

**R**eal economic growth rate for 2004 is projected to 5.3 percent and is expected to slow down to 4.9 percent in 2005. Higher oil prices have weakened incentives for investments, which has led to lower estimations of the growth rate in 2004. In spite of sluggish domestic demand, exports increased sufficiently and supported the growth of the Korean economy in 2004. The trade surplus has been maintained since 1998. Exports are also anticipated to remain high even in 2005. The CPI was anticipated to rise by 3.3 percent in 2004, but is expected to stabilize at less than 1 percent in 2005. Foreign exchange reserves still recorded more than US\$150 billion as of November 2003. The exchange rate is forecast to stabilize at around 1,150 Won per US dollars as long as there were no impacts from North Korean variables and China shock in 2004 and 2005.

Food prices surged by 4.4 percent in 2003. The main reason for rising food prices was the decline in the domestic supply of fruits, vegetables, and grains because of bad weather. Food price inflation is expected to accelerate even in 2004, rising by 5.7 percent in 2004. In 2005, however, food prices are expected to stabilize with about a 1-percent rise. Rice prices will lead to lower prices of food in both years because the decreasing trend of per-capita consumption of rice is expected to be sustained in the near future. Increased imports of oranges and other fruits will also lower the price of fruits in the 2004 season. Consumption of meat and dairy products is anticipated to increase as income increases. Most households also are expanding their expenditures for food away from home.

### Macroeconomic Situation and Outlook

Although internal and external uncertainties are still remaining in some countries, the world economy seems to enter into a recovery stage. The United States especially has experienced a period of active economic growth lately. A continuously increasing trend in exports boosted Korean economic viability over deteriorating domestic consumption and investment that would be expected to prevent national economy from growing substantially. There are two opposite factors surrounding the Korean economy; the recovery of the Japanese as well as the U.S. economy versus a damping Chinese economic growth with galloping prices of oil and primary resources. The World Bank outlook for the Korean economy coincides with that of the EIU (Economist Intelligence Unit): 5.3 percent in 2004.

The interest rate stabilized at around 5.4 percent in 2003 and is expected to remain constant in 2005. The general price index is expected to increase by 3.25 percent in 2004. Considering the rapidly rising trend of oil prices, the CPI seems likely to increase more than expected in the near future. Foreign reserves have expanded from US\$121.4 billion to US\$150.3 billion between 2002 and 2003 as exports increased continuously. Unemployment rate declined

from 4.1 percent in 2000 to 3.1 percent in 2002 but rebounded to 3.6 percent in 2003. It is also expected to rise to 4.0 percent in 2004 because of "the growth without job creation phenomenon" as well as the economic recession.

The agricultural sector accounted for 4.1 percent of the Gross Domestic Product in 2002, and it is projected to fall to below 4.0 percent in 2003. The share of agriculture in national employment was relatively higher than that in production but also showed diminishing trends, from 10.6 percent in 2000 to 8.8 percent in 2003. The foreign exchange rate rose slightly from 1,186.2 Korean Won per U.S. dollar in 2002 to 1,192.6 Won per U.S. dollar in 2003. It is expected to stabilize at around 1,150 Won per U.S. dollar in 2004 as well as in 2005, as long as the strong oil prices weaken and the Chinese economy successfully achieves a "soft landing."

### Food Prices and Consumption

The food price index is forecast to go up to 118.8 in 2004 from 112.4 in 2003 mainly because of the higher prices of rice and meats. They are also projected to rise further by 1.0 percent in 2005. Rice is a staple food and the most important commodity in Korea. Although consumption of rice is projected to decline to 4.7 million tons in 2004, the farm price has maintained an upward trend since 2002. The rice price is forecast to rise by 5.1 percent in 2005 but the real price, reflecting inflation, will fall by 0.5 percent. Import of the Minimum Market Access (MMA) quota of 0.2 million tons is also forecast to contribute to lowering the price of rice in 2004 and 2005.

