2).

Dividing Japanese marine fisheries into four major sectors: distant-water, offshore, coastal and aquaculture, aquaculture production exceeded that of the distant-water fishery and was nearly equal to coastal fisheries. The value of aquaculture production has exceeded that of the distant-water fishery since 1988 and that of the offshore fishery since 1992 (Figure 1).

Today, marine aquaculture is a major food production industry in Japan. Some big companies, e.g., Nihon Suisan, Maruha and foreign-affiliated firms such as Norwegian companies have entered into aquaculture through subsidiaries. Aquaculture products generally meet the tastes of consumers and consist mainly of medium- to high-quality products. As marine aquaculture continues to develop and expand, protecting the marine environment from the effects of water pollution is vital to the health of the industry. At the same time, Japanese consumers have been concerned about "Anzen" and "Ansin" on food including cultured seafood since the discovery of outbreak of Bovine Spongiform Encephalopathy, i.e., BSE in Japan. In English, "Anzen" can be translated into "safety" and "Ansin" can be translated into "trust." Accordingly, aquaculture policy of Japan has to

Table 1. Rate of Aquaculture to Total Fishery Production in 2004

Species	Aquaculture (A) (ton)	Fishery (ton)	Total (C) (ton)	A/C
Yellowtail	150,101	66,345	216,446	69.3%
Red Sea Bream	80,957	26,161	107,118	75.6%
Coho Salmon	9,607	–	9,607	100.0%
Olive Flounder	5,241	5,917	11,158	47.0%
Globefish	4,329	6,704	11,033	39.2%
Scallop	215,203	313,800	529,003	40.7%
Oyster	234,151	–	234,151	100.0%
Kuruma Prawn	1,818	1,044	2,862	63.5%
Nori(Laver)	358,929	–	358,929	100.0%
Wakame Kelp	62,236	3,673	65,909	94.4%
Konbu Kelp	47,253	91,122	138,375	34.1%

Source: MAFF

Table 2. Position of Aquaculture in Japan in 2004

		Volume 1000 ton	Value Billion Yen
Marine Fishery	(A)	5,670	1,500
Distant-water Fishery		535	169
Offshore Fishery		2,406	396
Coastal Fishery	(B)	1,514	500
<b>Aquaculture</b>	<b>(C)</b>	<b>1,215</b>	<b>434</b>
Inland Fishery		106	103
Fishery		60	51
Aquaculture	(D)	46	52
Total	(E)	5,776	1,604
	C/A	21.4%	28.9%
	(C+D)/E	21.8%	30.3%
	C/(B+C)	44.5%	46.5%

Source: MAFF

point to the preservation of the environment of aquaculture grounds and the safety of aquaculture products.

#### Measures for Conservation of the Environment of Aquaculture Grounds

In the course of aquaculture development, environmental problems have occurred. The fact is that aquaculture grounds, the environmental condition of which is suffering from excessive

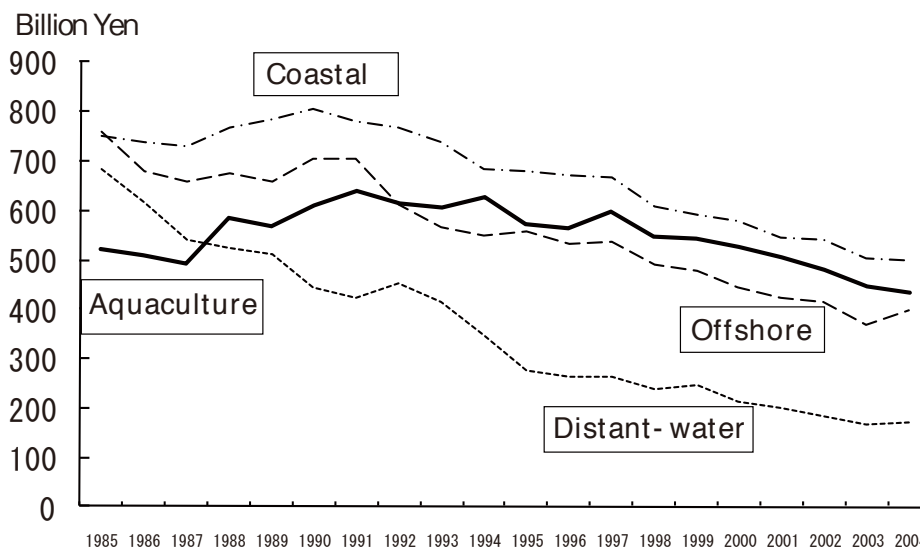


Fig. 1. Trend of the value of Japanese Fisheries.

