



# 『 Food Security in Northeastern Asia – Situation and Outlook 』

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주제 #3

## What Is the Real Food Security for Japan?

Comments by Dr. Kwansoo Kim

Japan - Korea

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## What Is the Real Food Security for Japan?

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### I. Introduction

The food security issue has been a major controversial topic particularly when each series of world trade negotiations opens. Producers in a well-developed country such as Japan argue that dependence of foreign produced food is risky when the country is attacked and supply sources are blocked. So often, examples of war-time situations are quoted. Also, "explosion of world population" has been a keyword for promotion (protection) of domestic agriculture. Some of the consumer groups agree with this advocate from the producers and are being patient with high prices of the domestic market. On the other hand, some groups are quite unhappy with these costly policies which are created by the closed market of the nation.

One needs to realize what causes the fluctuation of market prices and relatively high cost/prices of agricultural products. In Japan, the rice diversion program has been implemented during the last 3 decades while the market was almost completely closed until 1995, when the minimum access of rice imports started. The imported volume of rice gradually increased, and since 2000, about 770,000 metric tons of rice (brown basis) has been imported annually, accounting for nearly 9% of total domestic consumption. Domestic rice prices are still triple of the prevailing retail prices in the U.S. where the rice market is practically open but it is economically comparable with Japan.

In this paper, it is attempted to describe what would be the real food security and what Japan may have missed due to the maintenance of the essentially closed market of rice along with the contemporary world market situation. Considering the government

official development aid programs (ODA), Japan, as a donor, has often mutually benefited together with the ODA receiving countries. As a result, it might be an idea for food security of an economically developed country like Japan to develop good sources of food supply in foreign countries with more open market system domestically.

## II. Rice production and costs under the diversion program

The rice diversion programs started around 1970 when rice stocks accumulated excessive amount as much as over 7 million metric tons (milled rice basis), which accounted for over 60% of total domestic consumption then. The rice area planted was 3.28 million ha. in 1968 just before the introduction of the historic rice diversion program. Due to less domestic consumption over time (Fig.1), however, diverted areas increased over time reaching as much as 1 million ha. and planted areas decreased to 1.7 million ha. in 2002.

Because rice production was controlled by means of volume for each producer (Wailes, et. al. 1991), yield of rice per ha. did not grow much during the last 3 decades. Rice yield was already 4 MT (milled basis) per ha. around 1970. It reached the 4.5 MT level in the early 1980's. It was only after the mid-1990's when the yield increased further to reach a level of 4.9 tons. During the last 2 decades, the rice yields increased 10% at best in Japan comparing with the average rice yield increasing from 4.5 tons to over 8 tons, an 80% jump in California where the same type of varieties, japonica rice, is grown, and the average from 1.9 tons to 2.6 tons, a 37% increase in the world during the same period.

The slow growth of rice yields in Japan affected improvement of production costs. Government purchasing price which is based on production costs have been reduced by only 20% during the last one and half decades from 18,552 yen per 60kg of brown rice in 1986 to 14,845 yen in 2001 (Table 2). The 2001 year price is equivalent to nearly US\$2,000.00 a ton, brown rice. Average farm size for rice production has been approximately 1 ha. for several decades. The average farm size has been increasing very gradually. A large rice farm with more than 20 ha. had already achieved low production costs at a 10,000 yen level per 60kg (brown rice) 15 years ago (Wailes, et al, 1991). Despite the fact that economies of scale do exist in Japan, the producers have not been

serious about expansion of their farm size. Instead, their conforming to the compulsory diversion program has been a more important goal for them.

Retail prices of rice in Japan have been quite exceeding the world market prices. Price of milled rice per 1kg was as expensive as 503 yen (US\$4.00) in 1992 (Table 2). This was about 4,000 dollars a ton or almost US\$2.00 a pound of milled rice. The Japanese rice retail prices dropped sharply since the introduction of market access imports of rice (MA rice) in 1995 under the WTO agreement. Retail price in 2001 was 398 yen per 10kg of milled rice, about a 20% drop during the last 7 years. But the retail prices are still excessively expensive relative to the world prices. The impact of the MA rice on the domestic market has been considerably large. The SBS (simultaneous buy and sell) imported rice, which includes mostly high quality rice, increased to 120,000 tons per year in 1999, but has been cut back to 100,000 tons since 2000 in order to reduce pressure on already declining domestic prices.

Retail prices of rice in Japan has stopped declining. However, the domestic prices need to be further declined so that the domestic consumers more warmly appreciate the domestic supply. Meanwhile, the rice diversion program is under consideration to be completely eliminated in the near future. Even the government is beginning to realize that irrational policies are not compatible with the needs of the country any more.

### **III. Chaos in 1993 crop failure**

The unusual crop failure in 1993 appeared to be quite detrimental to the domestic consumers. The average yield of rice was about 25% below normal. Japan ended up importing over 2.5 million metric tons of rice to supplement the deficit. Domestic prices skyrocketed toward the end of the production year, and they peaked at 46,000 yen per 60 kg of, brown rice during the following year with some exceptional cases of even greater market prices (Fig. 3 ) (Momentarily, it was reported that the wholesale market prices went up as high as over 70,000 yen per 60 kg and the consumer prices at over 20,000 yen per 10 kg of milled rice relative to 6,000 yen in early 1993.). The Food Agency frantically tried to find available sources of rice supply outside the country.

It is ironic that it was openly rumored that the Japanese trading companies had been fully aware of where to get rices and how to market efficiently in the international arena; however, the reality was different and the trading companies did not have enough

information about supply locations. It was almost close to the summer of 1994 that the Food Agency realized that there was an enormous amount of surplus rice, particularly japonica rice, in northeastern China. Until then, the Japanese government had been importing rice from the major rice exporter, Thailand, where only indica rice was available. Finally, Japan imported 2.6 million tons of rice, with the majority from China. At the same time, a bumper crop in 1994 caused rice market prices to plunge.

If Japanese government had been used to importing foreign produced rice, rice imports and domestic rice markets in 1993/94 would not have been so chaotic. In addition, the crop failure in Japan could have been much less chaotically accepted by various rice exporting countries with a more steady production and marketing system developed for the Japanese market. The closed market policy of Japan was not attractive for riceexporting countries to develop high quality rice suitable for Japanese consumers. Further, a natural disaster occurs at certain area with a concentrated manner. Therefore, a geographically small country such as Japan is prone to nationwide crop failure. In this respect, to maintain supply channels worldwide on a daily basis is critical for the stable food supply of Japan.