The outbreak of BSE in the United States and Canada at the end of 2003 suppressed imports of beef and consumption. At the same time, consumption of domestically produced cow (Hanwoo), which is recognized as relatively safe, expanded. Domestic prices of beef have risen by more than 10 percent in 2004 compared to 2003 and are expected to rise further in 2005. Demand for pork increased as people substituted it for beef and chicken, raising the price of pork by 8.8 percent in 2004. Consumption of chicken was restrained because of the bird flu found in Southeast Asia in 2003 and 2004. The price of chicken is expected to rebound by 3.5 percent in 2004 because supply also decreased. But it will return to a downward trend if the bird flu problem becomes prolonged.

Vegetable consumption shows increasing trends as a whole. There are various consumption patterns and changes according to the commodities. Prices of vegetables, however, have tended to fall because of imports from China. Fruits are among the items for which consumption is supposed to expand as income increases. Demand for high-quality fruits especially increase despite higher prices. Shortages of high-quality fruits in the 2003 season brought about an increase in prices in the first half of 2004. But expanded imports of fruits from Chile is now expected to lower the price of fruits in 2004 and thereafter.

## Food Processing and Marketing

During 2000 and 2002, the growth rate of value-added production in the food and beverage industry was 10.9 percent while that of the total manufacturing sector was only 7.0 percent. As a result, the value-added food and beverage industry accounts for 7.2 percent of total manufacturing value added in 2002, which is 0.3 percent higher than the share of the food and beverage industry in 2000. The GDP share of food and beverage industry, however, declined from 2.04 percent to 1.93 percent since total GDP grew by a higher rate than the food industry, 17.1 percent during the same period. The employment share of the food and beverage industry fell slightly from 6.9 percent to 6.8 percent of the total manufacturing sector between 2000 and 2002. Accordingly, its share in total employment also decreased from 1.4 percent to 1.3 percent during the same period. That is, the food and beverage industry seemed to play an increasingly important role in manufacturing production while its importance was diminishing both in value-added production and employment in the national economy.

The scale of the food industry tends to be smaller as it implements structural readjustments and productivity improvements. The number of employees per firm has decreased from 34.2 people in 1998 to 27.6 people in 2000 and 24.2 in 2002. Tangible assets, except land per firm, also decreased from 1.96 million U.S. dollars to 1.78 million U.S. dollars between 2000 and 2002. But labor productivity of the food and beverage industry is higher than the manufacturing industry in average. Value added per worker in the food and beverage industry has increased from 70.3 thousand dollars in 2000 to 76.3 thousand dollars in 2002. During the same period, that of the average manufacturing company increased from 65.7 thousand dollars to 74.9 thousand dollars. The food and beverage industry is expected to grow still faster than the average manufacturing company for the time being because most people are more interested in healthy and functional foods for which development of cutting-edge science and biotechnology is required.

Demand for processed foods has grown in absolute terms but is reduced in the relative share of family expenditure. The average monthly expenditure on processed foods increased from 76.9 dollars in 2000 to 91.6 dollars in 2003. The share of total food expenditure used to purchase processed food has decreased from 55.6 percent to 39.7 percent during the same period. Expenditures on eating out, however, increased from 139.7 dollars to 194.7 dollars. Considering that most food consumed away from home is processed, the share of processed food has increased, in fact. Production in the processed food and beverage industry is projected to increase by 30 percent and exceed 34 billion dollars in 2005. Demand for processed food is forecast to grow faster than that for average food in the future.

## Agricultural Production and Trade

The agriculture and fisheries sector employed 1.95 million people in 2003, which is 5.8 percent smaller than the 2002 figure of 2.07 million. The number employed in agriculture is estimated to be 1.94 mil-

lion for 2004. Cultivated land area decreased by 1.1 percent from 1.85 million hectares to 1.83 million hectares during the same period. Both agricultural workers and cultivated land are expected to decrease even further in 2005 as agricultural imports increase rapidly.