organic sediment, are expanding. Excessive organic loading of the sediments is primarily caused by high-density farming and excessive feeding, both of which are aimed at increasing production. In order to resolve the situation, the "Law to Ensure Sustainable Aquaculture Production" was established in 1999 with a view to facilitating voluntary actions by fishermen to promote sustainable aquaculture by improving and maintaining environmental conditions, and by preventing the spread of fish diseases.

According to the law, the Minister for the Ministry of Agriculture, Forestry and Fisheries shall develop a "Basic Guideline" which establishes criteria for environmental indicators required for sustainable utilization of aquaculture grounds. The "Basic Guideline" established thus far contains the following three categories as the criteria:

1. Water quality.
2. Sediment condition on the bottom of aquaculture grounds.
3. Health condition of cultured fish, including mortality rate of cultured fish by diseases.

Each fisheries cooperative that conducts aquaculture, will voluntarily establish an "aquaculture ground improvement program" individually, or in cooperation with a neighboring cooperative or cooperatives, for its or their aquaculture grounds, based on the "Basic Guideline." The "aquaculture ground improvement

program" shall indicate the goal of the improvement and indicate measures to be taken for the improvement of environmental conditions, and shall also be authorized by a prefectural Governor (Figure 2).

To be concrete, an "aquaculture ground improvement program" for fish aquaculture shall report fish population density in the fish preserve, promote the use of assorted feeds and avoid using harmful materials for livestock and so on. The program for seaweed contains weed population density in the seaweed preserve and avoids using harmful materials for livestock and so on. When the "aquaculture ground improvement program" is not carried out, the Governor recommends the cooperative to develop the program in case its aquaculture ground is recognized to be conspicuously deteriorated, and can make it public if there no compliance.

In the past, farmers used fresh fish as feed, but this leads to environmental degradation because of wastage. Now, according to the guideline and programs, the use of fresh fish as feed and assorted feed of a type that mixes fish with dry ingredients that is made into moist pellets has been decreasing. The use of dry pellets which do not incorporate fresh fish has increased in Japan (Figure 3).

The Acid Volatile Sulfide in mud of seabed has decreased after establishment of the "aquaculture

