Chapter 3

Agriculture Industry Trends by Item

1. Grains
2. Livestock
3. Horticulture and Specialty Crops
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1. Grains

As the 20-year rice tariffication delay since the UR agricultural negotiations ended, anyone can now import foreign rice by paying a 513% tariff from January 1, 2015. Five countries including the United States and China raised objections against the tariff rate reported to the WTO and verification of the tariff rate is currently in progress. Even after tariffication, 408,700 tons, which is the import quota of 2014, will continue to be imported at a 5% tariff.

Rice is currently in excessive supply due to the consumption reduction rate being faster than the production reduction rate, while inventories are increasing due to the good harvests that have continued since 2013. The direct payment system has been implemented since 2005 for the stabilization of income for rice farms, and the target price from 2013 was raised from 170,083 won/80kg to 188,000 won/80kg.

A procurement program that was enacted to increase income for rice farms and stabilize supply was abolished and in 2005 a public stockholding program was introduced for food security.

The annual demand for soybeans in 2014 was 1.36 million tons. 150,000 tons were produced in Korea and the remaining amount was imported. Of this demand, 930,000 tons were for feed, accounting for 68%. Soybeans are imported in excess of the CMA quota because the price of imported beans is cheap.

A procurement program was implemented for barley to supplement rice shortage, but as the production greatly exceeded

the demand for domestic products, stock accumulated and thus the procurement program was abolished in 2012. Since the launching of the WTO, the CMA quota is being imported and is being used for processing.

The self-sufficiency rates for corn and wheat are less than 1%, and most of the domestic demand depends on imports. In particular, with the growth of the livestock industry, corn imports for feed accounted for 80% of the total demand in 2014. For wheat, the ratios for food and feed of the total demand were 58% and 42%, respectively.

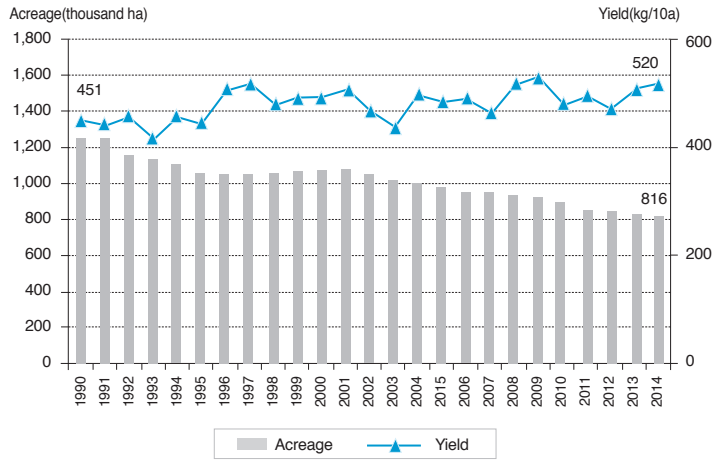
Rice

Supply and Demand Trends

Rice production reached 5.606 million tons in 1990 and dropped to 4.006 million tons due to the poor harvest in 2012, and it increased slightly to 4.241 million tons in 2014 as harvests improved. Though rice production changes every year depending on the harvest, it is overall dropping due to the reduced harvesting area. Through development and distribution of new varieties, rice production per hectare increased from an average of 4.52 tons from 1986 to 1995 to an average of 4.93 tons between 1996 and 2014. However, the rice cultivation area reduced by 34.4% from 1.244 million hectares in 1990 to 0.816 million hectares in 2014. The rice cultivation area in 2014 accounted for 48.3% of the 1.691 million hectares of farming areas and 87.4% of the 0.931 million hectares of paddy fields.

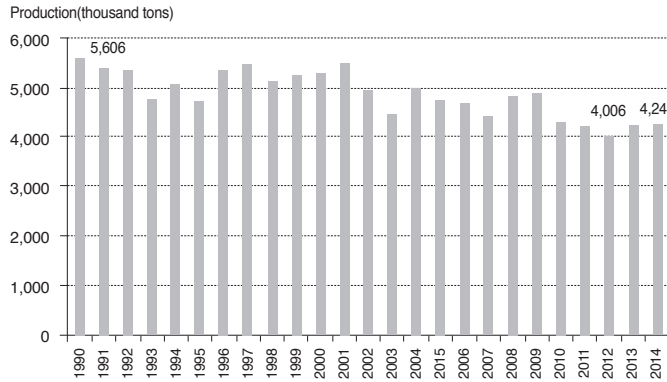
The number of rice farms in 2013 was 0.7 million, which accounted for 61.3% of the 1.142 million total farms. The rice cultivation area per farm is growing, but it is still in small scales at 1.19 hectares as of 2013.

Figure 3-1 Rice Production and Yield



Source: MAFRA, *Grain Policy Data,* Apr 2015.

Figure 3-2 Changes in Rice Production



Source: MAFRA, *Grain Policy Data,* Apr 2015.

Due to the increase in single-person households and the spreading of westernized diets, the rice consumption per capita dropped from 119.6kg in 1990 to 65.1kg in 2014. Rice consumption

Table 3-1 Rice Consumption per Capita

Crop Year	Consumption per Capita (kg)	Annual Change Rate (%)
1990	119.6	-1.5
1995	106.5	-1.7
2000	93.6	-3.4
2005	80.7	-1.6
2010	72.8	-1.6
2011	71.2	-2.2
2012	69.8	-2.0
2013	67.2	-3.7
2014	65.1	-3.1

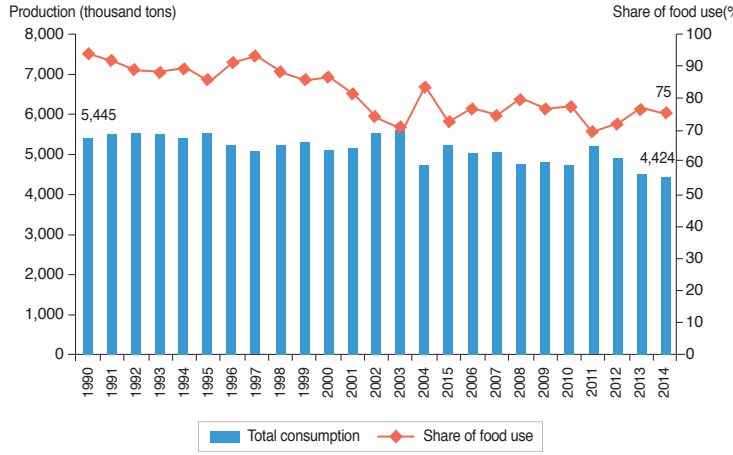
Source: MAFRA, *Grain Policy Data,* Apr 2015.

per capita fell by an annual average of 2.34% in the 1990s, but the rate of its reduction grew to 2.59% in the 2000s. Therefore, rice consumption for food continuously dropped from 5.127 million tons in 1990 to 3.340 million tons in 2014. Given the tendency for declining rice consumption per capita, it is expected that consumption for table purpose will drop even further.

The total annual demand for rice including rice used for processing, brewing and aid to North Korea dropped to less than five million tons in 2004, and continued to decrease to 4.424 million tons in 2014. When the ending stock of rice exceeded the adequate level, the government supplied part of the rice inventory for processing or brewing, and rice was aided to North Korea from 2002 to 2006. Thus, the percentage used for table consumption among the total demand dropped from approximately 90% in the early 1990s to 70-80% levels recently.

The recent price of rice released for processing and brewing

Figure 3-3 Rice Consumption



Note: The share of food use means the proportion of food rice to total consumption.
Source: MAFRA, *Grain Policy Data,* Apr 2015.

by the government was 30-40% and 10-20%, respectively, of the market price for table consumption. The price of rice released was determined in consideration of the prices of flour and tapioca, which can be substitutes for rice for processing and brewing. Aid to North Korea took the form of loans based on international rice prices, and when there was insufficient domestic stock, imports from Thailand were provided.

Ending stocks of rice fluctuated significantly in each year. Between 1990 and 1995, the annual average rice cultivation area decreased sharply by 38,000 hectares every year and dropped to 1.05 million hectares in 1996. Due to the relatively larger fall in rice price compared to vegetables, there was an increase in the cultivation of vegetables on paddy fields. Meanwhile, the rice cultivation area decreased considerably as converting paddy fields into non-

agricultural land became easy due to the surplus in rice supply. In addition to the decline in rice acreage, 1993 was a bad year for the rice crop with 4.2 tons of rice production per hectare. In 1995, rice production was also low and remained at 4.5 tons per hectare. As a result, the rice inventory at the end of 1996 was at a record low of 244,000 tons (stock-to-use ratio of 4.7%).

Table 3-2 Stock, Demand for Processing and Brewing, Aid to North Korea

Unit: thousand tons

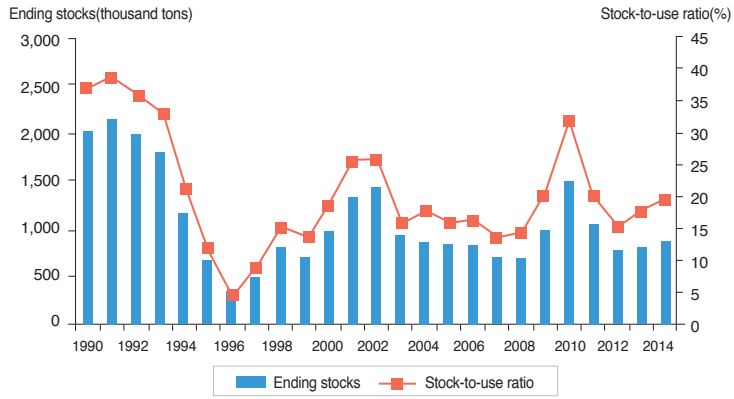
	Ending Stocks	Processing Use	Aid to North Korea
1990	2,025	58	0
1995	659	202	0
2000	978	175	0
2001	1,335	183	0
2002	1,447	337	400
2003	1099	313	400
2004	850	335	1051
2005	832	324	309
2006	830	373	168
2007	695	424	173
2008	686	436	0
2009	993	366	0
2010	1,509	549	0
2011	1,051	644	0
2012	762	566	0
2013	801	526	0
2014	874	535	0

Note: Of 400,000 tons aided in 2004, 300,000 tons were aided with Thai rice.
Source: MAFRA, *Grain Policy Data,* Apr 2015.

Rice prices have risen since 1997 as a result of continued poor harvests, while the prices of substitute crops have dropped. Consequently, rice acreage increased by an annual average of 5,500 hectares reaching 1.072 million hectares in 2000. In addition to the increased cultivation area of rice after 1996, good weather conditions also allowed good harvest seasons to continue. In 1996 and 1997, production per hectare was recorded at 5.1 tons and 5.2 tons, respectively. And continued good harvests and decreasing consumption for rice increased ending stocks.

Due to demand for rice increased with aid to North Korea from 2002 and poor harvests, the stock ratio in 2007 dwindled to 13.7%. Harvests were abundant in 2008 and 2009, and the inventory rose again to more than one million tons. The government released the previous year's rice and thus the inventory dropped to under one million tons, but it is now again rising.

Figure 3-4 Ending Stocks and Stock-to-use Ratio



Source: MAFRA, *Grain Policy Data,* Apr 2015.

Production Policy

Prior to the food policy reforms of 2004, the government operated a procurement program to encourage rice production and to achieve self-sufficiency. Until the first half of the 1990s, a basic policy of fixing government procurement prices above market prices was maintained to protect farms. Procurement prices were kept at high levels, averaging 124,468 won/80kg from 1990 to 1994, which equaled 180% of the production costs of 69,068 won/80kg during the period and 120% of harvest season market prices. The government also purchased a substantial amount of rice, ranging from 22% to 30% of the total domestic production. As a result of increased rice production by government price support and falling rice consumption, the ratio of stocks-to-use reached 39% at the end of the 1991 rice year. While the procurement program guaranteed sales channels for rice to farm households and increased their income from rice farming, it also led to the side effect of excessive supply.

With the conclusion of the Uruguay Round (UR) negotiations in 1993 followed by the launching of the World Trade Organization (WTO) in 1995, conditions surrounding rice policies changed. In particular, the government conceded to reduce domestic subsidies (Aggregate Measurement of Support: AMS) from 2.18 trillion won in 1995 to 1.49 trillion won by 2004. As 91% of the average AMS in the base year (1989-1991) was from government rice purchases, the procurement program became significantly limited.

Because tariff capping and reduction of AMS were discussed in the DDA agricultural negotiations, the rice procurement program was abolished and a public reserve program for food security was

introduced in 2004.

Meanwhile, production control policies were implemented at the time of rice production increase and overstock. From 2003 to 2005, farmlands where rice was grown in 2002 among farms under the rice farming direct payment program were provided subsidies of three million won per hectare annually if they did not cultivate rice or other commercial crops. While the production control program resulted in a decrease in the rice cultivation area, marginal land with low productivity participated in the program, and therefore, it did not have a significant effect in reducing rice production. As the rice inventory reached 1.5 million tons in 2010, the 'paddy income diversification program' was introduced for three years from 2011 to reduce the rice cultivation area. By cultivating crops other than rice, subsidies of three million won per hectare were provided instead of exclusion of variable direct payments. With this project, 37,000 hectares were converted to other crops in 2011. However, due to the poor harvest, the project area dropped to 7,500 hectares in 2012, and this program was abolished in 2013.

Income Policy

In 2004, there was a fundamental change in the Korean rice policy. Amid the rice negotiations in 2004, anxiety in the farm community heightened as the rice market was expected to either be liberalized through tariffication, or rice prices were destined to fall even if tariffication was delayed from 2005. If the domestic rice market was liberalized through tariffication, the damage to farm households would be significant with rice imports surging according

to international rice prices, customs duty, and exchange rates. Even if rice tariffication was to be delayed again, imported rice in the domestic market would increase every year, leading to a fall in the domestic rice price that would ultimately impact the income of farm households. Accordingly, the development of policy measures to stabilize farm household incomes emerged as a pressing issue.

In order to alleviate instabilities in farm household income, the government introduced the income compensation program for rice farmers in 2005. The program set a target price to compensate 85% of the difference in the market price from the government's fiscal budget. This enabled farm incomes to stabilize even when rice prices fell as farm prices, which included direct payments, did not deviate significantly from target prices. The direct payment program paid out fixed and variable payments to farmers. Fixed payments were classified as a green box since a constant amount was paid regardless of market prices. However, variable payments were considered to be amber box subsidies subject to reduction, as they were paid out in connection with market prices.

The target price of 170,083 won per 80kg was determined taking into account market prices and the income effects of the government procurement program. Fixed payments were only given to farmland that actually produced rice in the base year (1998-2000), provided that the currently idle farmland or farmland cultivating other crops maintains the shape and form of paddy fields. While farmland plots subject to variable payments were the same as those subject to fixed payments, farm households were required to cultivate rice in order to receive the variable payment. As variable payments were coupled with production, criticism that direct payments may create oversupply was raised.

Though the target price at the time of introducing the direct payment for rice income compensation was supposed to be adjusted every three years, the target price to be applied in 2008 dropped, and thus a request to maintain the previous target price rose. Accordingly, the target price was frozen at 170,083 won/80kg, and the Enforcement Decree of Grain Management Act was revised to change it every five years. Five years later there were demands to reflect production costs and inflation in the target price, and thus, the target price was raised to 188,000 won/80kg. The fixed direct payment was 700,000 won per hectare, but was increased gradually from 2013 to one million won per hectare in 2015.

The direct payment for rice income compensation hit a record high by paying out 1.5045 trillion won in 2005 and was the lowest in 2012 at 610.1 billion won. The 2008 and 2011-2013 harvest prices were higher than the trigger level, and thus variable direct payments were not given.