Out of the 2.6 million metric tons of Rice imported during the 1993/94 marketing year, almost 1 million tons of rice were unsold due to poor/unsuitable quality. However, in 1995 rice used for feed was as much as 2.05 million tons relative to only 10 ton's level during a few preceding years. This indicates that actual consumption of imported rice was probably far less than officially announced and that the Japanese consumers could survive with far less consumption of rice than the previous year. Many kinds of food are available in Japan today. Even though rice is a symbol of food and still important, consumers can adjust their food consumption when rice supply is limited.

#### **IV. World market price towards stabilization**

World production of major grains and soybeans have steadily increased over the last 4 decades. As Figure 4 and Table 1 indicate, rice and wheat increased by close to 2.5 times, corn by almost 3 times and soybeans as much as 4 times. Yields of the crops have also almost continuously increased as well (Fig. 5). From time to time, depressed market prices tend to slowdown the growth of production and yields. Fig. 7 indicates that there is

a large room to grow for yields in developing countries. Production of livestock products has been increased greatly as well (Fig. 6). Meanwhile, world population grew only by two fold from 3 billion to slightly over 6 billion people during the last 4 decades.

Accordingly, food prices decreased over time. Figure 8 shows the evolution of market prices in real term, adjusted using the consumer price index (CPI). This, along with Fig. 9 for more recent years, show that fluctuation of market prices during the 1960s and 1970s compare with relatively stable downward movement of them since the 1980s. This coincides with a more efficient production and marketing system developed over time (Fig. 10 and 11; Ito, et al. 1995).

Competition related to food production and consumption prevails in many styles. Figure 12 shows the basic mechanism. In the production side, surging market price of a certain crop is attractive to producers. The more production of the crop should be observed in the next season. This way, the prices of the specific crop should be depressed relative to other crops of that season. As such, it may be quite unusual to observe a commodity maintaining a high price continuously for a few years. See Fig. 8 and 9 again. It seems as if all the commodities check with each other and smooth out the rice fluctuation and excessive discrepancies.

Meanwhile, the same situation occurs on the consumption side. In the livestock industries, feed account for a major part of the total production costs. The feed managers carefully monitor the market prices of the individual crop materials used for feedstuff. Relatively expensive grain raw materials may be used less for feed compensated by cheaper grains. Although the major grain for feed is corn; however, soybean, soybean meal, and wheat are also used for feed. Rice may be used more and more if the low prices continue. On the other hand, if all feedstuff become more expensive, the livestock products get more expensive. If this kind of situation occurs, consumers may give up consumption of a portion of livestock products and begin to take nutrition more from non-livestock products. Less consumption of livestock products should lead to low prices of the products. Even among the individual grains for direct consumption, consumers do have a choice.

All types of food including grains, fruits and vegetables, and livestock products are, to a certain extent, complimentary with one another for human consumption. A commodity with uprising prices may be generally avoided by consumers rendering less demand. Further, with a more-or-less abundant supply situation of all kinds of food, more

consumers may be ready and prepared to adjust their diet to the present food supply condition. In this situation, again, prices of most of the food materials tend to move together in the same direction. The figures of individual commodity in Fig. 12 indicate the togetherness of prices movements as well.

#### V. A lesson from ODA programs

The Japanese Official Development Assistance Program (ODA) was initiated in the 1960's and has been continued since then. These days, Japan is one of the largest ODA donors in the world. One of the largest programs of the Japanese ODA was the PRODECER which was conducted for a development of agriculture in the Serrado areas in Brazil for over 2 decades from the late 1970's to 2001. In this project, a tremendous increase in soybean production in the areas is one of the marvelous successes followed by various other products such as coffee, cotton, fruits, livestock, etc. (JICA, 2002)

##### *Implications from significant increases in soybean production*

Soybean production in Brazil has been increased dramatically during the recent years surpassing the 40 million ton level and accounting for more than 20% of total world production. Soybean production at the Serrado areas was at an only 2 million ton level in 1980 accounting for only about 10% of the nation's total production when the PRODECER program was started. However, since then soybean production in the Serrado areas were encouraged by the PRODECER program as well as POLOCENTRO Plan and grew substantially to account for about half of the nation's total soybean production today. It is now apparent that further increases in soybean production in Brazil will be coming mainly from the Serrado areas.

Because of the major improvement of soybean production in the Serrado areas, the national total soybean production increased from 15 million tons in 1980 to over 40 million ton level in 2001. The yields per hectare were unstable during 1980's at around 1.7 tons, but they are now quite stable at around 2.5 ton level. This level is as large as the current level in the U.S.

The Brazilian soybean production is now the second largest in the world after the U.S. which produces almost 80 million ton. Soybean production in the U.S. was quite

unstable and stagnant in the 1980's and also during the first half of the 1990's. It even decreased considerably during the period. Accordingly, the Brazilian share of soybean production in the world increased from 15% in the early 1980's to over 20% in the recent years, growing at a faster speed than the rest of the world. This progress was greatly supported by the improvement of varieties which are applicable in the areas around the equator. Those varieties were developed by the joint research of Japanese-Brazilian governments under the overall PROCEDER programs.

Based on those increases in domestic soybean production particularly in the Serrado areas, Brazilian soybean exports increased dramatically reaching the 17 million ton level in 2001, accounting for a quarter of the world total 56 million tons of soybean exports. The increases in Brazilian soybean exports were remarkable during the last 5 years, in particular. The exports used to fluctuate for about 15 years after 1980; but during the last 6 years, soybean exports from Brazil increased by 4 times reaching the 17 million ton level thus obtaining a status as a stable and reliable supplier in the world soybean market and contributing to the stable world market prices.