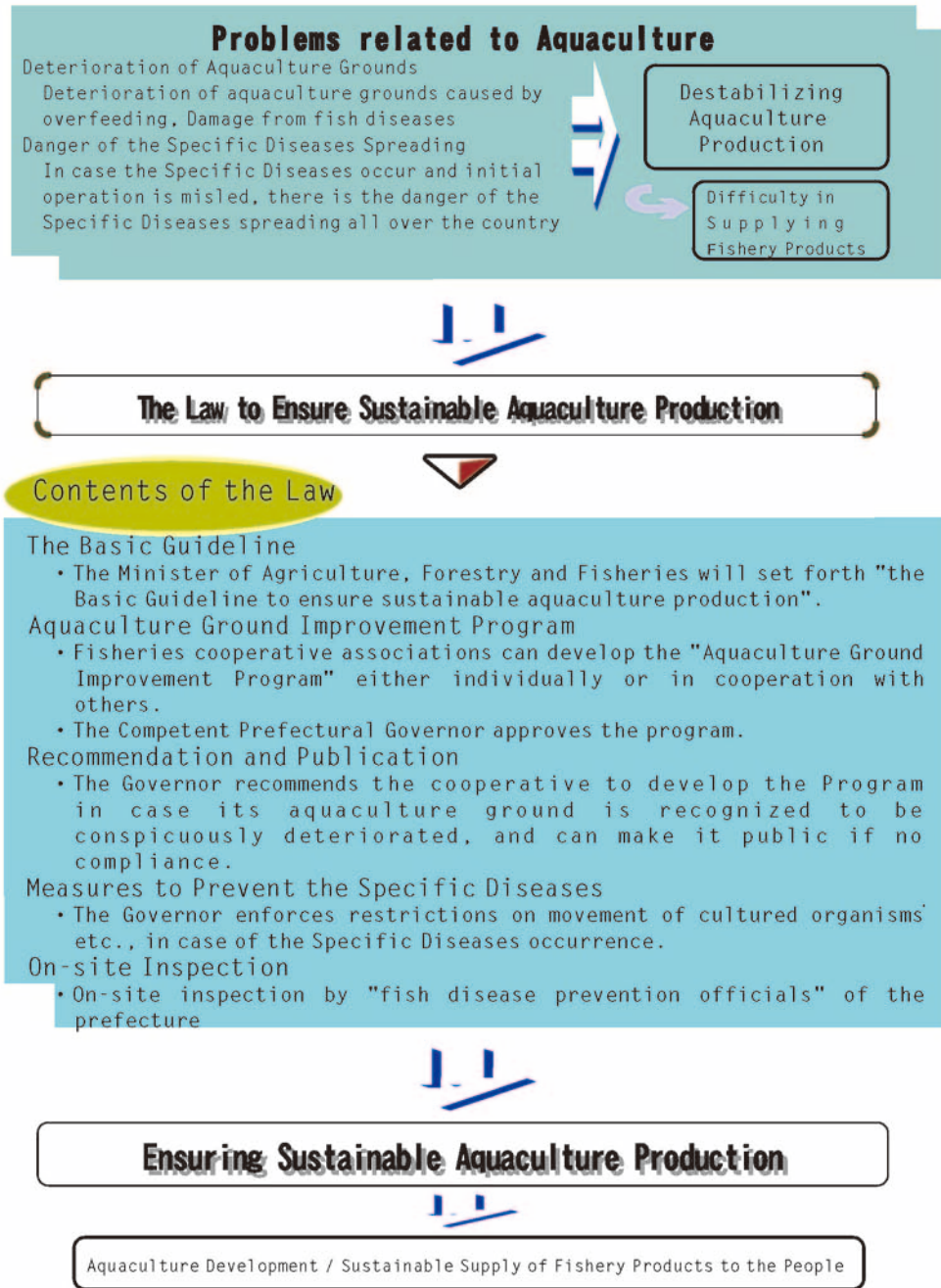


Fig. 2. Conceptual flowchart of the law to ensure sustainable aquaculture production.

ground improvement program" (Figure 4). This is just one example of how the environment of many aquaculture grounds has been improved since the establishment of the "aquaculture ground improvement program."

Currently, nearly 85% of the production of cultured fish is farmed on aquaculture grounds where the "aquaculture ground improvement program" has been established (Table 3). The Fisheries Agency has promoted sustainable

aquaculture production by establishing and implementing the "aquaculture ground improvement program" for all aquaculture grounds around Japan.

**Measures for Ensuring Food Safety**

In aquaculture, residual medicines brought on much criticism because it is said that aquaculture farming uses too much medication. To resolve this matter, the amount and usage of medications are

