

**Review on demand , Markets and Trade of
farming fishery products in China**

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After 1985, China's farming fishery develops very fast and has great achievement. During the period, the fishery industrial structure changes greatly. The supply-demand relation of farming fishery products translates from shortage of supply to abundance of supply and in some regions the supply of farming products exceed the demands, especially the traditional farming fishes. In China, the farming species is changed from the traditional species to special species of high-quality. During March to May last year, we made a study on the supply and consumption characteristics of farming seafood from 1985 to 2003.

1 The Study Objects and Methods

1.1 The study objects

In the studies, we analysis the supply property of farming fishes, the current and style of demand, the price and income elasticity of farming fishes, and the international marketing of the farming fishes. The main study species are traditional freshwater farming fishes (bighead carp, silver carp, grass carp, black carp), tilapia, freshwater prawn [*Macrobrachium rosenbergii (deMan)*], scallop and sea-mussel.

There is a long farming history of traditional freshwater fishes in China. During 1994 and 2003, the average output of traditional freshwater farming fishes is over 86% of the total output of freshwater farming. The farming cost of most traditional freshwater fishes as low and their fingerlings are easy to be obtained. For this reason, the price of them is moderate and those fishes are most important fishery products for Chinese. In addition to this, the statistic data of output and price of the freshwater farming fishes are easy to be obtained and we also can have long period's statistic data. Thus the freshwater water fishes become our first research object for studies the infection of price and income on the consumed trend of fishery products.

Except for the traditional freshwater fishes with relative low price, in order to resolve the supply-demand property, we also selects the tilapia and freshwater prawn [*Macrobrachium rosenbergii (deMan)*], with relative high price as study objects. The main reason to select these fishes is as follows. First, the average price of these fishes is higher that the average price of traditional freshwater farming fishes. Second, the farming model is different from the traditional freshwater. Especially, the main farming model of tilapia is industrial farming of high density. Third, consumer preferences are quite different between them.

Fourth, there is a long farming history and thus it is easy to have the normal statistic data of them. Meanwhile, their output is much higher than other special farming species in a relative period.

For marine culture species, we select the scallop and sea-mussel as the study objects. The reasons are as follows. First, the output of seashell is much high than other seafood. In the past 20 years, the output of farming shrimp and fishes is much lower. The influences of farming shrimp and fishes on consume is weak. In fact, the fast development of marine farming of shrimp and fishes started from the metaphase of last century and there is, by 2002, no normal statistic data of each species in the Annual of Fishery Statistics. Second, the consumption of scallop and sea-mussel is large and price is moderate. Third, it is easy to obtain the data of price.

1.2 Study Methods

We use the positive studies to analysis the supple characteristics of faming fishery products by different figures

According the data from “Chinese Statistics Almanac”, we obtain the demand elasticity, income elasticity and price elasticity for different fishery products. And then, the demand and marketing characteristics of faming fishery products are studied. As there is linearity pertinence between the consumption of fishery products and interpreting variables, we adopt the linearity model for studying the elasticity indexes. We think the consumption (q) is impacted mainly by income of resident (y), price of fishery products (p1), price of meat and its goods (p2) and price of birds and eggs (p3). Thus we have the function as follows:

$$q=c(1)+c(2)*y+ c(3)*p1+ c(4)*p2+ c(5)*p3+\varepsilon \quad (1)$$

In function 1, the c (1) is constant. The c (2), c (3), c (4) and c (5) are coefficients of explanatory variable and random disturbance. By the function, the income elasticity and the price elasticity are as follows, respectively.

$$E_y = \frac{dq}{dy} * \frac{y}{q} \quad E_p = \frac{dq}{dp} * \frac{p}{q}$$

As we could not have enough consume data of traditional farming fishes, tilapia and 罗氏沼虾 , we adopt the definition to calculate the income elasticity and the price elasticity of those fishery products.

1.3 Resources of Data

The resident income and consumption of fishery products per capita are from “Chinese Statistics Almanac”. The consumption of marine products and freshwater products per capita is calculated by proportion of them in the total fishery products on the basis of total consumption of fishery products per capita. The data of output is from the “Fishery Statistic Yearbook of China” published by Fishery Bureau, Agriculture Ministry.