Value-added production within the agriculture and forestry sector expressed in 1995 constant prices is estimated to decrease from 18.2 billion dollars in 2002 to 17.1 billion dollars in 2003 mostly because of the reduced inputs of agricultural production factors. Agricultural production, however, is forecast to rebound to 18.2 billion dollars in 2004 as long as the cultivating sector recovers its annual average production level. Production of the cultivating sector is down from 14.8 billion dollars in 2002 to 13.8 billion dollars in 2003 while the livestock sector decreased by 0.8 percent to 3.1 billion dollars during the same period. Value-added production in the cultivating sector is forecast to recover 14.8 billion dollars while that of the livestock sector is expected to be 3.2 billion dollars in 2004.

Korean imports of agriculture, livestock, and fisheries products increased by 6.6 percent to 12.5 billion dollars in 2003. An increase of more than 7 percent in agricultural product imports mostly accounted for the increment in total imports in 2003. Agricultural imports are expected to increase further to 11.0 billion in 2004. Expanding imports of rice as the MMA quantity may promote agricultural imports after 2005. On the other hand, strong trends of international prices of grains and other agricultural products may disturb increases in imports.

Export of agriculture, livestock, and fisheries products also showed increasing trends. Together they have increased by 6.6 percent to 3 billion dollars in 2003 from 2.8 billion dollars in 2002. Exports of agricultural and livestock products accounted for the greatest part of the increments in total exports in 2003. In 2004, exports of agriculture, forestry and livestock products are forecast to increase by 4.3 percent, approaching 1.95 billion dollars. Exports of perishable and processed products as well as wood products are likewise expected to contribute to increases in total exports. Thereafter, however, it seems unlikely that the increasing trend of agricultural exports will be maintained because Korea's domestic production costs tend to rise faster than that of other exporting countries such as China.

Because of the bad weather conditions, rice production was 4.45 million tons in 2003. In 2004, it is projected to be between 4.68 and 4.9 million tons as inputs such as pesticide and fertilizer will tend to be reduced. The decreasing trend of rice production is also expected to continue even in 2005 with a production range of 4.6 and 4.75 million tons. As rice production continues to fall, ending stocks of rice are forecast to decrease slightly from 1.1 million tons in 2003 to 1.0 million tons in 2004. In 2005, however, it is expected to increase to over 1.3 million tons due to the increasing MMA imports of rice as well as reduced per capita consumption. The reduction in rice production is attributed to rice field declines from 1.016 million hectare in 2003 to 1.0 and 0.98 million hectares in 2004 and 2005, respectively. Per hectare yields of rice are projected to recover from 441 tons in 2003 and remain constant in the range of 470–490 tons until 2005.

As the price of beef rose in 2003, farmers decided to increase the number of breeding cows rather than to sell them. Consequently, beef production for sale dropped by 5 percent from 147,400 tons in 2002 to 140,000 tons in 2003. Beef production is expected to slightly increase to 152,000 tons and 164,000 tons in 2004 and 2006, respectively. Since the Tariff Rate Quota (TRQ) on beef imports was removed as of 2001, beef imports increased to 302,000 tons in 2003 from 238,000 tons in 2000. The market share of the United States in Korean beef imports has continuously increased from 55.3 percent in 2000 to 68.2 percent in 2003 until imports from the United States was prohibited because of the BSE finding of December 27, 2003. Although beef imports are forecast to be reduced to 150,000 tons in 2004, they will continue to expand to more than 200,000 tons after 2005 with the self-sufficiency ratio of beef being sustained at around 38 percent or more.

As a result of the outbreak of FMD, pork production was reduced slightly to 784,100 tons in 2003 from 785,300 tons in 2002. The outbreak of BSE in the United States and Canada seemed to offset the effects of pork FMD in Korea so that pork consumption expanded. Production is forecast to rebound to 794,600 tons in 2004 and over 800,000 tons in 2005. Imports are also expected to increase by 18.0 percent to 74,000 tons in 2004 and over 100,000 tons in 2006.