Table 3-3 Direct Payments

Unit: won/80kg, 100 million won

Year	Harvest season price (October - January)	Fixed Payment	Variable Payment	Total Direct Payments
2005	140,028	6,038	9,007	15,045
2006	147,715	7,168	4,371	11,539
2007	150,810	7,120	2,791	9,912
2008	162,307	7,118	-	7,118
2009	142,360	6,328	5,945	12,330
2010	138,231	6,223	7,501	13,729
2011	166,308	6,174	-	6,174
2012	173,779	6,101	-	6,101
2013	174,707	6,866	-	6,866
2014	166,198	7,560	1,941	9,501

Source: MAFRA, *Grain Policy Data,* Apr 2015.

Public Stock Holding Programme

Public stock holding is a program in which the government stocks a certain amount of a commodity in its reserves in preparation for disasters or emergencies. Rice is a staple grain and it has low price elasticity of demand, so prices can rise sharply in years with poor harvests, which could in turn result in social chaos. Therefore, holding appropriate levels of reserves is necessary for food security.

Over the years, the government procurement system was used as a means to achieve food security, along with the enhancement of rice farmers' income through price supports. In times when the market supply of rice decreases due to bad harvests, the government would release its stocks to facilitate market stability. However, with the AMS limit being cut back and as discussions for further AMS reductions are being held in DDA negotiations, there are limits in food security through the procurement program. Therefore, a public reserve program was implemented for food security with the abolition of the procurement program in 2004. In order for a public stock holding program to be recognized as a green box under the WTO system, it must comply with the following conditions: 1) there must not be any price supports for producers, 2) target amounts of stocks for food security must be pre-determined, and 3) government must buy at market prices and sell at prices not below market prices.

Since 2005, the Korean government has decided on an implementation principle of setting the base amount of rice for year-end public stockholding at 864,000 tons, while purchasing and releasing 432,000 tons of rice every year. It also decided to review the level of its public stockholdings after three years, taking into account factors such as rice consumption. In 2008, the decrease in

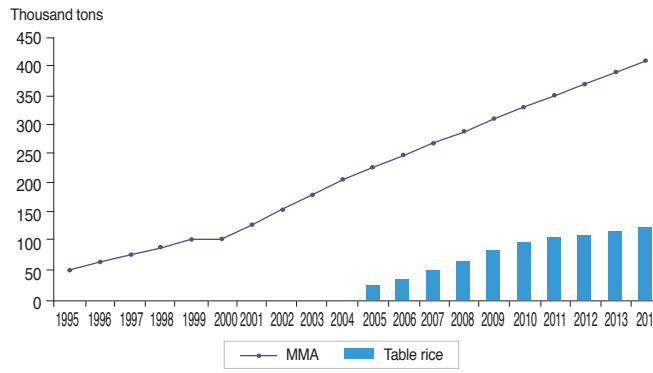
consumption was reflected and the amount of the public stockholding was set at 720,000 tons, which is 17% of the average consumption rates of 2005 to 2007, and it decided to purchase 360,000 tons annually.

The price at which the government purchases rice from farms for its public stockholding is the market price during the harvest season (October to December). As the harvest season prices are not determined when the government purchases its public stockholding rice, it initially pays 80% of the previous year's nationwide average price (based on grade 1 products) and settles the balance after the harvest season price is set. Selling prices of public stocks are determined in consideration of market prices.

Import Policies

In lieu of delaying rice tariffication as a result of the UR negotiations, Korea gradually increased minimum market access (MMA) quota imports from 1% up to 4% of the base year (1988-1990) consumption over a period from 1995 to 2004. In 1995, 51,000 tons (milled rice) was imported, and imports increased to 205,000 tons by 2004.

Figure 3-5 MMA and Table Rice Imports



Prior to the end of the extended rice tariffication delay period of ten years, the government notified the WTO with the schedule of modified concessions to convert to rice tariffication on September 30, 2014. Five countries such as the US, China, Australia, Thailand and Vietnam raised objections to Korea's proposed tariff rate on imported rice, and rice tariffication execution began on January 1, 2015 regardless of verification of tariff rates.

The major contents reported to the WTO provided grounds for applying the special safeguard, and the tariff rate was submitted as 513% using the ad valorem tax. The country specific quota provided in the 2004 rice negotiations was converted into a global quota, and the percentage of import of table rice was deleted in the notification.

MMA rice is imported by Korea upon the government's tender notice for bids to purchase imported rice bound by the import quotas of each country and according to specific criteria, such as quality, specified in the notice. The enterprise of state trading conducts competitive bids to importers on a lowest bid basis. A contract is signed between the successful bidder and the state trading enterprise after the bidder pays the contract deposit. As rice is imported to Korea through the lowest bid system, it may be difficult to import high quality rice.

The imported table rice is sold to distributors through an open bid system. Any difference between import prices and sales prices is reverted to the government as a mark-up. The distributors who win bids for imported rice at the highest price sell the rice to retail stores, meal service companies, and restaurants. Imported rice other than for table use is sold for processing or brewing. The sales price is determined by the government considering market demand.

Korea imports the most rice from China, followed by the US. The rice imported from China and the US is mainly Japonica type rice. While the amount is not large, Indica rice from Thailand is also being regularly imported.

Soybeans

Supply and Demand

Annual demand for soybeans is about 1.3 million tons with both domestic production and imports being supplied to the domestic market. Domestic production continued to fall until the early 2000s, but it has recently picked up due to government policies to increase domestic soybean consumption and to enhance the grain self-sufficiency rate. Soybean imports account for approximately 1.2 million tons.

Food consumption of soybeans accounts for approximately 30% of the total soybean use with the remainder being used as animal feed. 92,000 tons of the 417,000 tons of soybeans consumed as food in 2014 were used in households, while 325,000 tons were used for processing. As for the rate of use of soybean ingredients for processing in 2013, 28.9% was used for tofu, 27.4% for soya milk, 24.2% for fermented soybean pastes, and 19.5% for other uses. While per capita soybean consumption decreased up until 2003 reaching as low as 8.0kg, it grew to over 9kg after 2005 in line with increased consumer interest in health foods, but has recently reduced again and maintains a level of approximately 8kg.

Soybean consumption for animal feed is around one million tons, and they are all imported.

Table 3-4 Annual Supply and Demand of Soybeans

Unit: thousand tons, kg/person

Rice Year	1990	1995	2000	2005	2010	2011	2012	2013	2014(p)
Supply	1,450	1,820	1,781	1,493	1,448	1,384	1,301	1,323	1,505
Carry-in	106	231	79	117	73	67	62	54	61
Production	252	154	116	139	139	105	129	123	154
Import	1,092	1,435	1,586	1,236	1,236	1,212	1,110	1,146	1,290
Demand	1,254	1,558	1,694	1,420	1,381	1,322	1,247	1,262	1,358
Food	355	402	399	441	417	393	408	403	417
Feed	866	1,142	1,282	965	952	919	827	848	928
Seeds, etc.	33	14	13	14	12	10	12	11	13
Ending stocks	196	262	87	73	67	62	54	61	147
Per capita consumption	-	9.0	8.5	9.3	8.3	7.8	8.0	7.9	8.1

Source: MAFRA, Food Grain Policy Division.

Production Support Policy

From 1983 to 1988, a program to increase soybean production was implemented, raising government procurement prices every year and expanding the portion of government procurement in domestic production. Government procurement increased from 1.8% in 1983 to 36.1% in 1989. As the procurement price was raised every year, it exceeded soybean prices received by farmers from 1985. In addition, an active production expansion policy was implemented in which import and procurement of soybeans were conducted by the National Agricultural Cooperative Federation, which, in turn, supplied quality seeds and compound fertilizers exclusively for soybean farmers purchased with earnings from the sales of imported soybeans.

Despite the increase in government procurement, the three

major companies avoided buying domestic soybeans purchased by the government as they were more expensive than imports. As a result, the soybean production expansion plan was put on halt

Table 3-5 Production, Procurement and Prices of Soybeans

Unit: tons, %, won/kg

Year	Production	Procurement (Ratio[1])	Prices	
			Procurement Price[2]	Farm Price[3]
1985	233,863	20,270(8.7)	900	788
1990	232,786	68,817(29.6)	1,300	932
1995	159,640	3,248(2.0)	1,430	1,733
2000	113,196	4,113(3.6)	2,188	2,431
2001	117,723	5,498(4.7)	2,407	2,270
2002	115,024	4,832(4.2)	2,407(4,770)	2,397
2003	105,089	5,441(5.2)	2,407(4,770)	2,850
2004	138,570	10,463(7.6)	2,407(4,770)	3,040
2005	183,338	12,552(6.8)	3,017(4,204)	2,436
2006	156,404	14,111(9.0)	3,017(3,526)	2,037
2007	114,245	4,352(3.8)	3,017	2,421
2008	132,674	2916(2.2)	3,017	3,121
2009	139,251	1272(0.9)	3,168	3,081
2010	105,345	-	3,168	4,593
2011	129,394	-	3,168	4,329
2012	122,519	-	3,618	4,427
2013	154,067	8,943(5.8)	3,868	3,949
2014	139,267	9,409(6.8)	3,868	2,926

Note: 1) Ratio of procurement to production
2) Figures in parentheses show the procurement prices of paddy field soybeans.
3) Average prices received by farmers from November to December, released by Nonghyup Monthly Statistical Survey. The Q4 farm price indexes were converted to the figures of 2008-14.
Source: MAFRA, Food Grain Policy Division.

in 1989, while soybean import and procurement operations were transferred to the Korea Agro-Fisheries Trade Corporation. For soybeans produced between 1989 and 1991, a price difference compensation program was implemented for soybean processing companies to reimburse the difference in procurement and import prices. In the case of the 1989 produce, a total price difference of 45.3 billion won was paid out for 32,000 tons of soybeans.

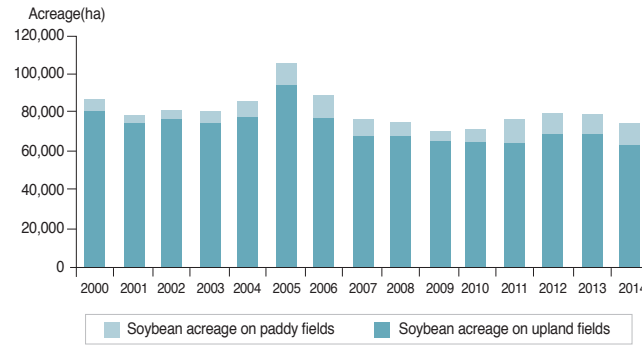
As UR negotiations began in 1988 and there was a basis for liberalization, a rise in procurement prices was suppressed and procurement reduced greatly. Accordingly, the share of government procurement among domestic production declined to 4.7% in 2001. From 1990 to 1998, procurement prices were either frozen or raised minimally, leading to a substantial fall in the proportion of government procurement as purchase prices were below market prices after 1994. As a result, the volume of government procurement from 1993 to 2001 fell to 1-5% of domestic production. From 2010 to 2012, the procurement price was higher than the market price so procurement was not made. From 2013 the procurement program was converted into the public reserve program. Market prices once again dropped with production increase and approximately 9,000 tons were purchased for public reserves.

The government sought various measures to support soybean cultivation on paddy fields as a means to alleviate problems related to the surplus of rice and to enhance the food self-sufficiency rate. In order to induce cultivation of soybean in paddy fields, the government set procurement prices of paddy field soybeans at rice income levels, favoring it over soybeans grown in upland fields. Taking into account the rice income of 724,000 won per 10 ares (average from 1997 to

2001), the procurement price of paddy field soybeans was fixed at 4,770 won per kg. Accordingly, government procurement was centered on paddy field soybeans after 2003 as paddy field soybean procurement prices were above farm prices, while farm prices of upland field soybeans were below government procurement prices.

As the procurement prices of paddy field soybeans were raised, the cultivation area also increased significantly. However, procurement also brought about such side effects as a fall in soybean prices. In 2006, the cultivation area of paddy field soybeans expanded to 11,944 hectares from 4,481 hectares in 2002. Nevertheless, the soybean price per kg increased from 2,397 won in 2002 to 3,040 won in 2004, but then fell to 2,037 won in 2006. After the differentiated procurement of soybeans from paddy fields was abolished in 2006, soybean production decreased and farm prices rose after 2007 but dropped with the consecutive good harvests in 2013 and 2014.

Figure 3-6 Soybean Acreage



Source: Statistics Korea.

Import Policies

As soybeans were liberalized in terms of TE (tariff equivalent), which corresponds to the domestic and international price differences, in UR negotiations, Korea has been importing current market access (CMA) quotas since 1995. The total CMA quotas are 1.032 million tons, comprised of 0.186 million tons for food and 0.846 million tons for animal feed.

The CMA quotas were determined on the basis of average amount of imports from 1988 to 1990. The market access quotas were also increased according to the supply and demand of soybeans in the domestic market. The increased soybean imports over CMA reached a total of 600,000 to 800,000 tons with 100,000 to 130,000 tons of quota increases for food annually. The quotas for food soybeans were increased at the request of the soybean processing industry including tofu cooperatives. Quota increases are determined without consideration of domestic soybean production. Accordingly, such decisions have been criticized for weakening the foundation of domestic soybean production.

Table 3-6 Annual Soybean Imports for Food

Unit: thousand tons

		1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Tariffs (%)	In quotas	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
	Over quotas	535.6	508.6	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0	487.0
CMA Quotas		186	186	186	186	186	186	186	186	186	186	186	186
Total Imports (including increase)		290	355	340	266	290	308	279	279	326	326	287	312

Source: MAFRA, Korea Customs Service.

Import and regulation bodies, as well as applied tariff rates, differ depending on the use of imported soybeans. Of the market access quota, food soybeans are subject to state trade with their management delegated to the Korea Agro-Fisheries Trade Corporation, while soybeans used for animal feeds are directly imported by companies seeking the import. Tariff equivalent was 487% (or 956 won/kg) as of 2004. Of the tariff rate quotas, 1% duty was imposed on soybeans used for oil and oil cakes while 5% duty was imposed on soybeans used for food.

A portion of food soybeans imported through state trading is sold at prices set by the government, while the rest is sold publicly in the wholesale market. There is a large price discrepancy among the prices of imported soybeans sold publicly, soybean imports sold at regular prices, and soybeans produced domestically. The government determines the price at which it is supplied by taking into account international prices of soybeans, exchange rates and

Table 3-7 Wholesale Prices of Domestic and Imported Soybeans, and Government Supply Prices

Unit: won/kg

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Domestic (A)	3,537	2,616	2,835	3,557	5,353	4,042	2,665	2,639	4,240	3,671	4,881	6,737	5,560	6,030	4,066
Imports (B)[1)]	2,133	1,959	1,900	2,032	2,195	1,993	2,407	2,297	3,058	3,169	3,163	3,202	3,524	3,847	3,219
Imports (C)[2)]	660	730	730	600	700	630	580	750	1,0 50	1,020	1,020	1,020	1,020	1,020	1,020
B/A	60.3	74.9	67.0	57.1	41.0	49.3	90.3	87.0	72.1	86.3	64.8	47.5	63.4	63.8	79.2
C/B	30.9	37.3	38.4	29.5	31.9	31.6	24.1	32.7	34.3	32.2	32.2	31.9	28.9	26.5	31.7

Note: 1) Wholesale prices of imports
2) Government supply prices
Source: Korea Agro-Fisheries Trading Corporation.