The U.S. has been the largest soybean exporter throughout the period. The U.S. accounted for almost 90% of the world total soybean exports in the 1960's, and Brazil was the third largest exporter after China. In the food shortage period in the 1970's, Brazil became the second largest exporter, although Argentina became the second ten years later. During the first half in the 1990's, however, Brazil came back to the second surpassing Argentina, the third, by almost a doubled amount of Argentina's exports. Meanwhile, the U.S. share of soybean exports decreased to a level less than 70% during the period. Even at the beginning of the 21st Century, Brazil has maintained the second largest position in the world soybean export market accounting for a quarter, while the U.S. share decreased to a half.

These dramatic increases in Brazilian soybean exports were also supported by improvements in the infrastructure of the whole transportation system at the harbors and roads as well as increases in soybean production. The improvements of infrastructure have been continuously conducted seeking further enhancement of agricultural exports.

Increased soybean production led to a development of livestock industries. Soybean meal, by-product feedstuff from production of soybean oil, facilitates production of meats and dairy products. Domestic production and exports of livestock products increased greatly during the last two decades (USDA, 2002).

### *Contribution to the world society Impacts on world market prices*

Substantial increases in soybean production as well as soybean/livestock products in Brazil have greatly impacted the world market prices and cheaper and more stable prices for the world society exists today than even before. Real prices of soybeans in the world market have been quite low during the last one decade, especially, relative to the situation in the previous decades. Even in the mid-1970's when the world market prices skyrocketed, soybean prices increased only by half of what rice prices increased. This maybe in part due to sharp increases in soybean exports from Brazil.

After the mid-1970's soybean prices per 1 ton were usually greater and more unstable than those for wheat and corn. However, the magnitude of price fluctuation has been becoming smaller and smaller during the recent years and soybean market prices are steadily moving downward. It is quite unusual to observe soybean prices to rise two years in a row during the last quarter century. In 1996, world soybean prices began to increase rather than in an expeditious manner. However, due to immediate increases in soybean exports from Brazil to a doubled amount relative to the one in the previous year, this moderated the uprising market situation within a short period. This was a marvelous contribution to the importing countries, and it was very significant because it was the time that the importing countries were secured with more stable and reliable world soybean markets in this contemporary era.

Monthly price movements in the world market from 1995 through 2001 indicate that no immediate sharp increases have been occurred. Rather, steady decline of prices during the recent years are more highlighted in the figure. Increases in soybean production in Brazil, the Serrado areas, are in part responsible for the prices declining.

In the fall, 2000, the BSE (mad-cow disease) problems were chaotic in Europe. Feedstuff made from bones and meat were prohibited in more countries and the livestock producers shifted to soybean and soybean meal for feeding. In this type of situation in the past, the market prices should have surged greatly. Today, however, away from a monopolistic lion's share situation by the U.S., more and major supplying countries as Brazil and other exporters have contributed to stable market prices. Accordingly, responses at the market were calm and significant rise in prices occurred only for a short period. Farm prices of soybeans in the U.S. rose from 4.5 dollar per bushel in November 2000 to 4.8 dollars the next month, only a 10% increase. Prices moved on a downward

trend after that.

Market prices at the Chicago Board of Trade are now very responsive to the situation in Brazil. The Chicago prices each day reflect the supply/demand condition in Brazil. The Brazilian soybeans have established their high status in the world. This situation of a stable and increasing supply with downward prices for soybeans as well as livestock products is welcome to the international society. The contribution of the benefits from this may be much larger than what one can imagine. The contribution of the PROCEDER, which initiated the major increases in soybean production in the Serrado areas, may eventually be recognized as an invaluable program by the international society as well as by the Brazilian people.

### *Contribution to Japan*

Japanese soybean imports from Brazil is only just three quarter million tons even today. Japan imports about almost 5 million tons from all over the world (mainly from the major exporter, the U.S.) each year during the last decade (Table 3). Brazilian soybeans account for only slightly more than 10% of total Japanese soybean imports. Accordingly, contributions of PROCEDER appear to be small.

However, dramatic increases of soybean production in Brazil originated from the PROCEDER projects have contributed to the stable and lower world market prices for soybean. This is a great benefit for soybean importing countries such as Japan. Imagine how much more prices an importing country would have to pay just in case Brazilian soybean production were only half of the actual production level. It is expected that soybean production in the Serrado areas will continue to increase in the future. Therefore, the current downward movement of the market prices will also continue, and importing countries like Japan will continuously receive the benefits at an increasing manner.

According to an analysis done by the JICA for estimating the contribution of PROCEDER, world soybean prices would have been 38 U.S. dollars higher, had it not been for the PROCEDER projects of Brazil. Japan would have to pay 186 million dollars (or 22.3 billion yen) more than the actually paid for the imported soybeans of 4.9 million tons in 2001 (JICA, 2002). This implies that Japan got benefited from the PROCEDER by that amount of value from just soybeans.

The loans from the Japanese government for the PROCEDER are about 35.1 billion yen (or 295 million dollars in nominal term (during the entire two decades since

1979. However, this amount of investment is considered to be paid off with a short term of soybean imports.

The important point is that those estimated values under the two scenarios are benefits annually obtained and Japan received the benefits in the past and will continue to accumulate them in the future as well. Since Japan has imported soybeans almost constantly at 4.9 million ton level during the last 10 years, the accumulated benefits that Japan received since 1991 must have been enormous, particularly when all crops and products generated by the PROCEDER are taken into account. Even just from soybeans alone, the accumulated benefits during the last 10 years should have been at least 200 billion yen with the scenario 1 or 100 billion yen with the scenario 2. If the situation during the last two decades is considered, the benefits may be much greater than the total loans that the Japanese government provided for the entire PROCEDER projects.

Further, additional benefits are coming from increases in livestock products, coffee, fruits, etc. Production of those products is expected to grow in the Serrado areas in the future, and the benefits to Japan will most likely continue.

## **VI. Conclusions: Seeking for the real food security**

Agriculture everywhere is always subject to a bad weather and crop failure. Man's skills and technology are almost helpless in comparison to the significant power of nature. A closed market of a small country like Japan is seriously prone to this problem. While men continuously develop technology, they need to understand their limit at the same time. Accordingly, it is critical to develop and maintain a good channel with other countries regarding food supply and demand. It is too risky for a geographically small country like Japan to try to achieve self-sufficiency in food supply. Even if it established self-sufficiency to a certain extent at the expense of extraordinary financial resources, it would still be subject to a crop failure, always.