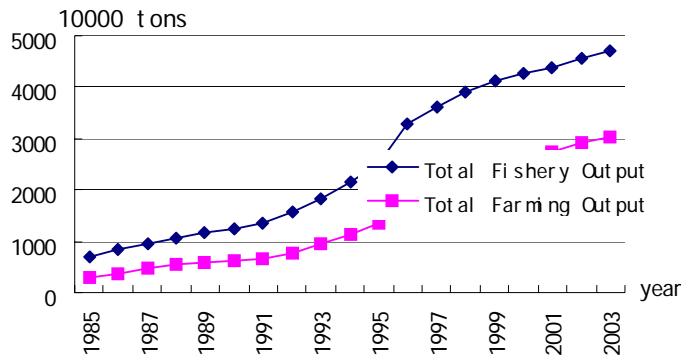
The consumption of traditional freshwater farming fishes, tilapia and freshwater prawn [*Macrobrachium rosenbergii (deMan)*], is calculated by the output times consumer coefficient productive-marketing. The consumer coefficient (retail quantity/buying quantity by pond) is from our investigation. The coefficients of traditional freshwater farming fishes , tilapia and freshwater prawn [*Macrobrachium rosenbergii (deMan)*], are 30%, 30% and 40%,respectively. The prices for them are calculated according the bargaining price of main seafood market provided by journal of “Scientific Fish Farming.

2 The Supple Characteristic of farming products (1985-2003)

2.1 Output of Farming Products over Fishing Output

In last 20 years, the farming output in creases 9 times from 3.09 million tons in 1985 to 30.27 million tons in 2003 (Fig. 1). The increasing rate is over 10% during the periods of 1986-1988 and 1996-2002. With the increasing of farming output, the proportion of farming products on total output of fishery products increases too. In 1985, the proportion is 44% and in 2003 is 64%. In 1993, the farming products exceed the fishing output.

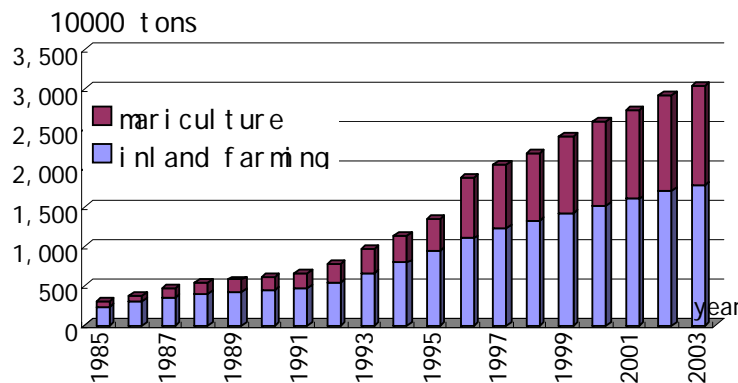
Fig 1 Increasing rate of fishery products between 1985 and 2003



2.2 Increasing of Proportion of Marine farming Output in Farming Output

In 1985, the outputs of inland farming and marine farming are 2.38 million tons, respectively. In 2003, the outputs attend to 17.74 and 12.53 million tons, respectively (Fig. 2). The proportion of marine farming output in total farming output increase from 23% in 1985 to 41% in 2003. We can find the annual increasing rate is stable.

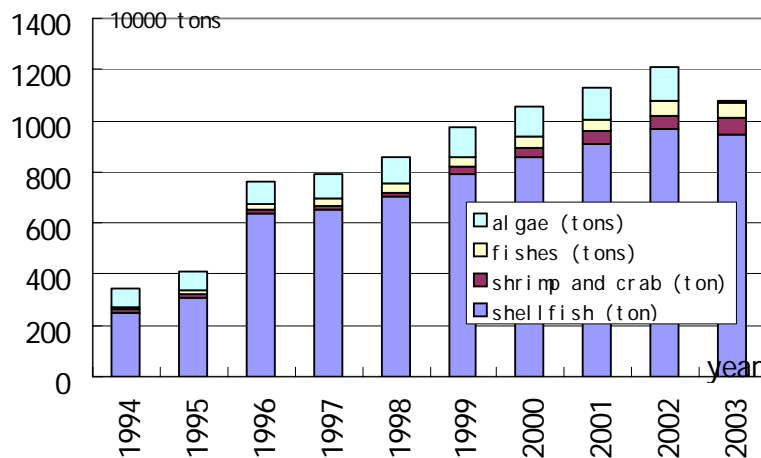
Fig. 2 Increasing trend of proportion of marine and inland farming outputs



2.3 Structural Surplus of farming fishery products

According to statistic data, the proportional of traditional farming fishes in freshwater farming fishes is 86% in 1994 and 65% in 2003. The proportion is still very high. In marine farming, the proportions of shellfish, algae and fishes, including shrimp and crab, in total output are 75-85%, 10-20% and 2-5%, respectively.