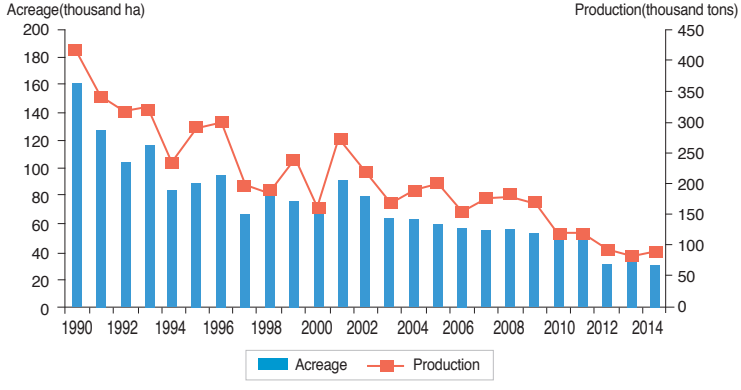
shipping charges. The government supply price of imported soybeans in 2014 was 1,020 won/kg, only 25.1% of the domestic wholesale price of 4,066 won. The low supply price of imported soybeans has raised concerns that it curtails the motivation of farmers to produce soybeans. The price of imported soybeans sold in the wholesale market in 2014 was 3,219 won, or 79.2% of the domestic soybean wholesale price, while remaining mostly at around the 60% level in recent years.

Barley

Barley was cultivated as one of the key food crops during periods when there were shortages in rice. However, barley is losing its ground as a major food crop due to increases in rice production and wheat imports.

The cultivation area of barley (including common barley, naked barley and beer barley) decreased from 160,000 hectares in 1990 to 31,000 hectares in 2014. From 1990 to recently, production per hectare has been recording 2.4 to 3.3 tons with large differences

Figure 3-7 Barley Acreage and Production

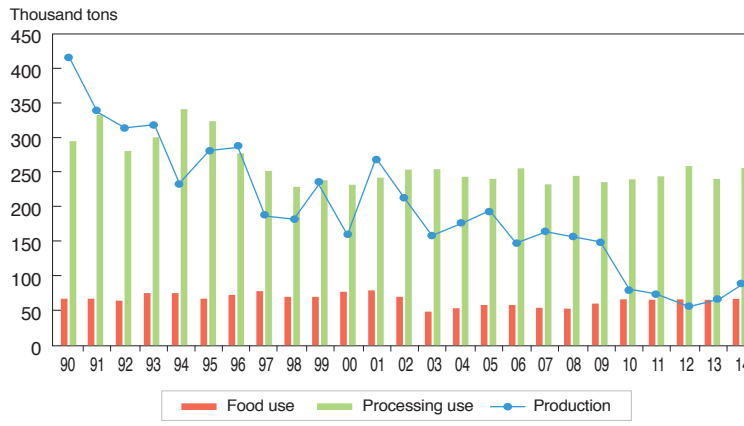


every year depending on climate conditions. As the cultivation area of barley decreased, barley production also fell 79% from 417,000 tons in 1990 to 88,000 tons in 2014.

Total consumption of barley decreased from 427,000 tons in 1990 to 356,000 tons in 2014. As of 2014, approximately 18.8% of the total consumption was used for food, while most of the rest was used for processing. In 2014, 67,000 tons out of the total demand of 356,000 tons were for food use, while 256,000 tons were consumed for processing. The annual per capita consumption of barley was maintained at a level of 1.5 to 1.7kg from 1990 to 2002, but after 2003, it decreased to levels of 1.0 to 1.3 kg.

While consumption as food reduced, barely used for processing that accounts for 80% of consumption is mostly imported, so the stock of domestic barley increased. The stocks as of the end of the 2005 crop year were 319,000 tons, equaling 5.5 times the annual barley consumption for food use.

Figure 3-8 Barley Production and Consumption



The Korean government introduced a government procurement system to encourage barley production at a time when rice was in shortage. However, though the annual barley consumption decreased, production maintained the 200,000 ton level in the 2000s, thus causing an increase of stock. The government gradually lowered the procurement price from 2007 and finally abolished the procurement program in 2012.

In the UR negotiations common barley was liberalized with tariffication and as there were no imports from 1986 to 1988, it was decided to ensure the minimum market access (MMA) opportunity. MMA rose from 14,150 tons in 1995 to 23,582 tons in 2004, and the 2004 MMA corresponds to 5% of the base year consumption. The tariff rate of the MMA quota in 2004 was 20%, and a 324% tariff was added to quotas in excess of MMA. Barley imported by the MMA was mainly consumed for animal feed or processing. Beer barley is added a 30% tariff for CMA quotas, and tariffs of 513% are applied to imports over the quotas. Barley imports rose by 4.5 times from 64,000 tons in 1990 to 291,000 tons in 2014.

Corn

Most of the domestic production is green corn, and Korea relies mostly on imports to meet the processing demand. Since 1995, Korea's self-sufficiency rate of corn has been 1%, and corn production is minimal.

Corn production decreased from 121,000 tons in 1990 to 81,000 tons in 2014, while the total demand during the same period increased 52% from 6.425 million tons to 9.789 million tons. Corn consumption for food accounted for only 0.8% (76,000 tons) of the

total demand in 2014, while corn for animal feed accounted for 80.2%. In this respect, domestic corn production barely reaches levels required to meet food corn demand.

Corn imports rose sharply from 6.198 million tons in 1990 to 10.138 million tons in 2014. This is because there was a stark increase in demand for corn used in processing and animal feed, which is cheaper compared to Korean corn.

Corn was one of the government procurement items to control the price. However, the procurement program was abolished in 2011. In UR negotiations, corn was imported by adding a 3%

Table 3-8 Supply and Demand of Corn

Unit: thousand tons

	1990	1995	2000	2005	2010	2011	2012	2013	2014
Supply	6,891	9,402	9,482	9,662	9,301	8,548	8,233	8,743	10,691
Carry-in	572	434	515	975	713	666	486	378	473
Production	121	89	79	78	77	74	74	83	80
Import	6,198	8,879	8,888	8,609	8,511	7,808	7,673	8,282	10,138
Demand	6,425	8,066	8,613	8,896	8,635	8,063	7,855	8,271	9,789
Food	3	-	35	73	73	70	70	79	76
Processing	1,466	1,709	2,046	2,205	2,009	2,065	2,062	1,870	1,959
Feed	4,949	6,300	6,475	6,583	6,604	6,023	5,681	6,407	7,850
Loss et al.	6	57	57	35	-51	-95	42	-86	-97
Ending Stocks	466	1,336	869	766	666	485	378	493	902
Self-sufficiency rate (%)	1.9	1.1	0.9	0.9	0.9	0.9	0.9	1.0	0.8

tariff for the CMA quota of 6.102 million tons, and for imports over the CMA quotas, tariffs dropped from 365% in 1995 to 328% in 2004. However, in addition to the CMA quota, TRQ quotas were increased in order to suppress inflation.

Wheat

As domestic production of wheat is very small, Korea is highly dependent on wheat imports. Since 1990, its self-sufficiency rate of wheat has been below 1%. Wheat was the first crop to be affected by market liberalization. Domestic production decreased considerably when the procurement program was abolished in 1984. In 1980 prior to the abolition of the procurement program, 92,000 tons of wheat was produced, but since 1990, it has been maintained at levels under 10,000 tons. However, due to increase in the domestic wheat demands in the late 2000s, production increased to 43,000 tons in 2011, but then dropped to 24,000 tons in 2014.

Annual wheat imports stayed under 3 million tons in the 1990s, but increased to over 3 million tons after 2000. The increase in imports can be attributed to a sharp rise in wheat demand for animal feed. The key countries from which Korea imports wheat include the US, Australia and Canada, and the US and Australia account for a high portion of wheat imported for use as flour.

Wheat demand rose from 2 million tons in 1990 to 3.6 million tons in 2014. Wheat consumed as food in 2014 was 1.1 million tons with domestic wheat production accounting for 1.1% of the total wheat demand for food. Meanwhile, the total volume of wheat for animal feed is currently comprised of imports. As of 2014, wheat for processing accounts for 27.1% of the total demand and wheat for feed 41.9%.

Table 3-9 Wheat Supply and Demand

Units: thousand tons

	1990	1995	2000	2005	2010	2011	2012	2013	2014
Supply	2,477	3,697	3,740	3,878	4,814	4,998	5,754	5,186	4,083
Carry-in	237	910	472	464	458	432	516	491	446
Production	1	10	2	8	39	44	37	19	24
Import	2,239	2,777	3,266	3,406	4,317	4,522	5,201	4,676	3,613
Demand	2,005	3,335	3,279	3,378	4,382	4,482	5,263	4,741	3,639
Food	903	1,070	1,363	1,225	1,139	1,118	1,115	1,072	1,106
Processing	992	1,024	880	814	1012	1083	1032	1011	987
Feed	98	1,225	1,016	1,257	2125	2176	3086	2660	1524
Loss et al.	12	16	20	82	104	104	29	-4	20
Ending Stocks	472	362	461	500	432	516	491	446	444
Self-sufficiency rate (%)	0.1	0.3	0.1	0.2	0.9	1	0.7	0.4	0.7

Outlook and Tasks

With the rice negotiations in 2004, Korea abolished the government procurement program for rice, which was a price support policy, implemented public reserve programs for food security, and also introduced the direct payment system for rice income compensation to stabilize income. However, as the government assertively intervened in the rice market according to the supply and demand of rice, the goal of the 2004 food policy reforms was not achieved and the limits of market function activation and public reserve program operation surfaced. Therefore, market intervention for supply and demand control and operation

of public reserve programs should be separated. Income policies should be reformed to a more efficient operation method as they are partially coupled with production. Moreover, the tariffication delay that lasted for 20 years since the UR negotiations was terminated and rice tariffication is executed from 2015. All capacities should be concentrated to procure the 513% that was notified in the verification of tariffs with concerned nations. As the current supply of rice is higher than the demand, it is necessary to review comprehensive rice supply and demand balance plans including the introduction of TRQ and utilization plans.

Soybeans are important as a substitute commodity to control the supply and demand of rice. Also, it is expected that the global non GM soybean production for food will gradually decrease, so the maintenance of the production base will be necessary. Therefore, it is needed to consider contract cultivation or the introduction of direct payment systems to stabilize farm prices.

In the case of barley, there is a huge price disparity between domestic and foreign products for processing and it is thus expected that imports will be inevitable. However, introduction of direct payment systems that can substitute price support policies should be reviewed to produce barley for food.

The corn and wheat markets are highly reliant on imports, so systematic management to import stable quantities at appropriate prices is necessary. For this, overseas contract cultivation and utilization of futures markets should be considered.

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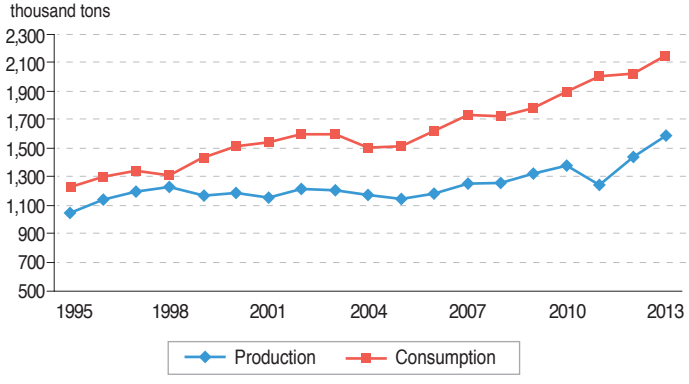
2. Livestock

Despite challenges surrounding the livestock sector in Korea, a rise in demand from growing populations and incomes has increased the sector's output and share in agriculture. Between 1995 and 2013, per capita meat consumption rose 2.4% annually from 27.5kg to 42.8kg, while meat production grew 2.2% annually from 1,057 thousand tons to 1,587 thousand tons. Imports of meat increased as consumption expanded faster than production during the same period, lowering self-sufficiency rates of meat from 85.9% to 73.9%.

Domestic meat production saw a decline in 2011, with burial disposal of cows and pigs after the outbreak of foot-and-mouth disease (FMD) in Korea at the end of 2010. However, as meat imports rose, meat consumption has been steadily increasing.

Figure 3-9 Meat Consumption and Production



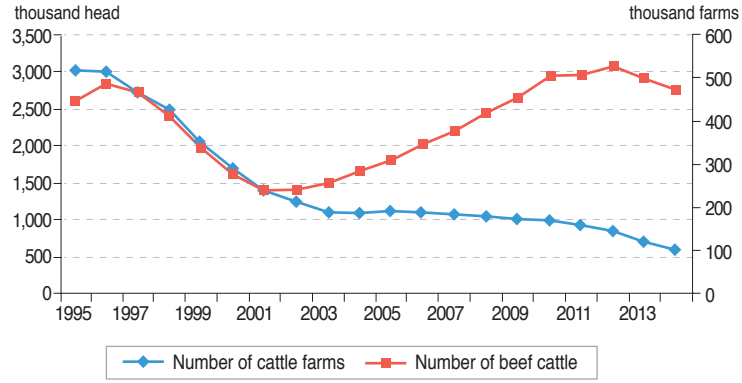
Source: National Agricultural Cooperative Federation, *Livestock Price and Supply-Demand Data.*

Beef

The number of Korean beef cattle was at its highest level with 2,843 thousand head in 1996, before gradually falling while the financial crisis affected the economy. The downward trend continued until the population fell to 1,406 thousand head in 2001, when beef import quotas were replaced by a tariff regime. The number of cattle began to increase as a result of higher beef demands and rising native cattle prices, exceeding 3 million head in 2012. After 2013, cattle inventories are facing a declining trend again.

The number of cattle farms declined from 520 thousand households in 1995 to 100 thousand households in 2014. In the wake of the financial crisis in 1998 and trade liberalization in 2001, the number of cattle farms with herd size of less than 10 head dropped significantly. Small-size farm numbers have dropped more quickly in recent years, since the Korean government decided to provide assistance when farmers closed down business because of Free Trade Agreements (FTAs). As cattle populations increased while

Figure 3-10 Number of Korean Beef Cattle and Cattle Farms



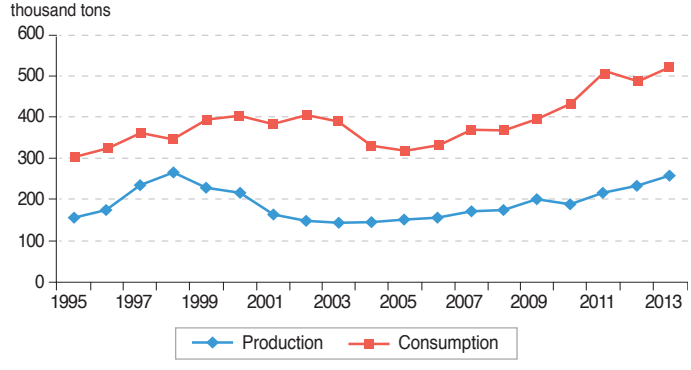
Source: Statistics Korea, Livestock Statistics.

cattle farm numbers decreased, herd size per farm rose from 5.0 head in 1995 to 26.6 head in 2014.

Higher national income increased per capita annual consumption of beef from 6.7kg in 1995 to 10.8kg in 2014. The figure dropped to 6.6kg in 2005, affected by the outbreak of bovine spongiform encephalopathy (BSE) in the US, before recovering to 8.1kg in 2009. While Korea's beef self-sufficiency rate was over 50% prior to 2000, the rate dropped to 42.8% in 2001 with the tariffication of beef imports, and further slipped to 36.2% in 2003. The self-sufficiency rate recovered to 50.0% in 2009, as beef outputs increased while imports dropped significantly due to quarantine problems related to US beef subsequent to 2004, before sliding to 48.1% in 2014 as beef imports increased in response to rising prices of native cattle.