## The Role of Infrastructure in the Korean Food System

### INTRODUCTION

Unlike other countries, Korea has maintained its own eating tradition of a single main food and complements. The main food or staple food is definitely rice. Though eating habits have changed a lot, especially for the younger generation, rice is still the most popular food in Korea. In that sense, main food producers are scattered all over the country. Rice also needs processing before being served. The rice processing centers (RPCs) might be called manufacturers because they make the raw rice edible through the process of drying, removing shells, cutting, and so on. The RPCs have played a major role in the Korean food system though they have been widely spread recently. Unfortunately, however, the RPCs are located in every farming region. They are in charge of supplying rice to local markets and to the main consuming regions such as Seoul, Busan, and other markets with huge populations. Various types of RPCs around the main markets seem to be operated along with the gravity theory in that they tend to supply more rice according to the distance and size of market.

### INFRASTRUCTURE AND FOOD SUPPLY IN KOREA

Most food has been transported overland using trucks and other vehicles as well as the railroad. Fresh foods such as vegetables, fruits, and meats that need quick delivery are usually transported by trucks while bulk-type commodities such as grains including rice have mainly used trains for domestic transportation. Imports and exports of food and agricultural products are transported using ships rather than air-

planes because the weights of most agricultural commodities are heavy relative to their values.

In Korea, Busan and Incheon are the main international ports of entry and exit for food and agricultural products. Busan is the largest port in terms of volume of freight and number of ships anchored in Korea. Incheon is the second largest port, but it has a spatial advantage in that it is located near the largest consumption region, Seoul. Inland transportation of imported food is usually by trains and truck. The quantity of food supplied is a function of the lengths of paved road and railroad as well as its production and price. Other types of infrastructure that can be considered as affecting the food supply are utilities such as electricity, measures of communication, construction, and other social services.

According to the "2000 Input-Output Table," the input coefficient of utilities including electricity was 0.00308 for agricultural production and 0.00746 for food and beverage production in 2000<sup>1</sup>. It implied that around 0.01 unit of utilities are required to produce 1 unit of food or agricultural product. Input coefficients of transporta-

**Table 1. Lengths of Railroad and Paved Road (Unit: Km)**

	Railroad	Road	Paved Road	Express Way
1971	3,198.70	40,635.40	5,789.00	654.9
1972	3,120.60	42,867.60	6,769.10	655
1973	3,133.00	43,581.30	7,820.00	1,012.90
1974	3,143.40	44,177.70	8,639.90	1,013.00
1975	3,144.30	44,885.40	9,999.90	1,142.40
1976	3,144.30	45,513.60	10,912.10	1,142.40
1977	3,141.90	45,983.80	12,106.80	1,224.60
1978	3,152.90	45,954.70	13,543.60	1,224.60
1979	3,158.10	46,333.10	14,277.50	1,224.60
1980	3,134.60	46,950.90	15,599.00	1,224.60
1981	3,121.30	50,336.40	17,178.90	1,245.20
1982	3,121.30	53,935.60	19,282.60	1,245.20
1983	3,120.70	54,599.60	21,278.80	1,245.20
1984	3,116.40	51,003.70	23,664.30	1,420.90
1985	3,120.60	52,264.10	26,072.10	1,415.40
1986	3,113.40	53,653.70	29,071.00	1,415.40
1987	3,129.90	54,688.70	31,282.60	1,539.00
1988	3,148.80	55,778.40	34,233.90	1,550.40
1989	3,120.40	56,480.50	37,492.40	1,550.80
1990	3,091.30	56,714.70	40,545.00	1,550.70
1991	3,091.30	58,088.20	44,377.70	1,597.40
1992	3,092.40	58,846.70	47,572.90	1,599.70
1993	3,097.90	61,295.80	51,888.50	1,602.40
1994	3,101.20	73,833.10	57,420.90	1,650.10
1995	3,101.20	74,237.40	56,386.50	1,824.50
1996	3,120.40	82,342.40	59,839.90	1,885.60
1997	3,118.30	84,968.40	62,868.20	1,889.10
1998	3,124.70	86,989.70	64,780.50	1,996.30
1999	3,118.60	87,534.30	65,356.30	2,040.50
2000	3,123.00	88,775.00	67,265.50	2,131.20
2001	3,125.30	91,396.40	70,146.00	2,636.60
2002	3,129.00	96,037.10	73,656.00	2,778.10

Source: Korea National Statistics Office (2003)

tion were 0.008061 and 0.01051 for agriculture and food and beverage, respectively. The impacts of communication were 0.001171 for agriculture and food including beverages. Thus, input coefficients of infrastructure, in total, were 0.015655 for agriculture and 0.022171 for food and beverage. That is, roughly 0.016 unit of infrastructure is required to produce 1 unit of agriculture and 0.022 unit of infrastructure is needed to produce 1 unit of food and beverage in 2000.