Fig. 3 Changes trend of main marine culture species between 1994 and 2003



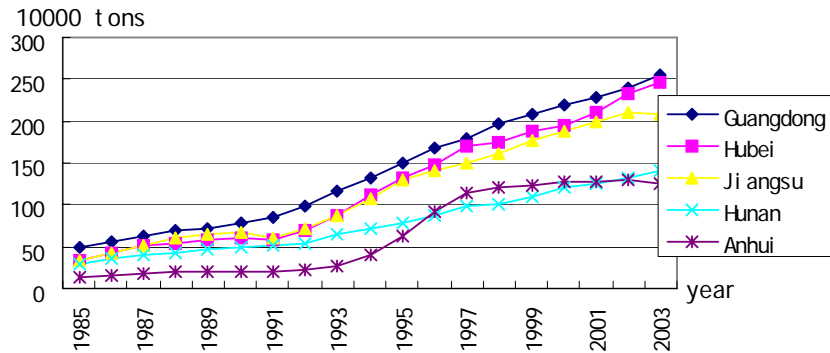
In order to resolve the problem of structural surplus of farming fishery products, the fishery administration pays attention on the adjustment of industrial structure and in recent years, the output of some special species increase greatly. The good example is the growth tilapia. In 1994, the output of tilapia is only 0.236 million tons and in 2003, the output increases to 0.806 million tons. By now, the farming output of tilapia in China is about 65% of the total farming output of the world.

2.4 Main Farming Area

2.4.1 Main Freshwater Farming Area (Fig.4)

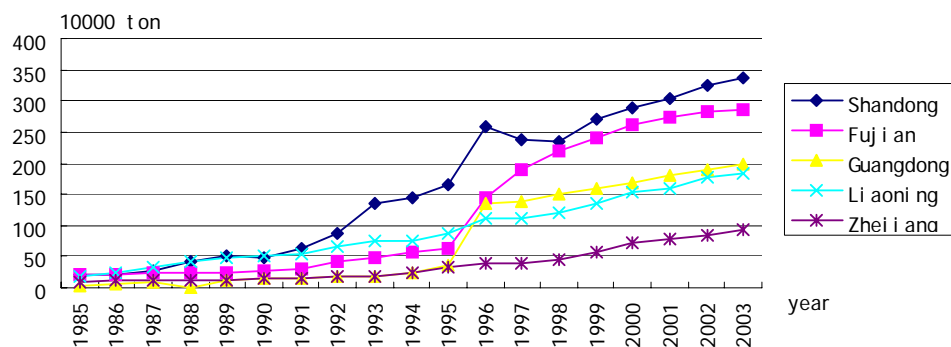
The main freshwater farming area in China is Guangdong Province, Hubei Provinces, Jiangusu Provinces, Hunan Provinces and Anhui Provinces. During 1985 and 2003, the output from those main farming areas grows constantly. During 1986 and 1987, the growth rate is between 10% and 30%. During 1989 and 1991, the growth rate is low. For instances, the output of Jiangsu Province decrease in 1991. From the middle of 90th last century, the growth rate is fast.

Fig. 4 Changes of farming output of different provinces between 1985 and 2003



2.4.2 Main Marine Farming Area (Fig. 5)

Fig. 5 Increasing trend of marine farming fish of main provinces between 1985 and 2003



The main marine farming area in China includes Shandong Province, Fujian Province, Guangdong Province, Liaoning Province, Zhejiang Province and Guanxi. In 2003, the total output of above 6 provinces is 94% of total output of the China. The outputs of Shandong and Fujian are 26% and 23%, respectively.