With growing cattle populations, Korea's beef production has been on the rise since it hit its lowest level in 2005. Domestic outputs experienced a temporary setback when FMD broke out in 2010, but beef consumption kept on growing as meat imports were up.

Figure 3-11 Beef Production and Consumption



Source: National Agricultural Cooperative Federation, *Livestock Price and Supply-Demand Data.*

Under the UR negotiations concluded in December 1993, beef imports were fully liberalized in 2001. Duties on imported beef stood at 41.6% in 2001. The Korean government cut them every year by an equal amount, and a rate of 40% was applied from 2004. Meanwhile, after free trade agreements with the US and Australia took effect in 2012 and 2014, respectively, the tariffs on the major beef exporters gradually got reduced. As of 2015, 29.3% is applied to US beef and 34.7% to Australian beef. In 2014, Australian beef imports reached 151 thousand tons, accounting for 53.8% of total beef imports. Beef from the US and New Zealand comprised 37.4% (105 thousand tons) and 7.5% (20 thousand tons), respectively.

Table 3-10 Beef Imports by Country (Quarantine Basis)

Unit: lean meat, tons

Year	US	Australia	Canada	New Zealand	Mexico	Others	Total
2005	0	101,363	0	39,001	0	2,227	142,593
2006	0	137,006	0	39,570	0	2,829	179,405
2007	14,616	147,376	0	38,244	2,549	0	202,785
2008	53,293	130,429	0	37,385	3,040	0	224,092
2009	49,973	116,714	0	30,162	1,007	0	197,860
2010	90,567	121,791	0	30,948	1,780	0	245,146
2011	107,202	145,241	0	33,121	3,892	0	289,444
2012	100,359	124,210	2,059	25,590	1,282	0	253,522
2013	89,238	142,799	1,491	22,299	108	682	257,107
2014	104,953	150,863	2,739	20,961	295	661	280,472

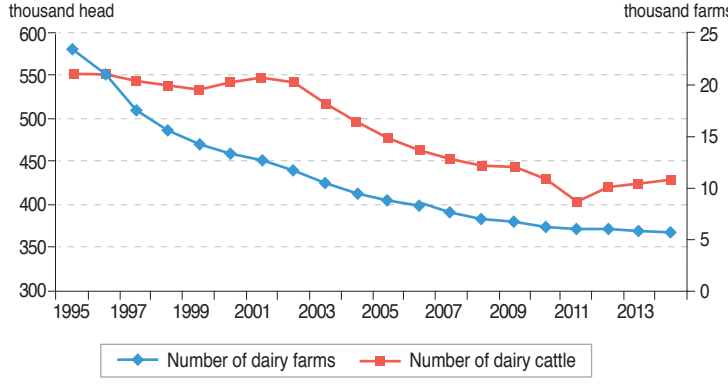
Source: Ministry of Food and Drug Safety.

Milk

Dairy cattle populations increased to 430,678 head in 2014, after sliding from 553,467 head in 1995 to 429,547 head in 2010. The number of dairy farms dropped to 5,693 households in 2014 from 23,519 households in 1995, while herd size per farm rose from 23.5 head to 75.7 head in the same period. The total number of dairy farms has been on a continued decline with the shut-down of small-sized farms, which, in turn, has raised the number of dairy cattle per household.

Between 1995 and 2002, though dairy cattle populations dwindled, raw milk production increased from 1,998,445 tons to 2,536,653 tons, thanks to a rise in milk yields per head. In 2014, raw milk outputs decreased to 2,214,039 tons. As raw milk production expanded in general and consumption stagnated, issues about excess inventory of powdered milk were raised in 2002. The Korean government introduced policies to cut raw milk production, and

Figure 3-12 Number of Dairy Farms and Dairy Cattle



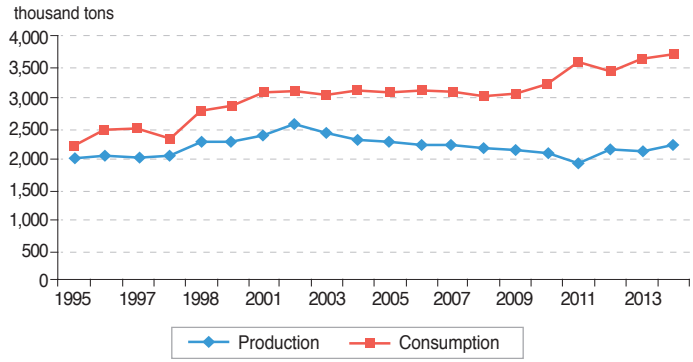
Source: Statistics Korea, Livestock Statistics.

dairy processors also implemented a production quota system for dairy farms from the end of 2002. Despite the quota scheme, however, excess stocks of milk powder remain unsolved, because of declining birth rates and spread of the anti-dairy sentiment.

Per capita annual consumption of dairy products rose from 47.5kg in 1995 to 72.4kg in 2014. Fluid milk consumption increased from 1,568,195 tons in 1995 to 1,702,295 tons in 2008, and then dwindled to 1,636,994 tons in 2014. Consumption of cheese, including both processed cheese and natural cheese, soared from 12,501 tons to 118,067 tons between 1995 and 2014.

Imports of dairy products were 1,196.90 million dollars in 2014, jumping from 229.18 million dollars in 2000. Cheese accounted for the largest share of dairy product imports in 2014, standing at 41.4%. The share of skim and whole milk powder is relatively small as imports above tariff-rate quotas (TRQs) are subject to higher duties. Meanwhile, mixed milk powder has the second highest share (13.2%) just behind cheese, thanks to lower tariffs.

Figure 3-13 Milk Production and Consumption



Source: Ministry of Agriculture, Food and Rural Affairs, Statistics Korea.

Table 3-11 Dairy Product Imports by Year

Unit: US$ thousand

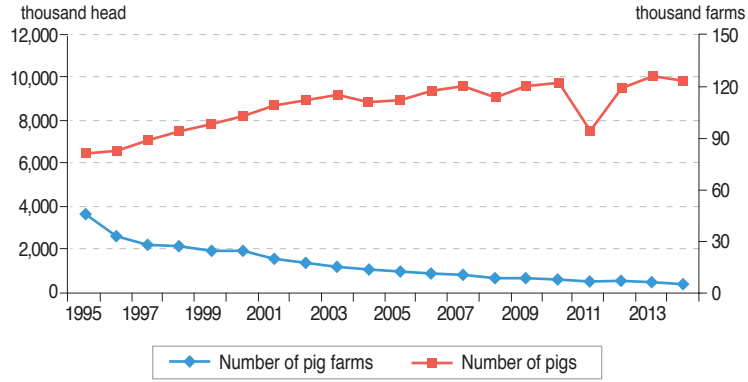
	Total imports	Milk powder				Butter	Whey	Cheese
		Modified	Mixed	Skim	Whole			
2005	432,814	23,027	72,656	14,636	4,342	12,807	32,786	143,526
2006	448,105	20,808	67,602	15,475	4,784	8,346	50,449	146,219
2007	582,692	19,768	103,782	17,624	3,366	11,298	67,083	178,992
2008	673,123	21,477	107,229	20,179	5,955	13,390	38,306	238,876
2009	500,865	21,206	69,176	23,389	3,533	13,271	28,888	189,917
2010	682,469	36,827	90,697	24,500	4,409	24,402	40,661	258,572
2011	1,119,208	41,348	123,260	123,570	22,900	41,651	42,939	357,590
2012	925,013	45,457	91,329	61,558	6,201	30,723	66,687	359,648
2013	1,018,845	47,006	126,134	76,666	8,514	23,981	60,835	402,172
2014	1,196,904	54,523	158,112	91,276	10,213	26,871	57,833	495,923

Source: Korea Dairy Committee.

Pork

Pig populations grew from 6.23 million head in 1995 to 9.86 million head in 2014. The number was 9.82 million in 2010, before plummeting to 7.58 million head in 2011 in the wake of the FMD outbreak at the end of 2010. As a decline in the number of pigs slaughtered led to higher wholesale prices in 2011, the number of sows began to rise and hit its highest level of 10.10 million head in 2013. Subsequently, a measure to slaughter sows was conducted in response to falling wholesale prices, and sow inventories dropped to 9.86 million head in 2014.

Figure 3-14 Number of Pig Farms and Pigs

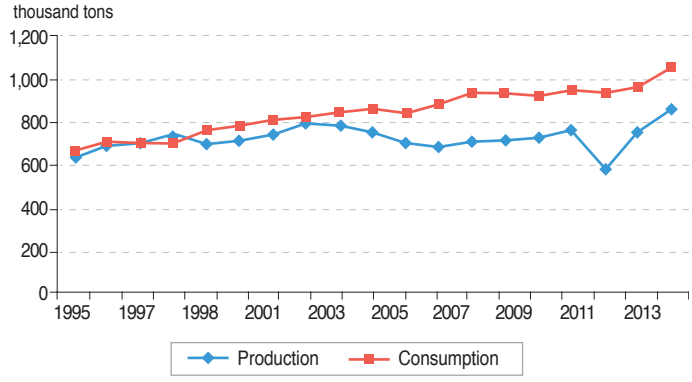


Source: Statistics Korea, Livestock Statistics.

Per capita annual pork consumption increased from 14.8kg in 1995 to 20.9kg in 2013 in line with an increase in national income. Imports also grew because of the shortage in pork production compared to demand, lowering pork self-sufficiency rates from 92.4% in 1990 to 81.1% in 2013.

As a result of the UR negotiations, pork imports were fully liberalized in July 1997. The tariff on imported pork in 1997 was 33.4%. The duties were reduced on an equal scale every year between 1997 and 2004, and a tariff of 25% is applied from 2004. Under the Korea-Chile Free Trade Agreement (FTA), which went into effect on April 1, 2004, the Korean government decided to cut tariffs on Chilean meat by an equal amount every year and fully eliminate them in a decade. Meanwhile, the Korea-US FTA (effective in 2012) and the Korea-EU FTA (effective in 2011) will eliminate tariffs on imported pork from 2016 and 2020, respectively.

Figure 3-15 Production and Consumption of Pork



Source: National Agricultural Cooperative Federation, *Livestock Price and Supply-Demand Data.*

Table 3-12 Pork Imports by Country

Unit: lean meat, tons

Year	Denmark	Belgium	Hungary	Canada	US	Netherlands	Chile	France	Austria	Poland	Others	Total
2005	8,597	16,889	6,866	20,182	43,155	9,483	25,334	0	0	0	43,050	173,556
2006	10,033	18,497	9,636	26,060	60,849	10,746	22,346	0	0	0	52,388	210,555
2007	11,102	16,809	10,005	29,358	70,169	13,453	31,808	21,431	13,984	11,584	17,700	247,403
2008	6,504	14,191	8,966	28,406	72,365	11,390	19,447	17,274	16,387	6,695	12,664	214,289
2009	1,813	10,578	4,738	26,244	74,826	11,295	36,303	14,207	12,839	2,496	14,502	209,841
2010	1,005	13,277	3,506	17,740	50,969	13,154	29,862	13,852	13,332	2,130	20,664	179,491
2011	16,330	13,831	7,523	47,544	142,954	18,893	24,969	16,465	17,934	9,241	54,564	370,248
2012	3,581	9,672	4,054	22,944	111,106	13,967	27,506	11,335	12,012	10,231	49,747	276,155
2013	1,826	6,958	1,907	10,430	75,720	8,627	19,470	6,403	8,424	6,661	38,535	184,961
2014	5,838	9,915	4,593	11,422	93,911	9,608	18,132	10,982	14,782	3,553	91,151	273,887

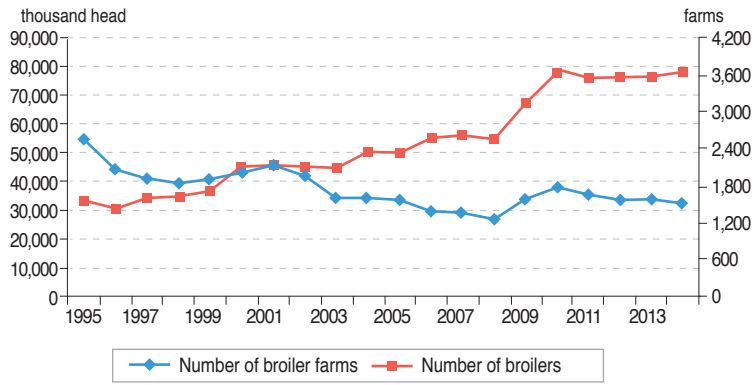
Source: Ministry of Food and Drug Safety.

Imports of dressed pork increased from 95,892 tons in 2000 to 273,887 tons in 2014. Between November 2010 and April 2011, 3.30 million pigs were culled to eradicate an outbreak of FMD. As pork production declined, pork imports hit its highest level in 2011, totaling 370,248 tons, and fell to 180 thousand tons in 2013 with growing domestic production. In 2014, Korea's pork import volume was 270 thousand tons.

Chicken Meat

The number of broilers rose from 33.08 million head in December 1995 to 77.75 million head in December 2014. The number has shown an upward trend in general, aside from temporary falls after outbreaks of avian influenza (AI) (a total of five times in 2003, 2006, 2008, 2010, and 2014). The number of broiler farms declined from 2,544 households in 1995 to 1,517 households

Figure 3-16 Number of Broiler Farms and Broilers



Source: Statistics Korea, Livestock Statistics.

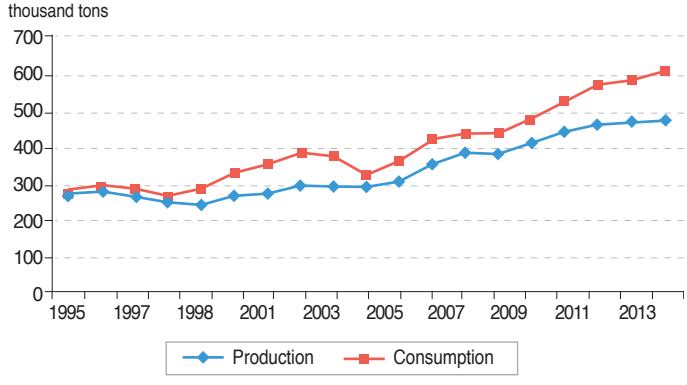
in 2014. As the total number of broilers increased despite a fall in the number of broiler farms, the number of broilers per household has jumped from 13,001 head to 51,250 head.

As the number of broilers increased, the number of broilers slaughtered also rose from 312.55 million head in 1995 to 791.15 million head in 2013. The slaughter weight of broilers decreased from 1.70kg in 1995 to 1.45kg in 2013. Despite the fall in slaughter weight, chicken production grew from 263,105 tons in 1995 to 473,445 tons in 2014 with a sharp surge in the number of broilers slaughtered.

The broiler sector has most aggressively pursued integration in the livestock industry, with the ratio of integrated volume to total chicken production soaring from 15% in 1989 to 92% in 2013.

Between 1995 and 2013, per capita annual chicken consumption witnessed a sharp spike from 6.3kg to 11.5kg. Self-sufficiency rates of chicken fell from 97.9% to 74.8% during the same period.

Figure 3-17 Chicken Production and Consumption



Source: National Agricultural Cooperative Federation, *Livestock Price and Supply-Demand Data.*

As the free trade deals with the EU and the US took effect in 2011 and 2012, respectively, tariffs on imported chicken meat, which have been gradually declining, will be eliminated in 2020 and 2021, respectively. The volume of chicken meat imports surpassed 0.1 million tons in 2010, partly thanks to the popularity of fried chicken snack in Korea. Chicken imports in 2014 stood at 141,400 tons, with the US, Brazil, and Denmark accounting for 45.9%, 37.0%, and 4.6%, respectively.