The real food security for a well developed country can be obtained with less financial pressure. Agricultural investments in developing countries are generally welcome. The ODA type of investment, in particular, are invaluable for both donor and receiving countries shown as an example at the PROCEDER programs in Brazil. For a donor, in particular, this is good not only for a reasonable source of food supply

developed, but even more importantly a geographical diversification of food supply sources can be developed.

Regarding the domestic agriculture, it is important to seek for reduction of production costs so that domestic products are more available to the consumers. To do this, research and development are indispensable along with the efforts of the producers. The high technology can be applied domestically so that the domestic producers can enjoy the benefits of the advancements of technology developed in their own country. Eventually, those technologies can be transferred to other countries for more benefit to the society as a whole. Of course, however, those activities are performed with their market gradually more opened to the foreign suppliers.

The producers with a high production cost would work hard to survive. Domestic producers have advantage over foreign suppliers, advantage of closer location to the consumers with the same language and culture to share. The freshness of the products is also appreciated by consumers. It is particularly so when it comes to food. Therefore, domestic producers can enjoy the advantage despite of some disadvantage in costs. Only those producers who can utilize those benefits and advantages may survive to maintain or expand their business in agriculture.

Another survival may would be as an environmental protector. People always enjoy to have and visit beautiful clean natural areas. Tourism in the rural areas attracts people. In this respect, agriculture, in part, may hold a multi-functional mechanism. To maintain such an environment would cost the society. This type of environmental development can be done at the expense of taxpayers. Accordingly, it can be done only to a level the society wishes to achieve, and therefore, it is not necessarily for increases in agricultural production. It may be rather for developing better landscape and planting flowers instead of just simple crops.

It maybe an extreme case that economically well developed country such as Singapore can firmly stay as a nation with almost zero self-sufficiency rate in food supply. It is ideal to produce food domestically at a reasonable cost; however, full domestic food supply is not necessarily a condition for an independent state. Instead, closer relationships among the countries are much more needed and may be prosperous as well. World population growth is almost under control, and total world population may never reach 10 billion (Table 2 and Fig.13). Investments in agriculture with enormous amounts of money in an already costly country would be a misallocation of resources.

The real food security may be more soundly and reasonably achieved based on a well developed relationship of food supply and economic partnership with countries in various areas on the globe than a closed or heavily protected domestic supply.

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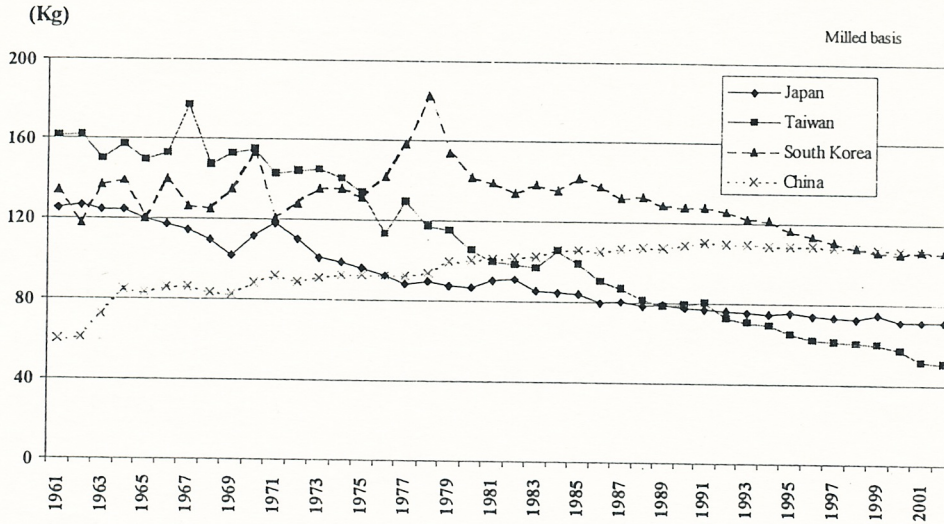
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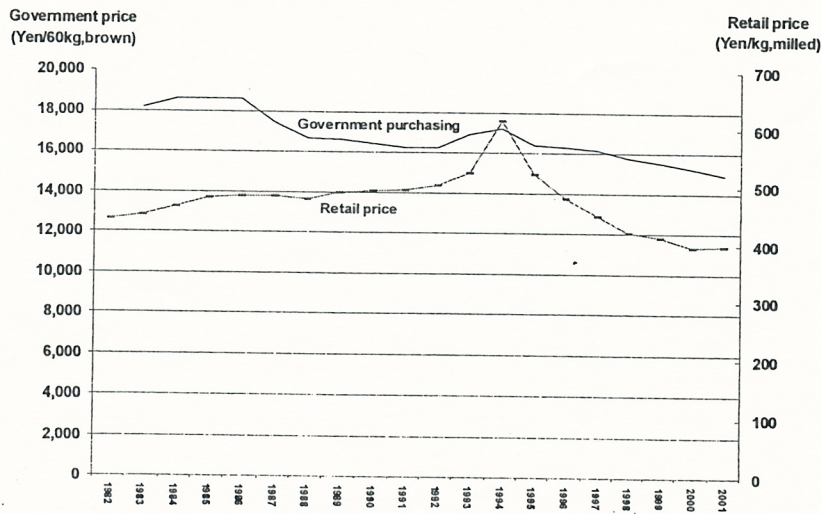
## Graph & Chart