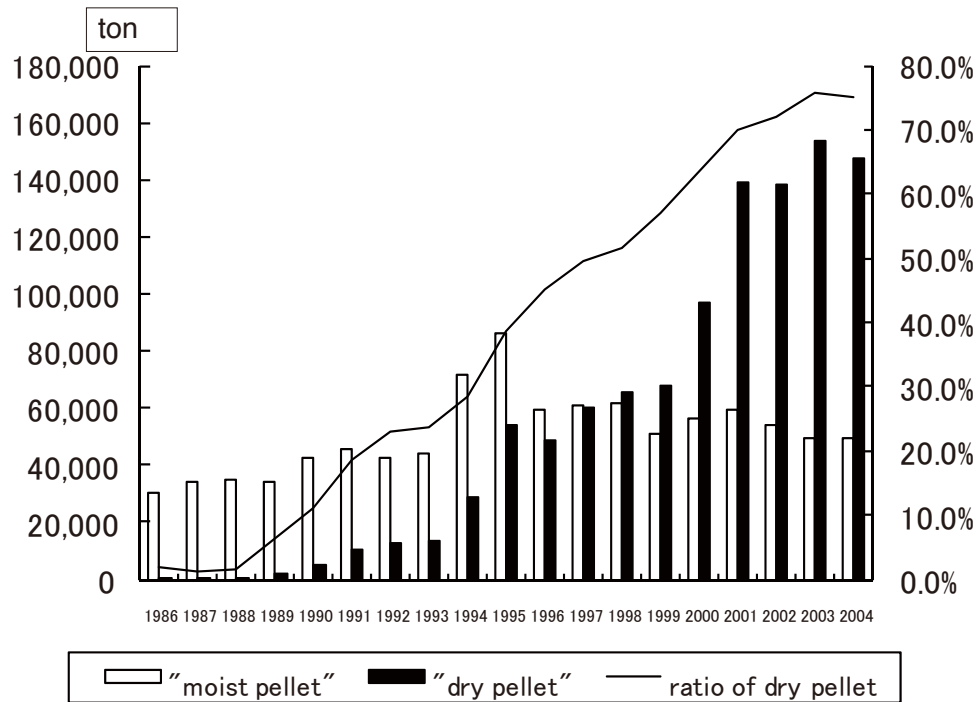


Fig. 3. Trend of production of assorted feed: distinct by form.

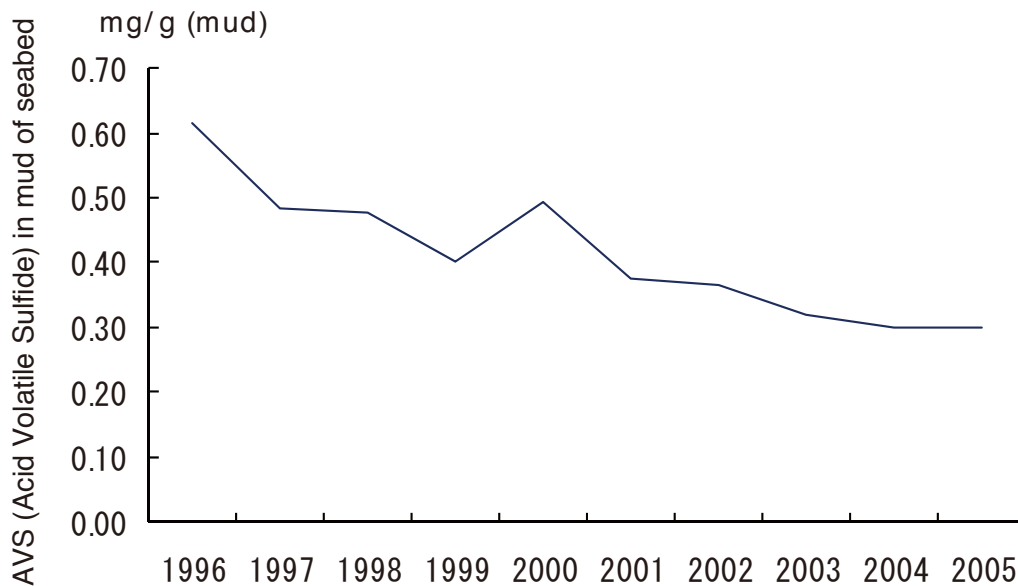


Fig. 4. Example of improvement of aquaculture ground.

governed by the "Pharmaceutical Affairs Law." This law regulates the usage of medicine, e.g., antibiotics, in conjunction with all aquatic animals. Recently, the development of vaccines for fish diseases has changed the situation with respect fish diseases. Furthermore, Governors can prevent the movement of cultured organisms in case of specific diseases outbreaks, and fish disease

prevention officials use medicines and vaccines in accordance with "Law to Ensure Sustainable Aquaculture Production." As a result, the amounts of damage caused by fish diseases and the sales volume of medicines for fish diseases have declined.