Chicken meat exports increased dramatically from 1,710 tons in 2000 to 19,280 tons in 2014. Exports of chicken showed an upward trend, encouraged by policy instruments to grow chicken meat exports from 2002, though there were temporary falls in 2002, 2004, and 2011 in the wake of AI outbreaks. The volume surged to 26,117 tons in 2013, before falling in 2014 as a result of a new outbreak of

Table 3-13 Chicken Imports by Country

Unit: tons (%)

	US	Denmark	Brazil	China	Others	Total
2005	20,651	20,346	1,140	7,165	9,201	58,503
2006	40,482	4,088	15,847	11,484	3,674	75,575
2007	19,921	1,637	22,583	11,889	4,000	60,030
2008	34,123	2,592	21,030	6,576	5,794	70,115
2009	29,423	2,065	30,161	3,516	5,460	70,625
2010	54,744	3,339	34,025	4,246	9,447	105,802
2011	86,620	3,874	24,904	3,255	12,297	130,949
2012	54,479	3,411	56,919	2,379	13,201	130,389
2013	45,308	5,422	59,411	2,468	14,083	126,693
2014	64,937	6,483	52,377	2,384	15,220	141,400

Source: Korea Agricultural Trade Information (KATI).

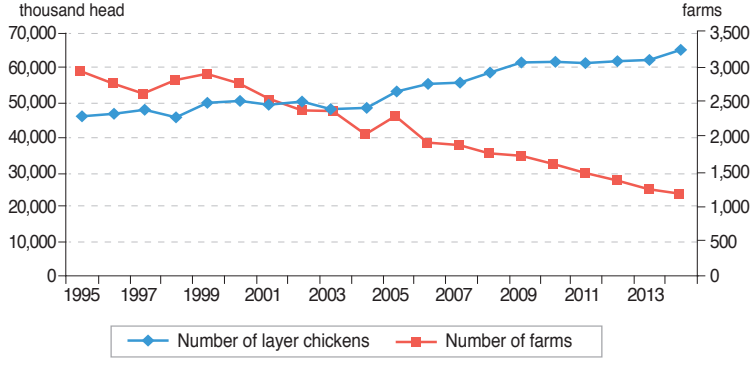
AI. In chicken meat exports in 2014, frozen chicken wings comprised 14.7% and prepared *samgyetang*, Korean chicken broth, accounted for 8.9%. Most of chicken wings are exported to Hong Kong, while *samgyetang* is shipped to Japan and Taiwan. From 2014, the US began to import *samgyetang*.

Eggs

The number of layer chickens increased from 42.43 million head in December 1990 to 61.47 million head in December 2010 and to 68.39 million head in December 2015. The figure dropped slightly in 2003, 2006, 2008, 2010, and 2014 with AI outbreaks, but its general trend remains upwards since 2008.

The number of layer chicken farms has declined significantly from 3,932 households in 1990 to 1,583 households in 2010 and to 1,165 in 2015. As the number of layer chickens rose and that of layer chicken farms fell, the number of layer chicken per farm increased from 10,791 head to 59,672 head.

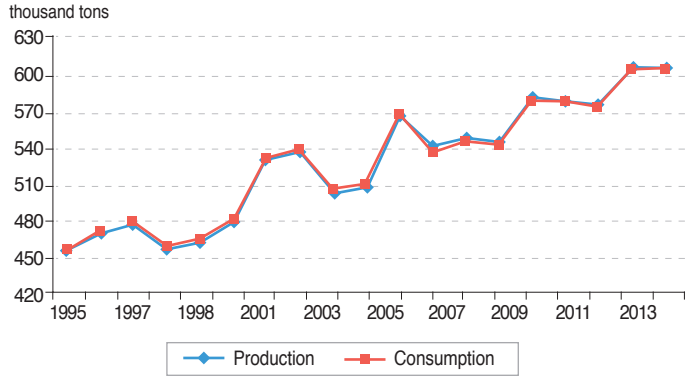
Figure 3-18 Number of Layer Chicken Farms and Layer Chickens



Source: Statistics Korea, Livestock Statistics.

With the number of layer chickens growing, egg production also grew significantly. Egg production increased from 393,305 tons in 1990 to 577,521 tons in 2010 and to 661,900 tons in 2015. Per capita annual egg consumption rose from 9.2kg in 1990 to 11.8kg in 2010 and to 12.7kg in 2014. There was little change in egg self-sufficiency rates between 1990 and 2014, from 100% to 99.7%.

Figure 3-19 Egg Consumption and Production



Source: National Agricultural Cooperative Federation, *Livestock Price and Supply-Demand Data.*

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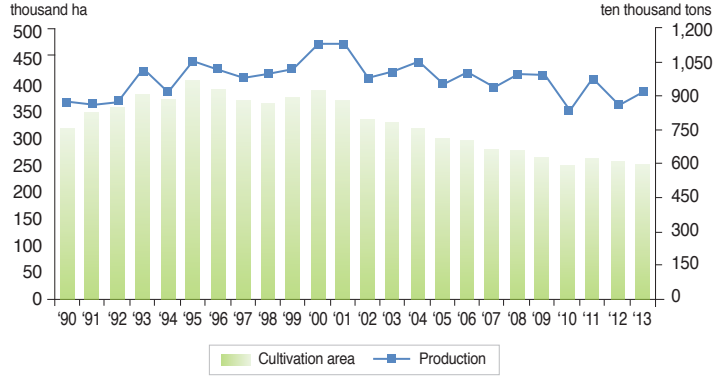
3. Horticulture and Specialty Crops

Vegetables

Production Trends

The vegetable cultivation area increased from 320,000 ha in 1990 to 400,000 ha in 1995. However, it has continued to fall over the years and stood at 250,000 ha in 2013 due to the aging demographic of farmers and the liberalization of the agricultural product market under DDA/FTAs. While the vegetable cultivation area has been decreasing at an average rate of 1% per year, production has been increasing at an annual average rate of 0.3% to approximately 9.24 million tons in 2013 as a result of the yield increase from facility modernization and technological development. In particular, the facility area proportion of vegetables has steadily increased from 12.6% in 1990 to 23.9% in 2013 owing to the government's active support for facility modernization.

Figure 3-20 Cultivation Area and Production of Vegetables



Source: Ministry of Agriculture, Food and Rural Affairs, *Statistics on Production of Greenhouse Vegetables and Greenhouse Facilities for Vegetables*, each year.

Vegetables are classified into flavour vegetables, root vegetables, leafy and stem vegetables, fruit vegetables and western vegetables. Flavour vegetables make up the largest proportion of the vegetable cultivation area (44.9% as of 2013), but their cultivation area has been decreasing at an annual average rate of 0.8% from 136,000 ha in 1990 to 113,000 ha in 2013. In the case of root vegetables, the radish cultivation area steeply decreased by 39.7% from 42,000 ha in 1990 to 25,000 ha in 2013, and the cultivation area of leafy and stem vegetables has declined at an annual average rate of 0.8% and fell from 63,000 ha in 1990 to 52,000 ha in 2013. On the other hand, the cultivation area of fruit vegetables, which have a high per unit area income, decreased only by 0.2% annually, recording 54,000 ha in 2013. Western vegetables make up only 1-2% of the entire vegetables, but they grew at a high annual rate of 9.1% and the cultivation area greatly increased from 400 ha in 1990 to 3,500 ha in 2013.

Table 3-14 Cultivation Area of Vegetables

Unit: thousand ha (%)

	1990	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013
Flavour vegetables	136.4 (43.1)	172.7 (42.8)	162.7 (42.1)	132.4 (44.4)	119.0 (40.7)	119.9 (43.2)	112.7 (40.9)	107.9 (41.0)	107.5 (43.8)	111.3 (42.7)	111.2 (44.1)	112.9 (44.9)
Root vegetables	41.8 (13.2)	42.4 (10.5)	45.3 (11.7)	31.3 (10.5)	34.9 (11.9)	29.3 (10.5)	31.2 (11.3)	27.7 (10.5)	25.5 (10.4)	26.6 (10.2)	24.9 (9.9)	25.2 (10.0)
Leafy and stem vegetables	63.3 (20.0)	72.2 (17.9)	74.3 (19.2)	59.5 (20.0)	65.4 (22.4)	55.9 (20.1)	59.4 (21.6)	56.3 (21.4)	47.3 (19.3)	59.5 (22.9)	52.4 (20.8)	52.2 (20.7)
Fruit vegetables	57.7 (18.2)	90.4 (22.4)	75.7 (19.6)	67.0 (22.5)	64.6 (22.1)	63.7 (23.0)	64.0 (23.2)	63.3 (24.1)	56.5 (23.0)	54.0 (20.7)	56.0 (22.2)	54.0 (21.5)
Western vegetables	0.4 (0.1)	0.5 (0.1)	1.7 (0.4)	2.3 (0.8)	3.9 (1.3)	3.8 (1.4)	4.0 (1.5)	4.0 (1.5)	3.7 (1.5)	3.6 (1.4)	3.4 (1.3)	3.5 (1.4)

Note: The number in ( ) is the component ratio to the total vegetable cultivation area.
Source: Ministry of Agriculture, Food and Rural Affairs, *Statistics on Production of Greenhouse Vegetables and Greenhouse Facilities for Vegetables,* each year.

The cultivation area of chilies and garlic, the major crops of flavour vegetables, has been steadily decreasing due to the aging demographic of farmers, shortages in labor forces and cheap imports from China. However, the cultivation acreage of onions has increased at an annual average rate of 4.1%, fueled by relatively stable prices. Accordingly, the share of chilies and garlic in the total cultivation area of flavour vegetables dropped from 46.0% and 32.0% in 1990 to 40.2% and 26.0% in 2013, respectively, while that of onions rose by 12.2 percentage points from 5.6% to 17.8% during the same period.

Among root vegetables, radishes and carrots have declined at an approximate average of 2.2% annually due to the decrease in consumption and increase in imports. The cultivation area of Chinese cabbages, a major leafy vegetable, has continued to drop due to a decline in kimchi consumption. However, cabbage consumption has been steadily increasing due to a rise in dining out and its cultivation area is increasing at an annual rate of 1.7%.

Among fruit vegetables, the cultivation acreage of cucumber is on the decrease from year to year due to the burdens of labor shortage and increased oil prices. The cultivation areas of strawberries and watermelons are also falling owing to the aging of farmers and increased fruit imports. However, pumpkin and tomato cultivation areas have been increasing due to the recent health-oriented consumption trends and well-being boom. The tomato cultivation area, in particular, declined since the mid-1990s, but it increased by 49.6 percentage points in 2007 compared to 2000. The cultivation acreage decreased due to declining prices resulting from a surge in production, but it is on the rise again recently.

Table 3-15 Cultivation Area and Production of Major Vegetables by Item

Unit: 1,000 ha, 1,000 tons

		1990		2000		2005		2010		2012		2013	
		Area	Production	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
Flavour vegetables	Chili	62.8	132.7	74.5	193.8	61.3	161.4	44.6	95.4	45.5	104.1	45.4	117.8
	Garlic	43.6	416.8	44.9	474.4	31.8	375.0	22.4	271.6	28.3	339.1	29.4	412.3
	Onion	7.6	407.4	16.8	877.5	16.7	1,023.3	22.1	1,411.6	21.0	1,195.7	20.0	1,294.0
Root vegetables	Radish	37.1	1,760.6	40.2	1,759.4	27.1	1,277.5	21.9	1,039.3	21.8	1,139.8	21.8	1,298.5
	Carrot	4.3	87.0	4.5	157.8	3.2	121.4	2.7	102.1	2.2	63.8	2.5	79.8
Leafy and stem vegetables	Chinese cabbage	47.5	3,373.4	51.8	3,149.3	37.2	2,325.3	28.3	1,783.0	30.5	2,151.5	32.2	2,388.0
	Cabbage	4.0	146.9	6.1	274.1	5.2	289.9	4.5	252.7	5.9	302.9	6.0	314.0
Fruit vegetables	Cucumber	7.0	216.1	7.3	453.5	5.9	403.3	4.4	306.0	4.2	288.1	3.6	254.6
	Pumpkin	4.1	82.3	8.4	240.5	9.3	339.1	9.0	302.9	10.5	325.1	9.5	323.4
	Tomato	2.5	77.7	4.9	276.7	6.7	439.0	5.3	324.8	6.3	432.8	6.1	388.6
	Strawberry	6.9	108.6	7.1	180.5	7.0	202.0	7.0	231.8	6.4	192.1	6.9	216.8
	Watermelon	25.7	593.2	30.5	922.7	23.2	904.9	16.4	678.8	15.2	642.9	14.9	672.9

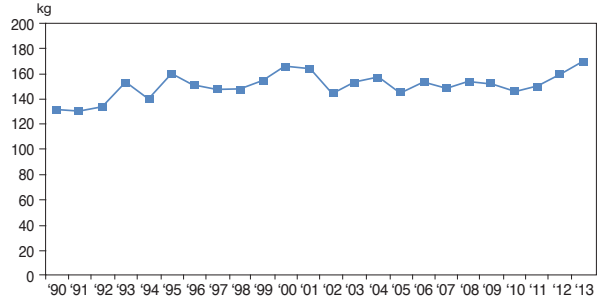
Source: Ministry of Agriculture, Food and Rural Affairs, *Statistics on Production of Greenhouse Vegetables and Greenhouse Facilities for Vegetables,* each year.

Consumption Trends

The per capita annual consumption of overall vegetables increased from 132.6kg in 1990 to 165.9kg in 2000, but it decreased to 140-150kg since then. However, due to changes in consumption patterns including the recent expansion in dining out, the consumption has again increased and reached 170kg in 2013.

In terms of items, the consumption amounts of chilies and garlic, both flavour vegetables, were 5.7kg and 9.1kg, respectively, in 2013, but they are on the decrease due to the drop in kimchi consumption. Onion consumption was 7.4kg in 1990 and increased by 3.6 times to 27.0kg in 2013 due to the changes in consumption

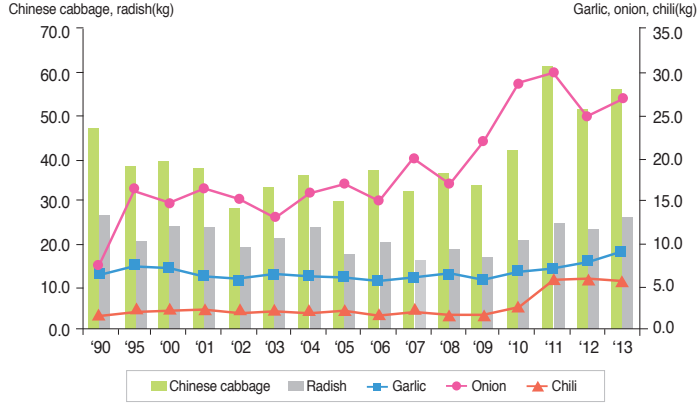
Figure 3-21 Trend in Annual Per Capita Consumption of Vegetables



Source: Ministry of Agriculture, Food and Rural Affairs, *Major Statistics of Food, Agriculture, Forestry and Fisheries,* each year.

patterns and well-being boom. Per capita annual consumption of Chinese cabbages (leafy and stem vegetable) has decreased from 46.9kg in 1990 to 33.8kg in 2009, but it recently bounced back to approximately 50kg. Also, the per capita annual consumption of radishes, a representative root vegetable, has decreased due to the decline in kimchi consumption.

Figure 3-22 Trend in Annual Per Capita Consumption of Major Vegetables



Source: Ministry of Agriculture, Food and Rural Affairs, *Major Statistics of Food, Agriculture, Forestry and Fisheries,* each year.