3 Demand Characteristics and Consumer Preferences of Farming Products

In order to make quantitative analysis on the demand characteristics and consumer preferences, we calculate the different coefficients of farming fishery products. The demand quantity of fishery products is affected by the level of resident income, the price of fishery products, the price of meat and its goods and price of egg. The different coefficients are listed in table 1 and 2.

Table 1 Price and income elasticity of fishery products between 1994 and 2003

YEAR	TAC	TPE	SEMFP	IEUR	PEUS	SEMFPUR	IERR
1994	0.6079	-1.5674	1.1873	0.3024	-2.6513	1.7077	0.8600
1995	0.5642	-1.5414	1.2899	0.2934	-2.8122	2.0010	0.7570

1996	0.5834	-1.5367	1.2679	0.3044	-2.9647	2.0800	0.7792
1997	0.6034	-1.5008	1.3038	0.3141	-2.9548	2.1827	0.8071
1998	0.6215	-1.3599	1.1436	0.3146	-2.6222	1.8750	0.8624
1999	0.6335	-1.1917	0.9743	0.3277	-2.3282	1.6185	0.8567
2000	0.6746	-1.2140	0.9612	0.3668	-2.4806	1.6701	0.8478
2001	0.6894	-1.1094	0.9192	0.3802	-2.3014	1.6213	0.8412
2002	0.6393	-0.8863	0.7791	0.3368	-1.7416	1.3018	0.8384
2003	0.6673	-0.8498	0.7693	0.3619	-1.7271	1.3295	0.8227

TAC: Total income elasticity; TPE: Total price elasticity; SEMFP: Substitute elasticity of meat and its goods for fishery products; IEUR: Income elasticity of urban resident ; PEUS: Price elasticity of urban resident; SEMFPUR: Substitute elasticity of meat and its goods for fishery of urban resident; IERR: Income elasticity of rural resident.

Table 2 Price and income elasticity of fishery products between 1994 and 2003

year	PERR	SEMGFPRR	IEMFF	PEMFF	SEEFPP	IEFFF	PEFFF
1994	-0.4622	0.6216	0.9162	-0.1320	0.2484	0.8167	0.2166
1995	-0.4217	0.6266	0.8602	-0.1120	0.2476	0.7461	0.1902
1996	-0.4081	0.5979	0.8308	-0.0832	0.2533	0.8520	0.1993
1997	-0.4013	0.6191	0.8705	-0.0918	0.1976	0.8636	0.1961
1998	-0.3861	0.5765	0.9602	-0.0877	0.2061	0.9486	0.2002
1999	-0.3451	0.5010	0.9209	-0.0749	0.1240	0.8962	0.1614
2000	-0.3421	0.4809	0.9911	-0.0806	0.1061	0.9395	0.1791
2001	-0.3160	0.4649	1.0239	-0.0842	0.1070	0.9454	0.1725
2002	-0.2888	0.4508	0.9614	-0.0704	0.0890	0.8615	0.1424
2003	-0.2716	0.4366	1.0193	-0.0955	0.0852	0.8803	0.1957

PERR: Price elasticity of rural resident; SEMGFPRR: Substitute elasticity of meat and its goods for fishery products of rural resident; IEMFF: Income elasticity of marine farming fish; PEMFF: Price elasticity of marine farming fish; SEEFPP: Substitute elasticity of egg for fishery products; IEFFF: Income elasticity of freshwater farming fish; PEFFF: Price elasticity of freshwater farming fish.

3.1 Increasing of Total and Per Capita Consumption

The supply of fishery products in China now is abundance. With the growth of the population and improving of income, the consumption and consumption preferences in China is increasing in recent years. In 1985, the demand of fishery products is 1.36 million tons and in 2003, the demand is 6.79 million tons which is 4 times of 1985 (Fig. 6).