**Fig.1. Per capita consumption of rice for Japan, Taiwan, South Korea and China during 1961 - 2002**

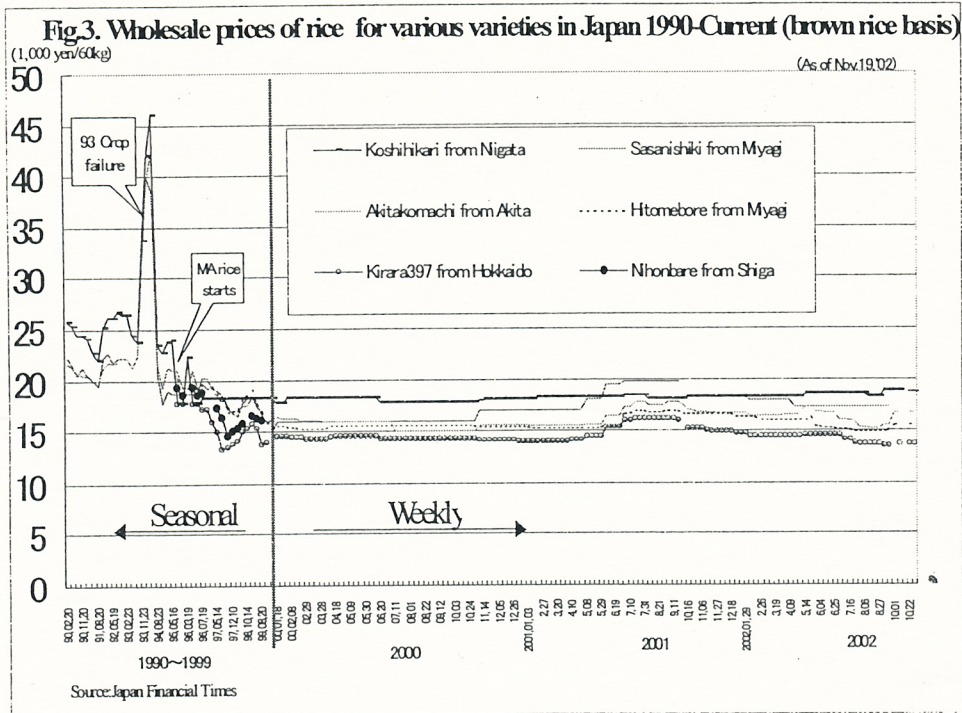


Source: S.Ito, *World Food Statistics & Graphics* (<http://worldfood.muses.tottori-u.ac.jp>)  
 Original data sources: USDA: *PS&D View*, October 2002; USBC: *International Data Base*, December 1998

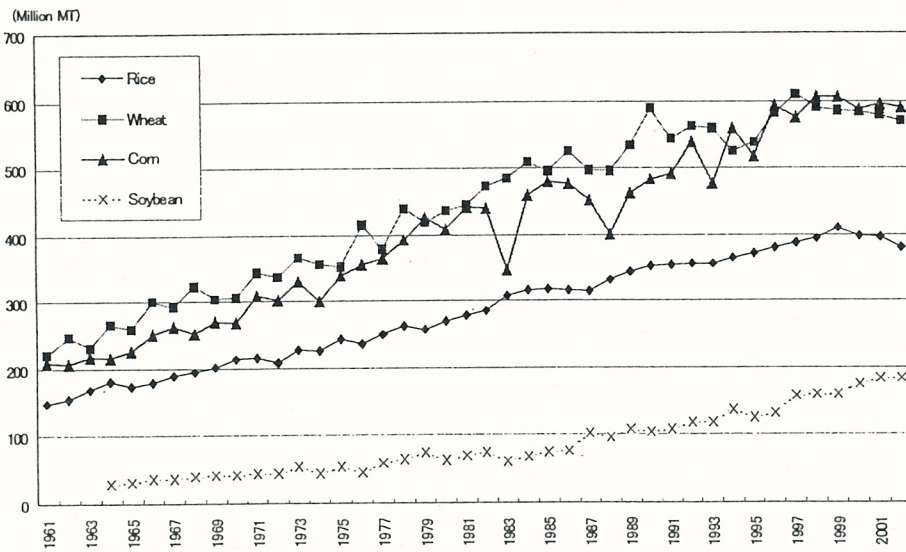
**Fig.2. Producer price and retail price of rice in Japan, 1982-2001**



Sources:  
 1. Rice Producer's Price (Government Marketed Rice) : Statistics and Information Department, Ministry of Agriculture, Forestry and Fisheries, *Monthly Statistics of Agriculture, Forestry and Fisheries*, August 8, 2002 : pp. 15 for 2001-1999, December 2000 : pp. 10 for 1998, December 1998 : pp. 15 for 1997-1995, December 1995 : pp. 15 for 1994-1992, December 1992 : pp. 15 for 1991-1989, December 1989 : pp. 15 for 1988-1986 and April 1987 : pp. 13 for 1985-1983  
 2. Rice Retail Market (Milled Non-glutinous Rice) : Statistics and Information Department, Ministry of Agriculture, Forestry and Fisheries, *Pocket Agriculture, Forestry and Fisheries Statistics (Pocket Nohrin/Susan Toukei)* 2002 : pp. 236 for 2001-1997, 1999 : pp. 200 for 1996-1992, 1994 : pp. 183 for 1991-1987, 1988 : pp. 178 for 1986-1982