Import and Export Trends

Vegetable exports grew by approximately 2.8 times from US$100 million in 1995 to US$310 million 2013. The major export products, which rose significantly, centered on kimchi and fruit vegetables including tomatoes, strawberries, cucumber and bell peppers. However, because the major importer of tomatoes, bell pepper and kimchi among the major export products is Japan, exports are on the decline due to weak yen. On the other hand, in the case of strawberries, superior domestic varieties were developed and exports have steadily increased owing to a rise in exports to Hong Kong and Singapore.

Table 3-16 Import and Export Trend of Vegetables

Unit: 1,000 tons, 100,000 dollars

	1995		2000		2005		2010		2014	
	Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount
Vegetable export (A)	55.6	1,104.3	64.2	1,859.2	88.9	2,314.3	96.4	2,767.5	126.6	3,135.0
Tomato	2.1	35.2	12.7	229.5	4.3	88.3	2.3	66.4	5.5	137.4
Strawberry	2.4	48.6	3.5	95.3	1.0	44.1	3.3	261.2	3.7	333.7
Cucumber	2.6	55.3	5.8	98.9	1.0	15.5	0.1	1.6	0.4	8.8
Kimchi	12.5	509.1	23.4	788.5	32.3	929.6	29.7	983.6	24.7	840.3
Bell pepper	-	-	-	-	17.8	531.4	16.2	583.0	23.1	796.1
Vegetable import (B)	93.2	1,322.4	220.1	1,872.6	587.6	3,812.4	853.9	7,194.9	890.6	7,977.7
Chili	4.8	128.5	6.3	108.2	83.1	516.0	156.1	1,137.4	172.7	1,286.2
Garlic	11.3	105.7	10.5	91.2	42.2	212.4	64.0	1,013.3	43.4	304.2
Onion	8.0	59.8	6.1	23.0	41.2	85.4	21.3	111.8	8.6	62.6
Carrot	1.1	15.8	11.4	50.6	73.2	292.4	86.4	405.1	99.4	483.6
Kimchi	-	-	0.5	2.0	111.5	513.4	192.9	1,020.2	212.9	1,044.0
Trade balance (A-B)	-	△218.1	-	△13.4	-	△ 1,498.1	-	△4,427.4	-	△4,842.7

Note: The figures for tomato, strawberry, cucumber, chilies, onion, garlic and carrot include tomato juice, frozen strawberry, pickled cucumber, dried and temporarily stored chilies and onion, frozen garlic and dried carrot, and yields are not applied to the figures.

Source: Korea Agro-Fisheries Trade Corporation.

Vegetable imports, on the other hand, have increased by 6-fold from US$130 million in 1995 to US$800 million in 2013 due to the impact of the liberalized agricultural product market. Consequently, the trade balance deficit has expanded substantially year after year from US$20 million in 1995 to US$480 million in 2013. The major vegetables imported are chilies, garlic, onions and carrots, and their import volumes have increased sharply since the 2000s. Such products are mostly imported from China, and the conditions for domestic vegetable production are deteriorating with domestic Chinese cabbages, chilies and garlic being substituted by Chinese products due to the recent surge in kimchi imports from China.

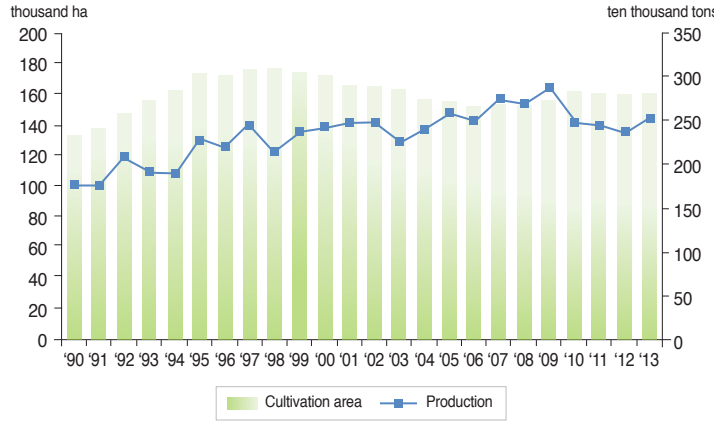
Fruits

Production Trends

The cultivation acreage of fruit trees increased from 130,000 ha in 1990 to 180,000 ha in 1998, but it decreased to 154,000 ha with the full-scale liberalization of the agricultural market and, at present, it is maintained at around 160,000 ha. While its cultivation acreage has been falling since the late 1990s, production has increased at an annual average rate of 1.5% due to a rise in yield from improved technology. In fact, production has climbed 42.9%p in 2013 with around 2.52 million tons compared to 1990.

Apple cultivation area reached its peak in 1992 with 53,000 ha, but fell to 26,000 ha in the early 2000s. However, it has shifted back to an upward trend since 2003. Its recent increase can be attributed to stable prices compared to other items. The cultivation acreage of adult apple trees continued to fall from 32,000

Figure 3-23 Cultivation Area and Production of Fruits



Source: Ministry of Agriculture, Food and Rural Affairs, *Major Statistics of Food, Agriculture, Forestry and Fisheries,* each year.

ha in 1995 to 16,000 ha subsequently, but has returned to an upward trend in 2006.

Pear cultivation area showed an increasing trend until 2000 due to the expansion in the consumption of pears stemming from increased national income, but has subsequently declined from 2001 and dropped to 13,000 ha in 2014 as farms either closed down or avoided planting pear trees as a result of price fall. Accordingly, the cultivation area of adult pear trees reached its peak in 2003 and has subsequently fallen.

Grapes showed an annual average growth of 7.4% in cultivation acreage up until 1999, but it has continued to decrease since the 2000s due to aging farm households, increased imports, closure of low-productive orchards, and the government's support program for closure of orchards. The cultivation area of adult trees also declined since the 2000s, falling by 42.5%p to 16,000

Table 3-17 Cultivation Area and Production of Major Fruits

Unit: ha, 1,000 tons

		1990	1995	2000	2005	2010	2014
Apple	Cultivation area	48,833	50,103	29,063	26,907	30,992	30,702
	Cultivation area of adult trees	26,002	32,222	21,259	16,379	20,582	21,399
	Production	628,947	715,982	488,960	367,517	460,285	474,712
Pear	Cultivation area	9,058	15,752	26,206	21,807	16,239	13,127
	Cultivation area of adult trees	7,137	7,602	13,314	17,101	14,772	12,230
	Production	159,335	178,321	324,166	443,265	307,820	302,731
Grape	Cultivation area	14,962	26,030	30,315	24,008	17,572	16,348
	Cultivation area of adult trees	12,845	14,251	24,167	19,921	14,850	14,019
	Production	131,324	316,443	475,594	381,436	305,543	268,556
Peach	Cultivation area	12,333	10,241	13,876	15,014	13,908	15,539
	Cultivation area of adult trees	10,466	7,473	7,688	9,830	9,923	9,809
	Production	114,578	129,640	170,044	223,701	138,576	210,335
Tangerine	Cultivation area	19,287	24,348	28,444	28,863	21,143	21,338
	Cultivation area of adult trees	17,089	20,102	26,505	22,614	20,407	20,303
	Production	492,676	614,801	563,470	637,961	614,786	722,325
Sweet persimmon	Cultivation area	9,869	20,158	23,816	17,199	15,244	12,451
	Cultivation area of adult trees	5,000	8,387	16,463	14,747	13,474	11,146
	Production	65,682	154,737	227,394	235,854	180,885	193,351

Source: Statistics Korea.

ha in 2014 compared to 2000. Despite the imports of grapes from Chile since 1996 as a result of the Korea-Chile FTA, the proportion of greenhouse grapes is on the increase. This can be attributed to the rising demand for domestic greenhouse grapes owing to their high quality despite the lower price competitiveness compared to imports.

In the case of peaches, the cultivation area declined until the late 1990s, but increased to 16,000 ha in 2003 due to relatively stable prices. However, it has shifted back to a downward trend since 2004 as a result of the government's support program for closure of peach farms. Recently, the cultivation area has increased again and bounced back to 16,000 ha in 2014 owing to an increase in consumption.

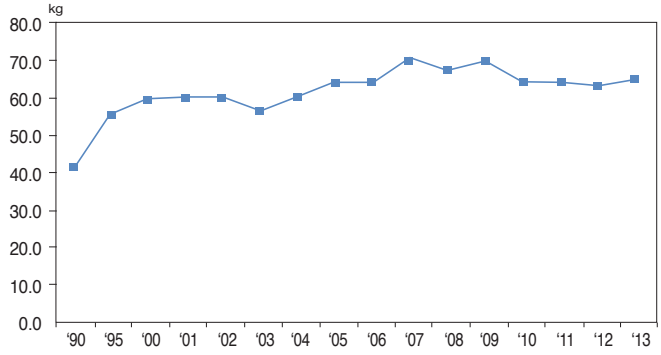
The cultivation acreage of tangerines and their adult trees continued to increase at an annual average rate of over 3% until 2000 despite increasing orange imports. However, due to the government program supporting the closure of farms in 2003-2004, acreage and adult trees have been on the decline ever since.

Sweet persimmons showed a continued increase in cultivation area and adult tree area up until the late 1990s. However, due to aging farm households and conversion to other crops, the cultivation area is decreasing at an annual average rate of 3.0% in the 2000s.

Consumption Trends

The annual per capita consumption of overall fruits increased at an annual average rate of 1.7% from 41.8kg in 1990 to 63.2kg in 2013 owing to the rise in national income and the increase in fruit imports.

Figure 3-24 Annual Per Capita Consumption of Fruits



Source: Ministry of Agriculture, Food and Rural Affairs, *Major Statistics of Food, Agriculture, Forestry and Fisheries,* each year.

By item, the annual per capita consumption of apples increased from 14.5kg in 1990 to 15.8kg in 1995, but it decreased to around 7kg due to price increases caused by recent declines in cultivation area and increases in the consumption of substitute fruits. However, it recently rose again to around 9kg except in the years when production dropped sharply due to bad weather conditions including typhoons.

The annual per capita consumption of pears increased to 9kg in 2010, but it sharply decreased to 5kg recently due to the increase in imported fruits. The annual per capita consumption of peaches is maintained at around 4kg owing to the increase in income and production.

The consumption of sweet persimmons increased up to the late 1990s, but it is on the decrease in the 2000s. In the case of grapes, consumption sharply rose to 10.3kg in 2000 but fell to 6.3kg in 2013 due to farm closures. The per capita consumption of tangerines has been decreasing in line with consumers' diversified preference of fruits and increased imports of oranges, and it was approximately 13.5kg in 2013.

Figure 3-25 Annual Per Capita Consumption of Major Fruits

Source: Ministry of Agriculture, Food and Rural Affairs, *Major Statistics of Food, Agriculture, Forestry and Fisheries,* each year.

Import & Export Trends

The fruit export amount increased by 4.3 times from US$ 60 million in 1995 to approximately US$260 million in 2014. Among fresh fruits, apple and tangerine exports have declined, while pear and sweet persimmon exports have been steadily growing. Also, since 2007, citrus exports have been on the rise. However, the trade deficit of fruit products is increasing year after year as imports are rising significantly compared to exports.

Fruit imports have increased to a whooping US$1,680 million in 2014 from US$320 million in 1995 due to the impact of agricultural market liberalization. In terms of items, banana imports were the highest at US$320 million in 2014 from US$ 50 million in 1995 followed by orange imports. In the case of kiwis, imports have

Table 3-18 Import and Export of Fruits

Unit: 100,000 dollars

		1995	2000	2005	2010	2014
Fruit exports (A)		599.8	451.4	1,208.8	1,954.2	2,586.3
	Apple	135.9	23.4	78.0	179.4	57.9
	Pear	70.9	171.0	560.9	541.2	623.2
	Sweet persimmon	0.9	39.2	55.9	83.5	128.5
	Tangerine	12.8	44.9	34.0	16.0	40.3
	Citrus	-	-	-	326.1	429.5
Fruit imports (B)		3,154.2	3,493.9	6,155.6	9,451.3	16,774.0
	Grape	206.0	311.0	529.8	1,231.1	2,420.5
	Orange	1,014.4	1,160.1	1,624.3	1,740.9	1,903.4
	Banana	495.1	752.5	1,148.4	2,103.5	3,211.1
	Pineapple				582.7	818.9
	Kiwi	96.5	86.5	533.1	565.1	565.0
	Mango				61.0	430.8
Trade balance (A-B)		△2,554	△3,042	△4,947	△7,497	△14,158

Source: Korea Agro-Fisheries Trade Corporation.

been rising every year owing to changes in consumption patterns, and grape imports have also climbed sharply and reached US$240 million in 2014 due to the conclusion of the Korea-Chile FTA. Recently, mango imports have grown to around US$40 million owing to an increase in tropical fruit imports.

Floriculture

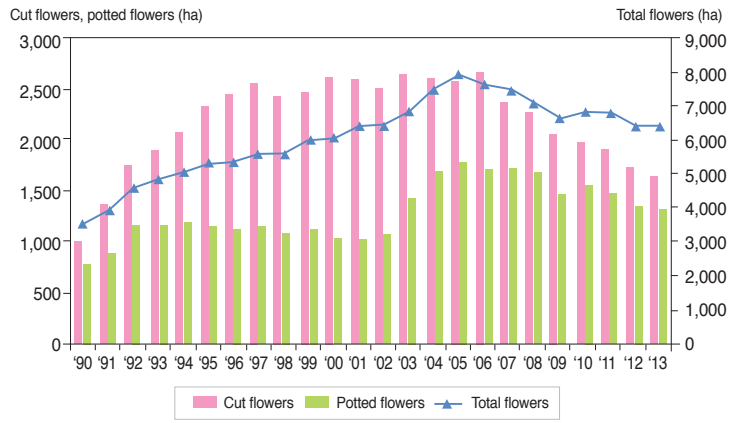
Production Trends

The cultivation acreage of floriculture has continued to grow

year after year, increasing by 2.2 times from 3,503 ha in 1990 to 7,688 ha in 2006. However, it decreased to 6,430 ha in 2013 due to the recent economic recession and a decrease in consumption. The production value grew from 239.3 billion won in 1990 to over 1,000 billion won in 2005, but declined to 736.8 billion won in 2013. In particular, since floriculture has a high profitability per unit area, its share in the agricultural production value (1.6%) exceeds its proportion in the total cultivation area (0.4%).

Until the 1980s, floricultural crops were mainly comprised of ornamental trees such as Chinese junipers and maples used primarily in creating parks. In the 1990s, however, production of cut flowers such as chrysanthemums and roses, along with potted flowers centering on orchids, was expanded to account for over half of the total area of floriculture. Cut flowers play a leading role in the floriculture industry with rapid increases in production owing

Figure 3-26 Cultivation Area of Flowers by Type



Note: Cultivation area of potted flowers includes herbaceous ornamentals.
Source: Ministry of Agriculture, Food and Rural Affairs, *Current Status of Floriculture,* each year.

to increased national income, changes in consumer preferences and high cultivation ratio at production facilities established through government support. However, the cultivated area of cut flowers has started to stagnate recently due to a decrease in spending.