Fig. 6 Changes of demand of farming products between 1985 and 2003

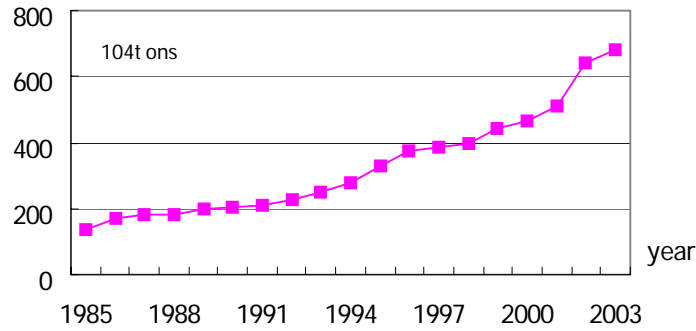
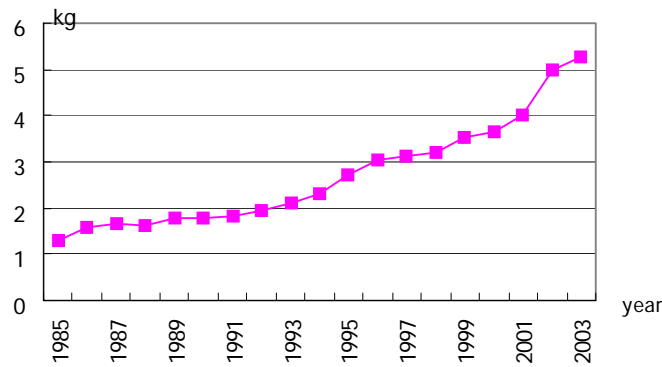


Fig. 7 Changes of demand per capita for farming products between 1985 and 2003



With the improving of resident income per capita, the demand per capita increases quickly. In 2003, the demand per capita is 5.3 kg which is 3 times of 1985. In 1985, the demand per capita is 1.3 kg.

3.2 Consumption demand of rural resident is lower than urban resident

From table 1 and 2, we find that the income elasticity of townsman is lower than the income elasticity of rural area. However, the price elasticity of townsman is larger than the rural area. Thus, we can have the conclusion as follows. The income of townsman is relative higher and the townsman has higher demand for fishery products. For the townsman, the fishery products are necessary goods and for the rural resident, even if they have higher demand for fishery products, they can not use fishery products as they want because the income limits their consumption. We can anticipate the rural resident will enhance their demand on fishery products with the increasing of their income. Thus we can think that the income is the most important factor to decide the demand of fishery products.

During 1985 and 2003, the fishery products consumption of townsman increase 0.779 million tons in 1985 to 4.5 million tons and the consumption in the rural area increase from 0.58 million tons in 1985 to 2.3 million tons in 2003. In 1985, the consumption of farming products per capita of townsman is 3.3 times of the rural resident. In 2003, the consumption of farming products per capita of townsman is 1.8 times of the rural resident. However, the absolute consumption between townsman and rural resident is enlarged from 2.38 kg in 1985 to 5.6 kg in 2003 (Fig. 8 and 9).

Fig. 8 Increasing trend of consumption of farming products

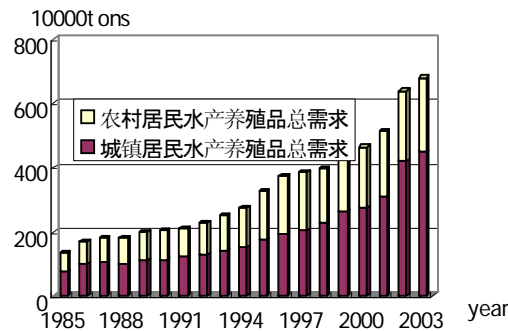
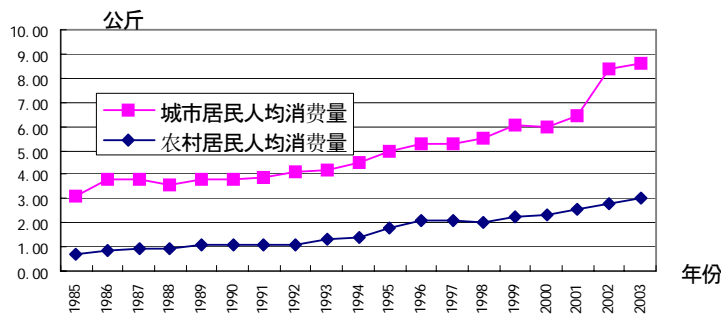


Fig. 9 Changing trend of farming products consumption per capita



3.3 Fishery products are becoming the necessary goods and the growth of population and urbanization push the increase of demand for farming products.

From Table 1 and 2, we can also know that the price elasticity of fishery products decreases since the middle of 90th last century. The changing of price elasticity demonstrates that the fishery products are becoming the necessary goods. However, during the period, the decreasing of the price and substitute elasticity is simultaneity. When the substitute elasticity is big, if the price changes a little, the consumer will buy other substitutes and thus induce the larger price elasticity. The decreasing of substitute elasticity shows that the fishery products can not be substituted.