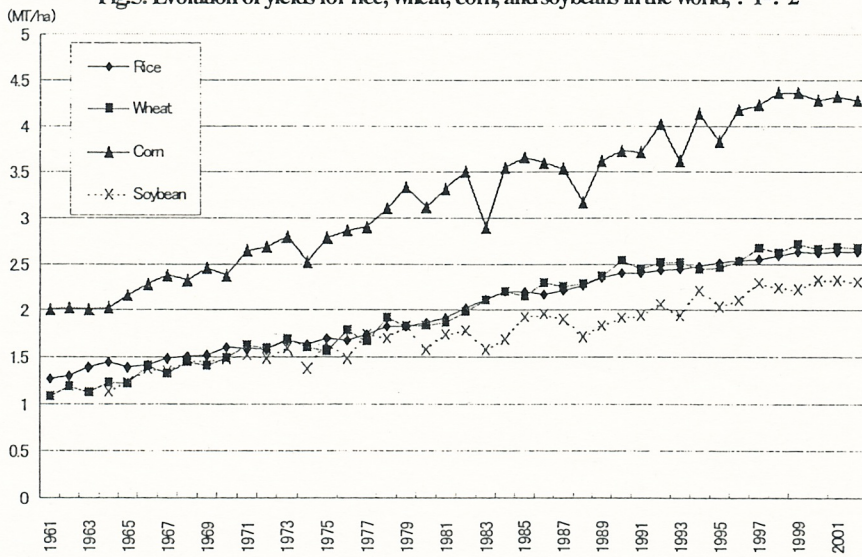


**Fig.4. Evolution of world total production for rice, wheat, corn and soybeans, ? 1-? 2**



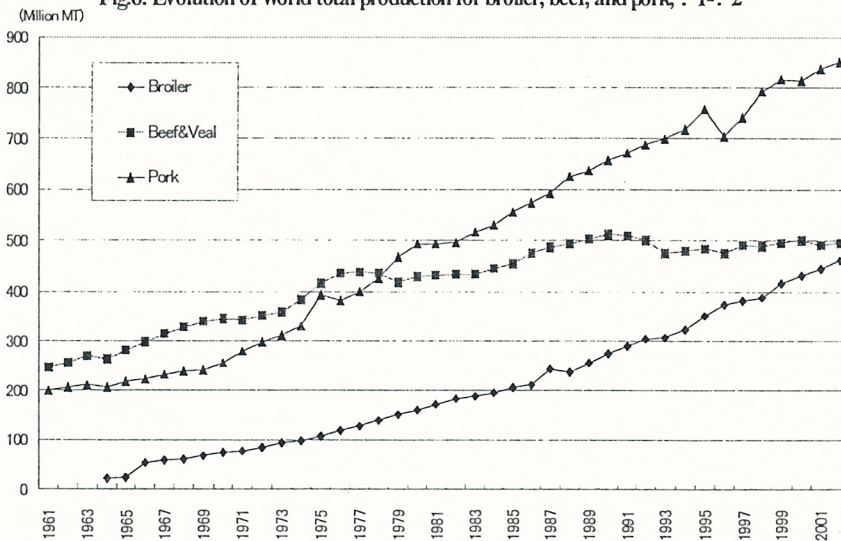
Source: S. Ito, World Food Statistics and Graphics (<http://worldfoodmuses.tottori-u.ac.jp>), Tottori University, Japan November 15, 2002. (Original sources are from ERS/USDA, PS&D View, October 2002).  
 Note: Rice is milled basis.

Fig.5. Evolution of yields for rice, wheat, corn, and soybeans in the world, ? 1-? 2



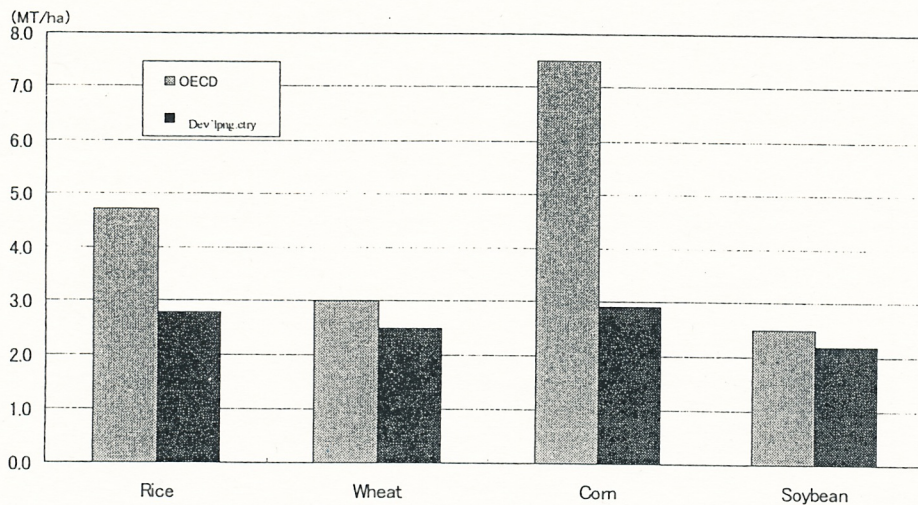
Source: S. Ito, World Food Statistics and Graphics (<http://worldfoodmuses.tottori-u.ac.jp>), Tottori University, Japan November 15, 2002. (Original sources are from ERS/USDA PS&D View, October 2002).  
 Note: Rice is milled basis.

Fig.6. Evolution of world total production for broiler, beef, and pork, ? 1-? 2



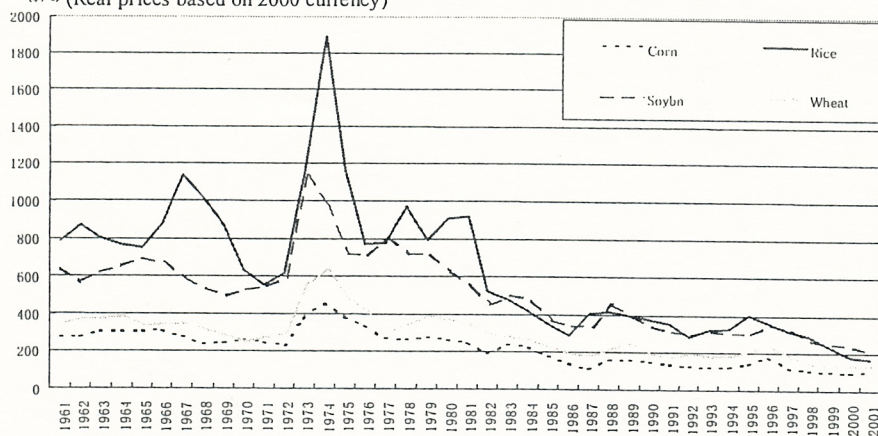
Source: S. Ito, World Food Statistics and Graphics (<http://worldfoodmuses.tottori-u.ac.jp>), Tottori University, Japan November 15, 2002. (Original sources are from ERS/USDA PS&D View, October 2002).

Fig.7. Difference in yields between OECD and developing countries, 2001



Source: S. Ito: World Food Statistics and Graphics (<http://worldfood.muses.tottori-u.ac.jp>). Tottori University, Japan November 15, 2002. (Original sources are from ERS/USDA PS&D View, October 2002).  
Note: Rice is milled basis.