On the other hand, the quality of farmed fish is not ranked high by the public because it is felt

Table 3. Settlement of "Aquaculture Ground Improvement Program"

number of "Program"	Cover Ratio*		
	Fish	Shellfish	Seaweed
367	84.4%	48.3%	65.7%

\*:"Cover ratio" is calculated as follows;  
 Volume in the aquaculture ground settled of "Program" / Total aquaculture volume × 100

to be much too oily. This problem is caused by the excessive feeding of fresh sardines. Today, the quality of farmed fish is improved by the promoting the use of assorted feeds, especially dry pellets. But the consumer's deep-seated distrust has not been easily dispelled. Therefore, supplying correct information to consumers about the way fish are produced in aquaculture is very important for increasing the market for farmed fish. Many consumers who visit fish farms say that they have changed their opinion about farmed fish and that their misunderstandings were wiped away (Figure 5).

In Japan, consumers have been concerned about

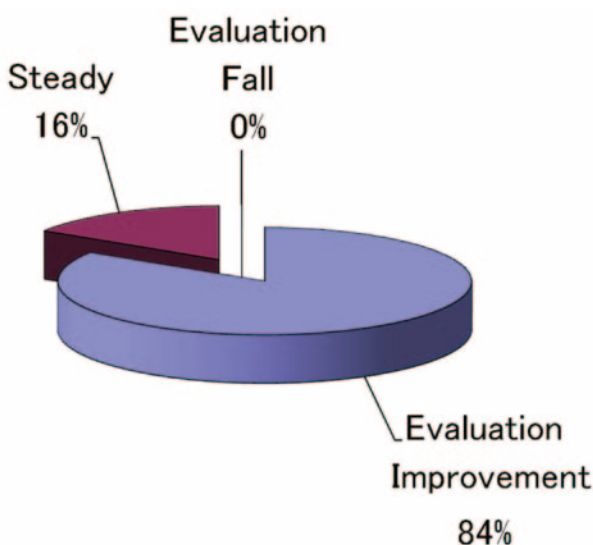


Fig. 5. Change of evaluation of consumers on aquacultured fish after communication with farmers.

the safety of food since 2001 when there was an outbreak of BSE in Japan. Now, there are two key words associated with food: Those are "Anzen" (safety) and "Ansin" (trust). Consumers demand the information about the production so they can judge whether a food is "Ansin" or not. No information means it is not "Ansin." In any case, it is thought to be important for aquaculture to farm fish properly according to the laws and regulations and supply information about production widely. Therefore, the introduction of a traceability system has been favorably received by consumers. It is quite possible that farmed fish for which there is no access to information about production will be excluded from market since consumers will not buy them. Supplying information may become very important to achieve sustainable aquaculture production in Japan. A new type of Specific Japan Agriculture Standard with Production Information was established in 2003. In that program the validity of production information is certified by Registered Certifying Bodies. Now, there are three Standards with Production Information for beef, pork and agricultural products. MAFF's staffs have been working for introduction of the standard for cultured fish. The private sector, including farmers and retailers, are interested in the traceability system. Some groups consisting of farmers and retailers or farmers by themselves have already established and are applying a similar system on their own.

## Conclusion

Marine aquaculture provides various nutritional, social, and economic benefits to society. Aquaculture is and will continue to be an increasingly important food production industry for Japan. The Japanese experience is evidence how uncontrolled industrial growth, including aquaculture itself, can pollute coastal waters and destroy valuable aquaculture food resources, but this can be prevented by proper regulation. On the other hand, the environments that were damaged can be recovered through proper management and great effort. Furthermore, acquiring the confidence of consumers is very important for sustainable aquaculture production. Regulation alone may not produce consumer confidence; that can only be gained through the provision of accurate information on production methodology and product healthfulness.