From 1985 to 2003, the total population of China increases from 1060 million to 1300 million. During 1985 and 2003, the consumption per capita increases only 3 times, the total consumption increases 4 times as the growth of population.

At the same time, the urbanization is pushing the rural resident moving to the city. The urbanization will increase the demand of farming fishery products. Scholar thinks that as urbanization, the population of townsman increases about 100 million and made the demand of fishery products increase about 5.7×10^4 tons

3.4 Promoting the development of marine farming to expand the supply of marine farming products

From table 1 and 2, the income elasticity of demand for fishery products is between 0 and 1. The income elasticity shows us that the demand of Chinese resident increases with improving of income. With the development of transportation and refrigeration technology, the inland people will be able to consumer more and more fishery products. But due to the limited natural resources the capture output will not increase accordingly. The deficit will be made up by marine farmed products ad imported products. The freshwater farming will be limited by the scarce freshwater resources. The administrative authority should direct more investments to upgrading of technology and expand the proportion of high-quality products. At the same time, measures should be taken to import more of the fishery products that are in short supply to satisfy consumers' demand.

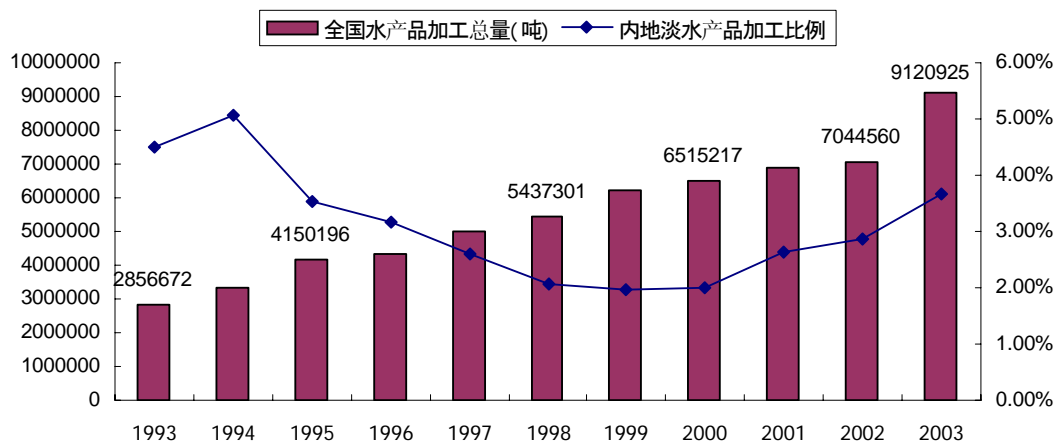
3.5 promoting the building of marketing systems to alleviate the imbalance between supply and demand

According to relevant statistics, about 80% of the fishery products are produced in East China, 18% in central China and only 2% in Western China. In addition, due to the backward processing and freezing technology, the products can only be sold in on the markets near the producing areas, thus making it rather difficult for people far away to buy fishery products. Finally, the three major fishing grounds are closed for a period for the fishery resources to recover. During this period, fishing activity is prohibited, causing a supply shortage of marine caught products on the market. To solve the above-mentioned problems, a full-functioning marketing system should be built. More processing factories should be set up in producing areas which can process the fishery products as soon as they are caught of farmed. This will reduce the transportation cost of processed products and enhance their competitive edge.

3.6 Advancing the fishery products processing

As we have mentioned above, about 80% of the fishery products are produced in East China and more processing factories should be set up in producing areas. We would like to talk more about the processing of fishery products. Chinese like fresh and living fishes in general. With the improving of living standard, Chinese is in deep love with processed fishery products in recent years because they would like to save more time for other activities. However, the existing problems remain noticeable in China's fishery products processing industry. First, the scale of processing enterprises is small. Second, the portion of processed fishery products is rather lower and the technological level is low as well. Third, 95% Chinese fishery products processing enterprises are located in the eastern coastal area, especially in Shandong and Zhejiang provinces, and mainly engage in marine products process. The processing of freshwater farming fish remained at very low level. In 2003, the processed freshwater farming fish is only 7.75% of total output and in inland, the rate is only 3.68%. After 1999, the rate of processed farming produced in inland has showed the increasing trend.