Fig. 8. Evolution of world market prices for corn, rice, soybeans and wheat, 1961-2001 (\$/t) (Real prices based on 2000 currency)



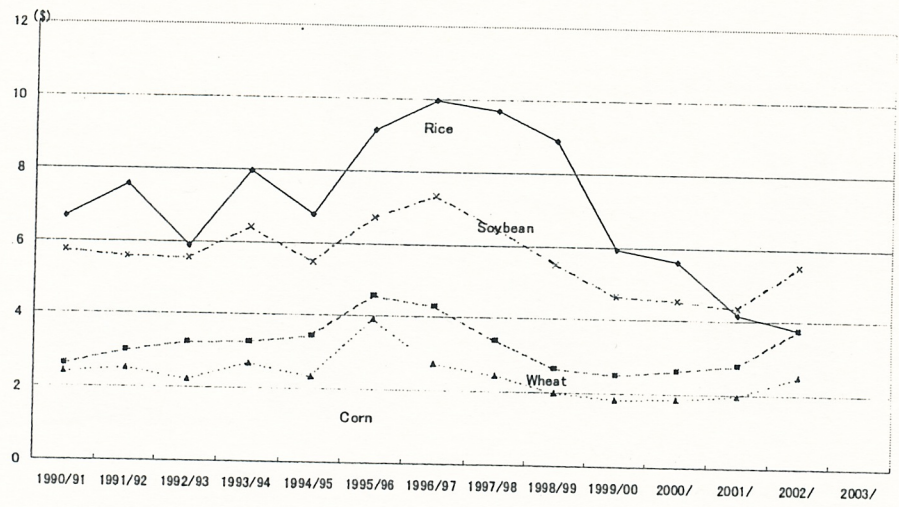
DATA : IMF: International Financial Statistics Yearbook, 1999.

USDA: WASDE report, WASDE-364, July 12, 2000. Rice since 1986 and others since 1999, data were obtained from the USDA.

Note 1 : Rice : Bangkok, 5% broken, milled. Wheat : No1, Hard Red, US Gulf. Corn : Yellow No. 2, Chicago.  
Soybeans : US (Rotterdam)

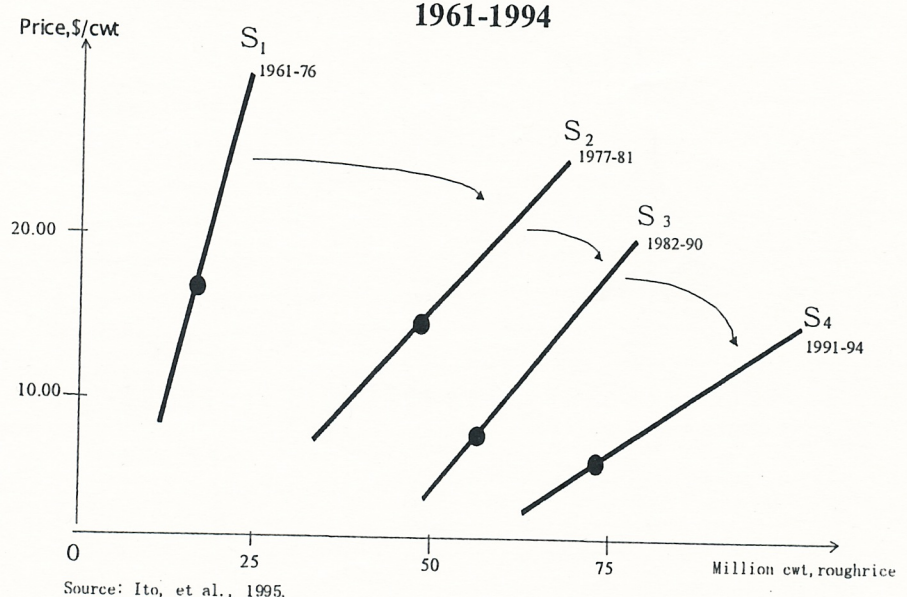
Note 2 : The real prices were calculated based on US CPI, year 2000=100.

Fig.9. Market prices for the major grains and soybeans in the U.S. ? 0-? 2



Note: Farm prices, Rice per cwt, the others per bushel.  
Source: USDA: WASDE, October 2002 and previous issues.

Fig. 10. Shift in rice supply curve in the U.S. 1961-1994



Source: Ito, et al., 1995.

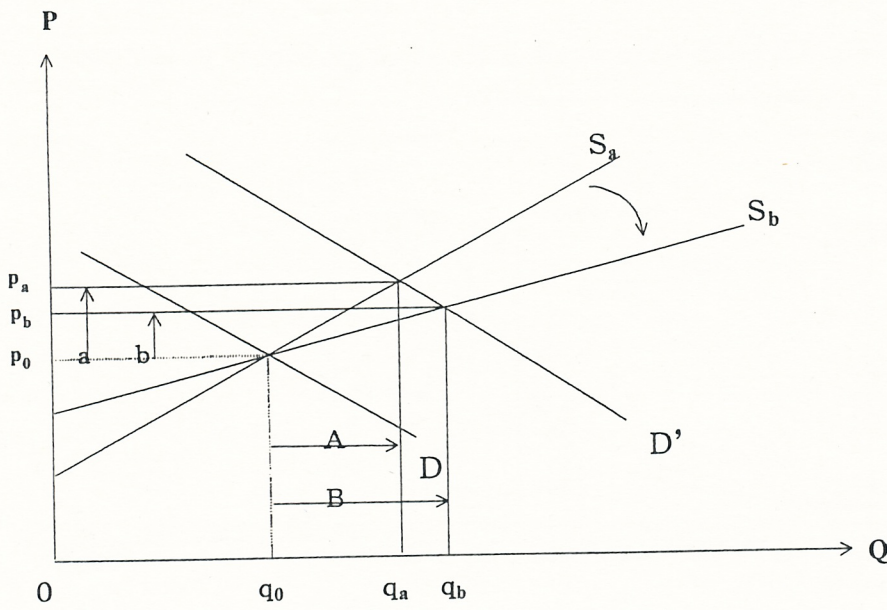
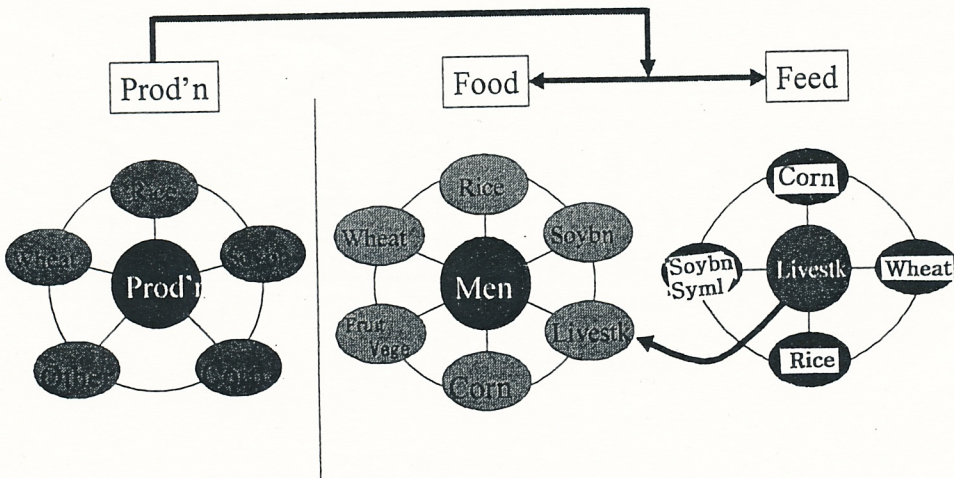
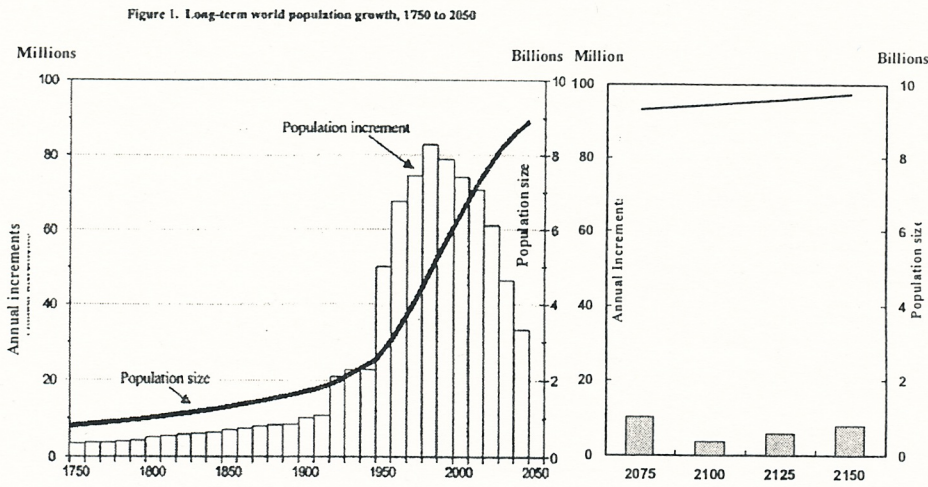