Chrysanthemums were the major cut flowers grown until the early 1990s. Since 1992, however, the cultivation acreage of roses has increased rapidly, reflecting not only changes in consumption patterns, but also the selection of roses as the cultivation plant by a substantial number of floriculture farms receiving policy funds in

Table 3-19 Cultivation Area and Production of Major Flowers

Unit: ha, million KRW

	1990		1995		2000		2005		2010		2013	
	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
Cut flowers	1,006	59,224	2,323	225,757	2,625	301,245	2,597	451,661	1,975	297,561	1,641	262,933
Rose	159	10,158	481	63,019	766	127,049	751	182,343	456	99,575	353	78,631
Chrysanthemum	287	12,484	658	45,588	732	56,175	797	103,024	583	77,390	489	74,302
Lily	84	7,781	186	19,606	245	28,109	227	34,571	204	29,335	178	27,516
Carnation	71	7,814	153	21,348	133	16,239	116	32,646	125	19,656	82	14,492
Common Gypsophila	177	8,118	330	28,854	207	19,660	108	27,085	63	6,023	42	4,654
Potted flowers	787	99,516	1,148	188,270	1,036	268,499	1,789	435,532	1,563	431,755	1,324	396,820
Orchid	53	22,368	202	49,174	308	107,135	332	121,350	227	85,153	181	70,235
Herbaceous ornamental	118	6,723	80	2,160	71	6,752	501	86,524	314	137,591	355	146,269
Cactus	38	3,078	98	9,488	50	8,728	71	13,338	73	14,795	61	12,970
Total flowers	3,674	239.348	5,343	508,970	6,047	664,997	7,950	1,010,532	6,829	850,995	6,430	736,811

Note: Potted flowers include herbaceous ornamentals.
Source: Ministry of Agriculture, Food and Rural Affairs, *Current Status of Floriculture,* each year.

the process of implementing the government's facility modernization program. As the policy funds were converted into loans in 1998, the share of roses since then remained somewhat unchanged. However, the proportion of roses and chrysanthemums still remains high, accounting for over 58% of total cut flower production.

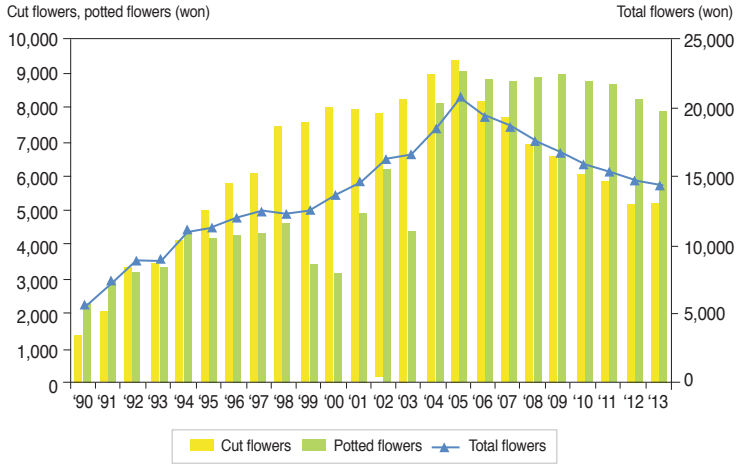
Up until the early 1990s, potted flowers were comprised of a wide variety of sorts, including dwarf ground rattans, cactuses and orchids. Since the mid-1990s, however, orchids have become the major potted plant as their portion of cultivation area increased sharply due to an increase in national income. With the recent deterioration in economic conditions, the production amount of orchids, which have been regarded as expensive, is decreasing, while the relatively low-priced herbaceous ornamentals, such as petunias, pansies and begonias, are increasing.

Consumption Trends

As flowers are regarded as luxury products as opposed to necessities, the per capita annual consumption remained below 10,000 won up until the early 1990s. However, with the improvement of national income owing to economic growth, flower consumption tripled from 5,646 won in 1990 to 16,749 won in 2009. Due to the impact of the recent economic recession, however, flower consumption decreased to 14,452 won in 2013, showing a clear decrease trend.

The annual per capita consumption of cut flowers increased significantly from 1,382 won in 1990 to 9,383 won in 2005, but consumption decreased to 5,236 won in 2013 due to a decline in cultivation area. The consumption of potted flowers has been on

Figure 3-27 Annual Per Capita Consumption of Flowers by Type



Source: Ministry of Agriculture, Food and Rural Affairs, *Current Status of Floriculture*, each year.

the rise, increasing from 2,321 won in 1990 to 7,902 won in 2013. While the potted flower consumption, in particular, showed a slight decrease after the mid-1990s due to changing consumption patterns, including increased preference for cut flowers, it has shifted to an upward trend recently due to an increase in herbaceous ornamental consumption.

Import and Export Trends

Until the mid-1990s, flower imports exceeded exports. However, after the financial crisis in 1997, the consumption of relatively high-priced and high-quality orchids fell drastically, and bulb imports also declined with the rise in exchange rates, sharply reducing flower imports from US$26.74 million in 1995 to US$10.34 million 1998. On the other hand, exports expanded from US$6.36 million to US$11.48 million during the same period as farms increased their exports due to the fall of flower prices and domestic consumption.

In the years thereafter, too, flower exports steadily increased, reaching US$100 million in 2010 with cut flowers leading the exports. The cut flower exports were centered on roses, chrysanthemums and lilies, with the three items comprising over 60% of flower exports, which were very low until the early 1990s. The low amount of flower exports in the early 1990s can be attributed to 1) high domestic prices, 2) a strict selection process involved in export, 3) the rise in logistic costs including air transportation costs, and 4) reluctance of farmers to export their products due to concerns over claims from importing countries.

Meanwhile, almost all the cut flowers centering on roses, chrysanthemums and lilies are exported to Japan. However, due to the continuing weak yen, flower exports, which maintained trade surplus, sharply decreased to US$40.63 million and the deficit hit US$16.59 million in 2014.

Table 3-20 Import and Export of Flowers

Unit: 1,000 dollars

		1995	1998	2000	2005	2010	2014
Flower exports (A)		6,363	11,484	28,888	52,142	103,067	40,625
	Rose	47	3,419	10,324	10,597	34,235	7,807
	Chrysanthemum	152	272	4,682	8,577	13,802	4,723
	Lily	2,318	3,388	4,395	10,484	27,845	12,309
	Cactus	3,312	2,266	2,736	1,881	2,756	4,544
	Orchid	216	660	3,250	16,668	19,279	6,429
Flower imports (B)		26,739	10,336	19,472	28,845	44,744	57,213
	Orchid	13,354	6,603	10,826	14,546	24,023	22,532
	Lily	4,060	1,063	3,311	5,290	5,488	4,437
Trade balance (A-B)		△20,376	1,148	9,416	23,297	58,323	△16,588

Source: Korea Agro-Fisheries Trade Corporation.

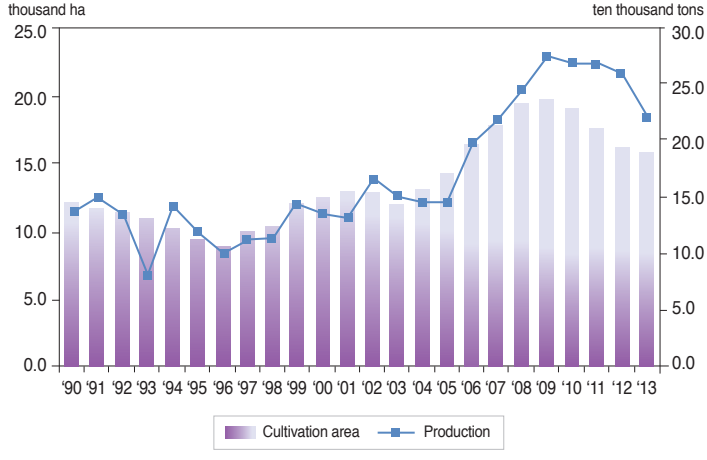
Specialty Crops

Production Trends

The cultivation acreage of ginseng decreased at an annual average of 4.3% from 12,184 ha in 1990 to 8,940 ha in 1996. However, that figure has grown at an annual rate of 6.1% on average since 1997 to 19,702 ha in 2009, as ginseng was regarded as a highly profitable crop in the wake of the full-fledged liberalization of the agricultural market. However, since then, the cultivation acreage began to decrease and dropped to 15,824 ha in 2013. Ginseng production also increased to 27,460 tons in 2009 but declined by 20 percentage points to 21,968 tons in 2013 due to the decreased cultivation acreage.

Ginseng cultivation is classified into general cultivation and contracted cultivation, each making up 73.5% and 26.5% of the total

Figure 3-28 Cultivation Area and Production of Ginseng



Source: Ministry of Agriculture, Food and Rural Affairs, *Ginseng Statistics*, each year.

Table 3-21 Cultivation Area by Ginseng Type

Unit: ha (%)

	1990	1995	2000	2005	2010	2013
Cultivation area	12,184	9,375	12,445	14,153	19,010	19,702
General cultivation	8,955 (73.5)	5,642 (60.2)	9,811 (78.8)	8,856 (62.6)	9,742 (51.2)	6,464 (40.8)
Contracted (designated) cultivation	3,229 (26.5)	3,733 (39.8)	2,634 (21.2)	5,297 (37.4)	9,268 (48.8)	9,360 (59.2)

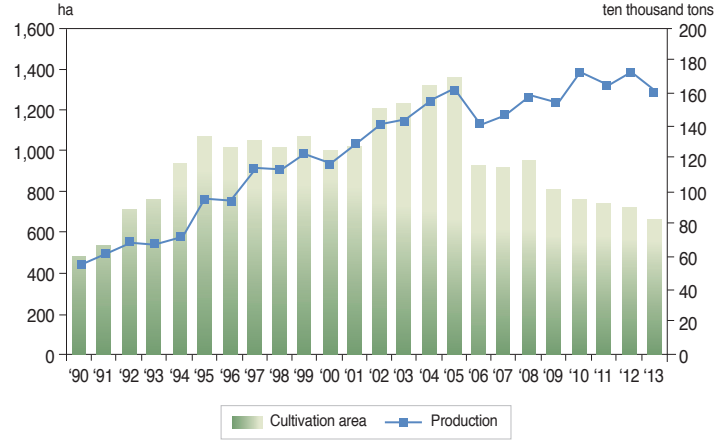
Source: Ministry of Agriculture, Food and Rural Affairs, *Ginseng Statistics*, each year.

in 1990. However, in 2013, general cultivation decreased to 40.8% while contracted cultivation increased to 59.2%. As a result, the proportion of purchase amount to total ginseng production reached 51.4%.

Mushrooms are classified into "agricultural mushrooms" cultivated as agricultural by-products and "forest mushrooms" picked from the forest or cultivated on bed logs. The cultivation acreage of agricultural mushrooms showed a sharp increase at an annual average rate of 6.7% from 483 ha in 1990 to 1,361 ha in 2005 owing to changes in consumption patterns and an increase in imports. However, that figure dropped to 660 ha in 2013 due to a drop in prices. Production was on the rise every year owing to the yield increase from an increase in production and cultivation area, but is somewhat stagnant recently with production reaching 161,604 tons in 2013.

The production status of agricultural mushrooms shows that cultivation area of oyster mushrooms has been on the decrease since the mid-2000s, but the yield has been rapidly increasing as bag cultivation and bottle cultivation methods are introduced

Figure 3-29 Cultivation Area and Production of Mushrooms



Source: Ministry of Agriculture, Food and Rural Affairs, *Major Statistics of Food, Agriculture, Forestry and Fisheries,* each year.

thanks to advanced technology. The cultivation area of mushrooms has been rapidly decreasing because mushrooms are produced based upon substrate cultivation requiring a lot of labour. In the meantime, cultivation area of flammulina velutipes is expanding as it is lucrative and requires relatively lower level of labour and management cost compared to other types of mushroom along with increasing consumption, representing the largest portion of total mushroom production.

The cultivation acreage of tea leaves was only 715 ha in 1995. However, it showed a high annual average increase rate of 12.3%, reaching a whopping 3,800 ha in 2007, as tea became recognized as a healthy food. However, due to a rise in the consumption of substitutes for tea such as coffee, its cultivation area started to decrease and dropped by 23%p to 2,926 ha in 2013 compared to 2007. Production also increased every year but

Table 3-22 Cultivation Area and Production by Type of Mushrooms

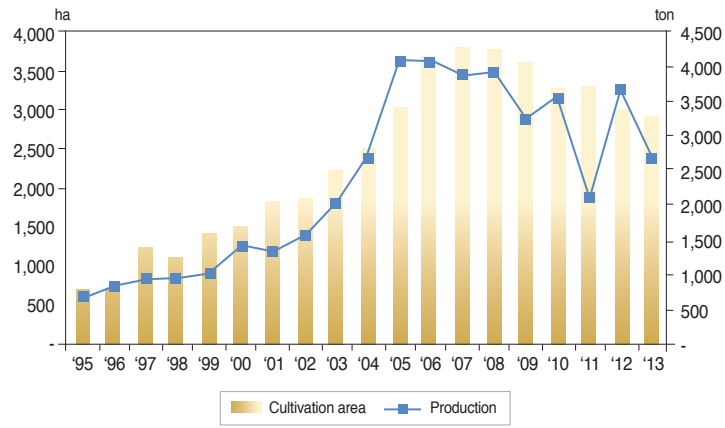
Unit: ha, ton

	1990		1995		2000		2005		2010		2013	
	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
Mushroom	54	10,281	121	15,723	148	21,813	174	18,985	125	22,635	51	6,678
Oyster mushroom	335	43,732	542	72,801	670	70,759	556	56,866	215	45,191	201	66,039
Japanese Touchwood	94	810	393	3,346	100	653	91	448	26	650	28	208
Flammulina Velutipes	0.2	404	10	3,867	61	23,837	84	40,161	45	53,187	26	33,416

Source: Ministry of Agriculture, Food and Rural Affairs, *Major Statistics of Food, Agriculture, Forestry and Fisheries and Production of Specialty Crops,* each year.

has been falling recently due to the decrease in cultivation acreage and recorded 2,700 tons in 2013.

Figure 3-30 Cultivation Area and Production of Tea Leaves



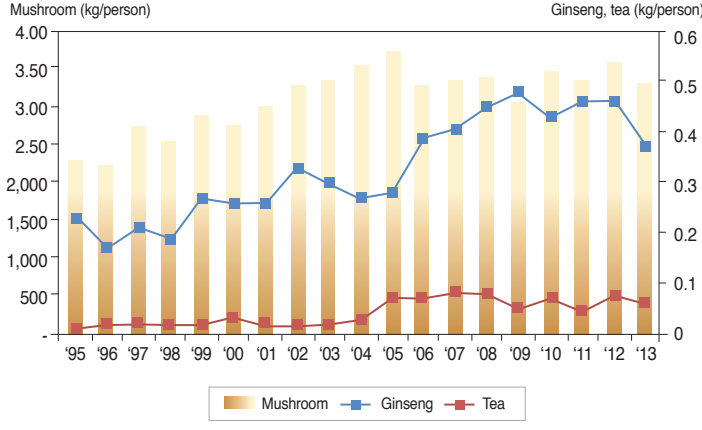
Source: Ministry of Agriculture, Food and Rural Affairs, *Major Statistics of Food, Agriculture, Forestry and Fisheries,* each year.

Consumption Trends

Previously, ginseng was mainly purchased as a gift. However, with the increase in household consumption owing to the rise in national income, the per capita annual consumption of ginseng has grown from 0.23kg in 1995 to 0.37kg in 2013.

In the case of mushrooms, per capita consumption increased by 44.7 percentage points from 2.29kg in 1995 to 3.32kg in 2013. Tea consumption was only 0.01kg in 1995 but increased to 0.08kg in 2008 in line with the heightened consumer awareness of health. However, it dropped to 0.06kg in 2013 as tea was replaced by substitutes such as coffee.

Figure 3-31 Annual Per Capita Consumption of Specialty Crops



Note: Ginseng and tea consumption was estimated using the following equation: (Production+Import-Export)/Population.

Source: Ministry of Agriculture, Food and Rural Affairs, *Ginseng Statistics and Major Statistics of Food, Agriculture, Forestry and Fisheries,* each year.