Fig. 10 Rate of processed fishery products and rate of processed freshwater farming products



3.7 Demand for high-quality fishery products increases greatly.

As the development of Chinese economy, the demand for high-quality fishery products increases greatly. For instances, the import of Salmon increases from 25,155 metric tons in 2000 to 74,205 metric tons in 2003. The consumption of salmon concentrates in coastal areas such as Jiangsu, Shanghai, Beijing and Guangzhou. In 2003, the import amount of salmon in Jiangsu and Shanghai is 55% and 29% of total import amount, respectively. Many hotel, restaurant and supermarket sale salmon at present. The consumers are mainly resident with high income and people from Japan, Hangkong and Taiwan (China)

3.8 The consumers pay more attention to the quality of fishery products

In recent 3 years, many consumers with high income are reducing the consumption for fishery products farmed in China and are increasing the consumption imported. The main reason is that consumers are afraid of the safety of China's farming products.

4 Import and export of China's fishery products

4.1 Revealed comparative advantage of main fishery country in the world

The comparative advantage of the seafood in China is favorable, and the growing rate is higher than the average for developing countries. On the other hand, there is some distance to some countries, for example Thailand.

4.2 Characteristics of export of China's fishery products

China's main agriculture products for export are vegetables, fruits, animal products and fishery products. The export value of fishery products is increasing, and the its ratio in agricultural products is raising, indicating the there are good prospects for China's export of fishery products(Table 3) . From 1999 to 2003, the export value of fishery products increases from 2.969 to 5.49 \$billion.

The main characters of export of fishery products in China are follows. First, the export of fishery products mostly occurs in provinces along the coast. The export value of fishery products from coastal areas, such as Shandong, Guangdong, Liaoning, Zhejiang and Fujian, makes up 92% of the total. Shandong and Liaoning mainly represent the processing export, and Guangdong, Zhejiang, Fujian mainly represent the ordinary export. Second, the farming products are the mainly exported products. The main exported products are eel, prawn and frozen fishes. In 2003, the export of the farming products such as shrimp, eel made up 47% of ordinary exports. Third, seafood is mainly exported to a handful of countries such as Japan, America, Korea, Hong Kong.

Table 3 The export value (\$ billion) of fishery products from 1999 to 2003

Year	Export value of fishery products	Export value of agriculture products	Ratio of export value of seafood in agriculture products(%)
1999	2.969	13.394	22.2
2000	3.83	15.62	24.5
2001	4.19	16.7	26.1
2002	4.69	18.14	25.9
2003	5.49	21.43	25.6

4.3 Characteristics of export of China's fishery products

China also imports amount of fishery products. The main countries from which China imports are Russia, Peru, America and Japan. The import value from 1999 to 2003 are 1.29 billion \$, 1.85 billion \$, 1.88 billion \$ and 2.48 billion \$, respectively.

In China, the main imported products in China are fish flour, cod, frozen fish. The imported fishery products are increasingly varied. On one hand, China imports some superior products, such as live lobster, live crab and grouper, but inferior fishery products are also imported.

4.4 Problems with fishery products trade

With the rapid economic development, the trade of fishery products has achieved a high growth. However, there are many problems with exported seafood. The problems include: (1) technical barriers to trade are more and more common nowadays; (2) the system of information management is underdeveloped; (3) the corporation's activities in exporting are not well organized; (4) many corporations are not aware of the importance of the brand in marketing and the advertisements about seafood are not very effective. Among the problems, the importance of the brand in marketing is very evident.

In China, there are not many seafood brands and there are few famous brands. However, in modern world, more and more people pay attention to the brands of the products. So it is a good opportunity for foreign corporations entering into China's market, and it is important to build the corporation image and brand. The "place brand" is a very character of the aquatic products, for the production of seafood is mostly connected with the provenance. For instances, salmon (Norway), tuna (Japan), lobster (Australia), hairtail from East China Sea and scallop from Yellow Sea are well known provenances to the consumers. Thus, the corporation could take advantage of the "place brand" to promote their products. For example, Norway represents 71% of Chinese imports of fresh and frozen Atlantic salmon and 34% of fresh and frozen Pacific salmon.

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