Fig.11. Difference in impacts depending upon slope of supply curves.

Fig. 12. Substitute relationships among crops in production and consumption



**Fig. 13. Long-term world population growth, 1750 to 2150**



Source: United Nation: Long-range World Population Projections: Based on the 1998 Revision, Executive Summary, (<http://www.un.org/esa/population/publications/longrange/longrange.htm>), The World at Six Billion, (<http://www.un.org/esa/population/publications/sixbillion/sixbillion.htm>)

**Table 1. Production growth of the major crops in the world (1961-2000, 5 year average)**

	(Prod. in 1000 tons, Yield/ha)															
	Rice				Wheat				Corn				Soybeans			
	Prod.	Growth	Yield	Growth	Prod.	Growth	Yield	Growth	Prod.	Growth	Yield	Growth	Prod.	Growth	Yield	Growth
1961-65	165	-	1.36	-	244	-	1.16	-	215	-	2.05	-	41	-	1.42	-
1966-70	195	18%	1.51	11%	305	25%	1.41	21%	261	21%	2.36	15%	41	-	1.42	-
1971-75	224	15%	1.64	8%	351	15%	1.62	14%	316	21%	2.69	14%	56	38%	1.54	8%
1976-80	255	14%	1.79	9%	417	19%	1.81	12%	390	23%	3.07	14%	77	37%	1.66	8%
1981-85	301	18%	2.09	17%	481	15%	2.06	14%	434	11%	3.39	10%	91	18%	1.75	5%
1986-90	332	10%	2.28	9%	527	10%	2.35	14%	454	5%	3.53	4%	102	12%	1.86	6%
1991-95	360	9%	2.45	7%	545	3%	2.48	5%	517	14%	3.87	9%	121	19%	2.04	10%
1996-00	393	9%	2.59	5%	590	8%	2.64	8%	593	15%	4.28	11%	157	29%	2.24	9%
Growth in 40 yrs. times	2.38	-	1.90	-	2.41	-	2.26	-	2.76	-	2.09	-	3.86	-	1.58	-
2001	393	-	2.60	-	575	-	2.69	-	597	-	4.29	-	182	-	2.33	-

Sources: S. Ito, World Food Statistics & Graphics, Tottori Univ. Japan (<http://worldfood.muses.tottori-u.ac.jp/>), Dec. 2001. Original data are from the USDA P-S&D View, November 2001.

Note 1: Rice is milled base.

Note 2: Growth rates during the last 40 years except for soybeans 35 years.

Table2. Growth rates in world population and food  
(UN, USDA, 2001)

Population/yr. ( '90-'50)		Food/yr. (1996-2000)	
• 1990	1.6%	Rice	1.7%
• 1992	1.5%	What	1.7%
• 1994	1.4%	Corn	2.8%
- 2000	1.3%	Soybeans	5.5%
- 2025	0.8%		
- 2050	0.3%		

Table3. Japanese dependence on US food supply

	総輸入量 (A)	輸入依存度	米国からの輸入量 (B)	(1,000トン,%)	
				米国依存度 (B/A,%)	(1980年の米国依存度,%)
コムギ wt	5,960	101%	3,229	54% (第1位)	60% (第1位)
コーン cn	16,117	99%	14,939	93% (第1位)	93% (第1位)
コメ rc	654	7%	292	45% (第1位)	1%
ダイズ sy	4,884	96%	3,867	79% (第1位)	95% (第1位) '77
ブロイラ br	567	35%	96	17% (第1位)	58% (第1位)
牛肉 bf	785	53%	415	53% (第1位)	34% (第2位)
豚肉 pk	612	28%	171	28% (第2位)	28% (第2位)

ソース: USDA: PS&D View, November 2001, 財務省「日本貿易統計」及び輸入食品事典研究会「総説・輸入食品事典」(1996)

ブラジル産ダイズの日本輸入量  
75万トン (2000年)  
Soybean imports from Brazil, 750,000 tons (2000)