To study the effects of infrastructure on food supply, we estimated a food supply equation using the Cobb-Douglas function and data from 1983–2002 as follows:

$$\ln EN = \text{Tech} + \ln IM + \ln P + \ln EL + \ln RA + \ln PR$$

where dependent variable EN means per capita daily energy intake. Of the independent variables, Tech is technology level, IM food imports, P food price, and EL, RA, and PR represent infrastructures such as electricity generating capacity, length of railroad, and length of paved road, respectively. This model is a log-log type as it shows.

The result of the estimation is shown in Table 2. Food price, lengths of paved road, and food imports were significant at 1 percent,

Independent Variables	Coefficient	t-Statistic	Probability
Tech	0.013	1.8	0.09
ln IM	0.040	2.0	0.07
ln P	-0.287	-3.3	0.01
ln EL	-0.028	-0.4	0.72
ln RA	-0.864	-0.8	0.42
ln PR	0.137	2.5	0.03
* Adjusted R squared: 0.9106			

5 percent, and 10 percent, respectively. According to the estimation, a 1-percent increase in food imports and the length of paved road results in 0.04 percent and 0.14 percent increases in daily energy intakes, respectively. A 1-percent increase in food prices, however, contributes to a 0.29-percent decline in daily energy intakes.

Food imports, in turn, can be considered as a function of food prices as well as infrastructure. To analyze the impacts of infrastructure on food imports, we need to estimate the import demand function using a linear equation as follows:

$$IM = GDP + P + EL + RA + PR$$

where dependent variable IM means food imports, while independent variable GDP is per capita gross domestic product, P is food price, and EL, RA, and PR represent infrastructure such as electricity generating capacity, length of railroad, and length of paved road, respectively. This model is a linear model.

Estimated results were summarized in Table 3. Per capita GDP and electricity-generating capacity are significant at a 0.1-percent level, while food price and the length of paved road are significant at 1 percent and 10 percent, respectively. The estimation shows that a 1-percent increase in per capita GDP results in a 33.2-percent increase in food imports while the same increase in food price lowered food imports 247.6 percent. As for infrastructure, the impact of electricity-generating capacity is insignificantly different from zero, which means there is almost no impact on food imports while a 1-percent increase in length of paved road had the positive effect of raising food imports 0.11 percent.

In sum, food supply in terms of per capita daily energy intake is directly and indirectly affected by the length of paved road. One of the reasons is that paved road has been constructed continuously and most food is transported by trucks while length of railroads were con-

Independent Variables	Coefficient	t-Statistic	Probability
GDP	33.2	9.0	0.00
P	-247.6	-3.8	0.00
EL	-0.00	-6.1	0.00
RA	1.01	0.1	0.94
PR	0.11	1.8 0	.09
* Adjusted R squared: 0.9751			

stant until recently and only bulk-type food is transported by trains. Food imports also have been affected by infrastructure such as electricity generation capacity and length of paved road. Electricity, however, has had only a limited impact on food imports while length of paved road has had strong effects on food imports. Imports of food have increased regardless of the electricity-generating capacity. One noteworthy fact is that most imported food is transported by truck rather than railroad, ships, or airplanes from port of entry to consumption regions.

<sup>1</sup> Bank of Korea, *2000 Input-Output Table*, 2003.

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Table 4. Input Coefficients of Infrastructure for Agri-Food Sector

Infrastructure	Input Coefficient for Agriculture	Input Coefficient for Food and Beverage
Utilities	0.00308	0.00746
Transportation	0.008061	0.01051
Communication	0.003023	0.002709
Construction	0.00069	0.000481
Social Service	0.00080	0.022171

Source: Bank of Korea, 2000 Input-Output Table, 2003