Import and Export Trends

Ginseng is a major export product of Korea with exports at around 2,000 tons every year, representing 10% of domestic production. Ginseng exports have been on the rise recently and expanded to over 5,000 tons. Imports in 2006 have surged over 10 times compared to 1995 with the rapid increase of low-priced ginseng imports from China. However, imports sharply declined to 52 tons in 2014 due to a safety issue.

Mushroom exports rapidly increased from 97 tons in 1995 to 21,178 tons in 2010 owing to a rise in Flammulina velutipes exports from improved production technology. However, exports have been on the decrease as China, the major importer, has increased its own production. Meanwhile, imports have significantly increased since 2010, and the trade balance turned negative as more than 30,000 tons were imported in 2014.

Table 3-23 Specialty Crops Trade

Unit: ton, 100,000 dollars

		1995		2000		2005		2010		2014	
		Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount	Qty	Amount
Export	Ginseng	2,527	1,400	2,078	790	2,098	825	3,298	1,242	5,819	1,835
	Mushroom	97	12	187	56	504	28	21,178	389	15,397	369
	Tea	366	13	371	10	1,481	48	708	44	452	50
Import	Ginseng	37	8	107	32	297	61	160	40	52	34
	Mushroom	7,600	104	11,801	91	17,411	154	16,185	138	31,770	245
	Tea	117	7	410	17	850	40	585	42	891	120

Source: Korea Agro-Fisheries Trade Corporation.

The export of tea leaves increased more than 4 times from 366 tons in 1995 to 1,481 tons in 2005. However, exports have declined again due to a decrease in cultivation acreage. Imports have risen every year as black tea imports have increased, but began to decrease since 2008, and are again increasing recently.

Outlook and Tasks

The horticulture industry in Korea has declined with the cultivation acreage of vegetables and fruit trees falling due to the impact of liberalization of the agricultural market. Imports are expected to significantly expand with further market liberalization measures from the recent FTA and DDA negotiations. In the case of vegetables, the cultivation acreage is expected to further decrease with the increase of low-priced imports, including chilies, garlic, onions and carrots from China, and with the change in the consumption pattern leading to declining kimchi consumption. Fruit cultivation acreage is also anticipated to gradually fall owing to consumption substitution from the increase in cheap imports including bananas, oranges, kiwis and grapes. Furthermore, production in the floriculture industry is also forecasted to decrease due to the continued stagnant consumption and difficulties in exporting. The cultivation acreage of specialty crops, ginseng, mushrooms and tea, is also decreasing recently due to increased imports, aging of farmers and decreased consumption and this is anticipated to continue.

Nevertheless, the facility horticulture industry and the specialty crop industry can be fostered into competitive sectors as they are more capable of overcoming inhibiting factors, such as land,

technology and labor, than other industries, and can better control supply and demand situations and remain competitive against imports through application of cutting-edge technologies.

Accordingly, in order for the domestic horticulture industry to overcome the current adversities and grow into a competitive sector, first, it must focus on the production of high-quality crops by introducing advanced technologies and establishing technology systems. Second, the industry needs to improve efficiency in distribution to allow timely transactions of fresh crops through the development of low-temperature distribution systems and promotion of packaging and standardization. Third, it must encourage the consumption of horticultural and specialty crops by devising various schemes that satisfy consumer needs in line with the recent boom in well-being and changes in consumption patterns. Fourth, active government support is needed to foster high-quality horticultural and specialty crops into an export industry as a means to compete with low-priced agricultural imports from China.

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4. Forest

Overview

In Korea, 64.0% (6,417,570 ha) of the total area (10,026,625 ha) is mountainous land, covered with various species of trees and shrubs. Of those trees (in the forested areas) 40.5% are coniferous, 26.9% are broadleaf, and 29.3% are mixed. Recently, the total area covered by broadleaf trees has increased while the area covered by mixed trees has been generally steady. On the contrary, the area covered by coniferous trees has steadily decreased from 2003. The major species of trees in the Korean forests are red pine, Japanese larch, Korean pine, and pitch pine. The forested areas are divided among three different climatic zones according to temperature; namely they are the sub-frigid forest, cool-temperate, and cold-temperate zones.

The combined growing stock of the forest is 800,025,300 m^3, with an average stock per ha (of forest) of 125.6 m^3. The stock of coniferous trees, the most dominant species, has a volume of 336,337,314 m^3, while mixed and broadleaf trees occupy 248,369,179 m^3 and 215,318,806 m^3, respectively. Since the majority of the forest

Table 3-24 Accumulation of Timber Resources by Age Class and Forest Area, 2010

Age Class		I	II	III	IV	V	VI	Unforested Area	Total
Area	1000ha	160	466	1,396	2,262	1,388	492	197	6,369
	%	2.5	7.3	21.9	35.5	21.8	7.7	3.1	
Accumu-lation	1000ha		26,672	157,316	306,880	218,074	91,083		800,025
	%		3.3	19.7	38.4	27.3	11.4		

Source: Korea Forest Service, *Statistical Yearbook of Forestry*, 2014.

Table 3-25 Accumulation of Timber Resources by Forest Area and Ownership, 2010

	Area		Accumulation	
	1000ha	%	Million m^3	%
Private forests	4,338	68	511	64
National forests	1,543	24	229	29
Public forests	488	8	60	7
Total	6,369	100	800	100

Source: Korea Forest Service, *Statistical Yearbook of Forestry*, 2014.

is comprised of young to middle-aged trees, the timber volumes are growing faster in recent years. The age distribution of the forests reveals that the age classes with the most active growth (III, IV, and V) represents 79.2% of the total forest area.

Of the forested areas, 68% are privately-owned, 24% are classified as national forests, and the other 8% are public forests. In the last decade, the percentage of forest area privately-owned has decreased while the percentage of national and public forests has increased. In terms of timber production, private forests account for 64%, national forests for 29%, and public forests for 7%. The national forests, though, are accumulating volume growth at a much faster pace than those of the public and private forests. The rate of increase from 2006 to 2010 in accumulation of private forests, national forests, and public forests is 57%, 44%, and 44% respectively.

Forest Products and Trade

The total value of forest-related production was 6,910 billion won in 2013, up from 3,197 billion won in 2003. This output represents only 0.48% of Korea's GDP, which is slightly higher than the 2003 figure of 0.42%. Non-timber products such as mushrooms,

Table 3-26 Major Forest Production Categories, 2013

Unit: billion won

Lumber		Agricultural Materials		Nuts and Fruits		Mushrooms		Landscape Materials		Total
Q(m^3)	V	Q (t)	V	Q (t)	V	Q (t)	V	Q(tree)	V	V
3,800	390	60	940	206	644	20	196	114,428	764	6,910

Note: Q indicates 1,000 in quantity and V indicates the value of each item. Agricultural materials include farm materials, wild vegetables, sap, and medicinal herbs.
Source: Korea Forest Service, *Statistical Yearbook of Forestry,* 2014.

nuts, and fruits account for more than 94% of the forest-related goods in value.

Non-market goods provided by the forest, such as wildlife protection, recreation, and watershed management, have attracted considerable attention in recent times. Although the value of such goods is not considered in the market, their benefits were estimated to be worth as much as 73,181 billion won in 2008, almost 50% more than their presumed 2000 value. Among intangible goods, watershed management is believed to offer the most substantial benefits, followed by soil protection and air purification through carbon dioxide reduction.

Table 3-27 Estimated Supply Values for Non-Market Goods by Year and Good

Unit: billion won

Function	2000	2005	2008
Air Purification	13,535	13,428	16,837
Water Storage	18,126	23,594	24,750
Forest Soil Conservation	12,692	16,481	18,235
Recreation	4,830	11,629	11,689
Wildlife Protection	768	775	1,670
Total	49,951	66,907	73,181

Source: Korea Forest Research Institute, *Study on the Quantification of the Public Functions of Forests,* 2010.

Production and Consumption by Good

Lumber

While the total consumption of lumber has fluctuated over the last decade, domestic production of lumber increased significantly in recent years. This has led to reductions in the quantities of imported lumber and boosted the self-sufficiency rate for lumber consumption from 17.3% in 2001 to 56.6% in 2013.

Table 3-28 Korean Lumber Supply by Year and Type

	2001	2004	2007	2010	2013
Log					
-Domestic	1,533	2,037	2,680	3,715	4,897
-Imported	7,303	6,582	6,333	4,227	3,757
Recycled Lumber	1,905	2,220	2,699	2,228	2,231
Totals	8,836	8,619	9,013	7,942	8,654
Self-Sufficiency Rate (%)	17.3	23.6	29.7	46.8	56.6

Source: Korea Forest Service, *Statistical Yearbook of Forestry,* 2014.

Processed Wood Products

Although plywood was Korea's leading and most significant export item just a few decades ago, the combination of all processed wood products today cannot satisfy domestic demand. The levels of production showed slight fluctuations in all major forest products except MDF, which displayed decreasing trends.

Table 3-29 Production of Major Forest Products by Good and Year

Year	Plywood (1000 m^3)	Particle Board	MDF	Pulp (1000 M/T)	Paper (1000 M/T)
2010	450	919	1,836	511	11,106
2011	455	795	1,812	585	11,480
2012	435	801	1,712	562	11,332
2013	482	802	1,678	541	11,801

Source: Korea Forest Service, *Statistical Yearbook of Forestry,* 2014.

Trade

In the last decade, exports of forest-related products have continually increased in value from $188 million (USD) in 2003 to $410 million in 2013. Starting from 2011, there has been a rapid increase in export value with the values of $245 million, $310 million, and $410 million in the years 2011, 2012, and 2013 respectively. The major forest export products are plywood, chestnuts, other wood and wood products, and mushrooms. Although chestnuts used to claim the highest export value among all forest exports 10 years ago, wood and wood products currently has the highest export value despite recent fluctuations.

Table 3-30 Major Forest Export Products, 2013

Plywood		Wood and Wood Products		Mushrooms		Chestnut		Total
Quan. (1000 m^3)	Value ($1,000)	Quan. (M/T)	Value ($1,000)	Quan. (M/T)	Value ($1,000)	Quan. (M/T)	Value ($1,000)	Value ($1,000)
6	5,894	257,375	87,860	159	5,811	12,816	32,772	410,101

Source: Korea Forest Service, *Statistical Yearbook of Forestry,* 2014.

Table 3-31 Major Forest Import Products, 2013

Round Logs		Sawn Wood		Plywood		Others	Total
Quan. (1000 m^3)	Value ($1,000)	Quan. (1000 m^3)	Value ($1,000)	Quan. (1000 m^3)	Value ($1,000)	Value ($1,000)	Value ($1,000)
3,757	739,002	1,756	540,564	1,287	658,327	1,385,524	4,316,933

Source: Korea Forest Service, *Statistical Yearbook of Forestry,* 2014.

The increasing trend of forest product imports from 1998 reached its peak in 2008 at $3.5 billion, which was followed by a decline in 2009 to $2.9 billion. Since 2010, though, forest imports have been steadily rising again.

The major forest imports are lumber products such as round logs, sawn wood, plywood, and other lumber products. In the year 2013, other lumber products reached $932 million in import value.

Policies

Korean forest policies have been shaped by five successive national forest plans: the First National Greening Campaign, the Second Forest Development Plan, the Third Forest Resources Enhancement Plan, the Fourth Forest Development Plan, and the Fifth Sustainable Forest Management Plan. Each of these plans addresses all aspects of the major forest policy and tries to achieve a balance between the need for preservation of forest resources and the public's demand for them.

The Fifth National Forest Plan (2008-2017)

The Fifth National Forest Plan was established based on the

foundations, framework, and shortcomings of the Fourth Plan. It has been designed to further expand the implementation of sustainable forest management (SFM) in the pursuit of maximizing forest functions. The comprehensive vision of this Plan is "to realize a green nation with sustainable welfare and growth" by sustainably managing forests, which are key resources for strengthening the nation's economic development, land conservation, and improved quality of life. This Plan particularly highlights the importance of forest functions in response to climate change. In the implementation of the Plan, initiatives were launched to establish a foundation to achieve a sustainable welfare society by developing environmental and social resources, and by promoting forest related industries. The government therefore encourages the systematic implementation of forest conservation and management with the purpose of achieving well-balanced land development and conservation. Furthermore, natural disaster prevention efforts will be strengthened to improve ecosystem health, vitality, and public safety. The Plan additionally highlights the recreation and cultural functions of forests contributing to improvement in quality of life and living environments in both urban districts and mountain villages.

Vision for the 21st Century

The Vision for the 21st Century is a government plan which tries to predict the future of forest resources while also outlining an optimal framework for utilizing and preserving them. The plan embraces the belief that forests should not only be kept healthy and beautiful but also economically viable through the adaptation of

technologies and techniques of the SFM manner.

Listed below are some of the long-term goals specified in the plan, which are also intended as benchmarks of successful forest management.

1) Stronger fundamentals in forest management and operation: these include extending the total length of forest roads from 2m/ha in 1998 to 10m/ha by 2030, increasing mechanization in forest operations from 20% in 2002 to 90% by 2050, raising the number of forest technicians and other well-trained laborers from 4,000 in 2000 to 30,000 by 2050, and steadily growing the domestic supply of timber resources so that it may satisfy 50% of domestic demand by 2050 and become a more competitive industry.
2) Stabilizing the forest ecosystems and eventually making them healthier: to achieve this 25% of all forest lands will be designated as conservation zones by 2030 and forest fire prevention and suppression systems will be sophisticated.
3) Controlling air and water pollution: to this end, forests will be established as stream buffer zones as part of conservation projects for five major rivers. Global warming will also be addressed through enhancement of carbon dioxide sequestration capabilities, as storage capacities rise from 174 TC to a target of 569 TC by 2050.
4) Facilitating and promoting recreation: to satisfy fast-growing demand, new facilities and hardware will be erected for leisure activities and the number and size of events and festivals will be increased.

5) Establishing green networks within cities to more efficiently manage urban forest sites
6) Further developing mountainous villages: development in 240 mountainous villages will be extended through ecosystem preservation projects in hopes of creating recreational forests and a basis for green tourism by 2030.
7) Extending national forests by purchasing private forest lands: this aims at substantially expanding the total area of the national forests, which would be managed according to SFM principles.

Major Forest Policies

The major forest policies of Korea focus on five key themes: forest resources, forest health, forests for people, forest management support, and international cooperation. Under forest resources, specific focus is given on tree planting, biomass forest plantations, forest tending, green job promotion, wood pellets for energy, and domestic timber. The green job project aims to provide job opportunities and vocational education to the unemployed with different social backgrounds with the expectations of contributing to forest rehabilitation and management, forest disasters prevention, and forest resource development. Secondly, the forest health theme focuses on forest fire control, forest pest and disease control, natural disaster control, forest land management, forest biodiversity, and the preservation of the Baekdu-Daegan Mountains. Irrational restrictions have been eased to establish an eco-friendly system of forest land use, and both in-situ and ex-situ conservation methods are used to enhance biodiversity conservation functions.

The third theme, forests for people, addresses issues such as recreation, mountaineering, urban and school forests, tree burial forests, mountain village projects, and therapy forests. Special attention is given towards investment in forest recreation as public demand has rapidly increased in recent years. Furthermore, forest management support strives to build a foundation for the forest industry, support forest managers, provide infrastructures for forest management, improve forest technology, and facilitate trade in forest products. Increasing the market competitiveness of domestic forest products and guaranteeing sustainable forest livelihoods are essential, especially in an era of vigorous market-opening through FTAs and other trade agreements. Lastly, issues regarding bilateral cooperation, desertification prevention projects, overseas plantation, and cooperation with DPRK are covered under the theme of international cooperation.