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SPECIAL ISSUE: OUTLOOK OF KOREAN AGRICULTURE

SITUATION AND OUTLOOK OF LIVESTOCK SECTOR

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key words: livestock, outlook, Hanwoo, beef, dairy, milk, hog, pork, layer, egg, broiler, chicken, farm price, demand, supply, production, foot and mouth disease

ABSTRACT

This report provides long-run baseline projections for the livestock sector through 2011. For beef cattle industry, as the beef cattle numbers are forecast to show a steady growth until 2007, the farm price of beef cattle are forecast to drop sharply after 2007. For dairy and egg industry, a steady increase in demand is forecast to induce a stable growth of those industry until 2011. While both the pork production and imports are forecast to increase steadily until 2011, the hog price is forecast to show a moderate increase until 2004 and then to be on a decrease after 2004. For chicken industry, until 2011, it is forecast that the chicken production will on its current level and its price will show a downward trend.

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I. Introduction

The livestock industry was one of the sectors, which had suffered most during the recent financial crisis. The high exchange rates raised the price of feed imports and in turn put pressure upon livestock farms in finance. Besides, the contraction in the meat consumption during the financial crisis shrank the livestock industry. As the exchange rates has gotten stable from 1999, the livestock industry has been on recovery.

The hog farmers had been benefited from pork exports to Japan. As the pork exports to Japan had increased sharply from 1997 when the pork exports in Taiwan had been discontinued by the breakout of the Foot and Mouth Disease (FMD), more than 80 thousand tons of pork was exported in 1998 and 1999 annually. However, the FMD had broken out in March of 2000 in our country, and the pork exports has been discontinued since then.

According to the International Animal Health Code of Office International des Epizooties (OIE), because our country suspended vaccination for the FMD in September of 2000, in case of no additional breakout of the FMD until August of 2001, our country is eligible to apply the deliberation for its restoration to a FMD free country. However, even if our country is declared as FMD free before the OIE general meeting in May of 2002, reopening of pork exports will depend on the negotiation between our country and an importing country.

This report provides long-run baseline projections for the livestock sector through 2011. Projections cover five livestock categories (beef cattle, milk cows, hog, layer and broiler), their trade, their domestic supply and demand, and their farm prices. The projections are based on specific assumptions regarding macroeconomic conditions, policy, weather, and international developments. The baseline projections were derived from the KREI-ASMO 2000.

The KREI-ASMO 2000 is a revised version of the short-

and the long-run forecasting model for an agricultural sector developed by Korea Rural Economic Institute (KREI) in 1998. It is developed to analyze overall how the agricultural sector changes over time. It is composed of 4 sectoral models: a world rice demand and supply model, a crop and fruit model, a livestock model, and an aggregate model. The world rice demand and supply model forecasts the world rice price. The crop and fruit model forecasts the demand and supply of crops and fruits. The livestock model forecasts the demand and supply of livestock markets. The aggregate model aggregates the forecasts derived from other 3 sectoral models and then calculates the farm income and the value added in agricultural sector. Each sectoral model is programmed to be capable to perform simulation experiments individually.

II. Beef Cattle

1. Situation for Beef Trading Conditions

While the quota system on imports has allowed a Korean beef

TABLE 1. Outlook for beef import price, 1999-2011

	unit	1999	2000	2001	2004	2011
World Price	\$/ton	2,557	3,114	3,277	3,316	3,363
Exchange Rate	W/\$	1,190	1,117	1,150	1,100	1,100
Tariff rate	%	42.0	41.6	41.2	40.0	34.0
Domestic Price	W/kg	4,918	5,609	6,061	5,817	5,656

- Note: 1) The world price is calculated in terms of CIF price using estimates from FAPRI (Food and Agricultural Policy Research Institute).
 2) Assume the exchange rate is 1,150 won/\$ in 2001 and 1,100 won/\$ from 2002.
 3) Assume the tariff rate goes down 15% annually in 2004-11 from 2004 rate.
 4) The domestic price is the purchasing cost of imports in wholesale market, including exchange rate, tariff, misc. costs, margin, etc.
 5) The projections for 2000 are KREI's preliminaries, and those for post-2001 are its forecasts.

market open partially by 2000, application of 41.2% tariff on live cattle and beef import forces a beef market open completely from 2001. The tariff rate is supposed to go down 0.4% annually to reach to 40% in 2004. The post-2004 tariff rate will be determined, based on the next WTO agreement.

Following a report¹ from the Economic Research Service (ERS), the United States Department of Agriculture (USDA), it is expected that, in 2001, U.S. beef production declines and beef price goes up as the total number of beef cattle decreases owing to 2000 drought. Hence, domestic consumer price for beef import is expected to rise in 2001. However, the domestic price for beef import is forecast to show a downward trend in the long term owing to falling tariff rate.

2. Situation for beef industry

A fall in the cattle's farm price and a rise of the feed costs by financial crisis in late 1997 has deteriorated profitability of beef cattle farms. The slaughter rate for beef cows was below 10% in 1996. However, deterioration of profitability of breeding farms caused by fall in the calf price attributable to a fall in the steer price pushed the slaughter rate for beef cows up to above 20%. Then, the slaughter rate for beef cows climbed up to around 39% in 1999. In consequence, as a decrease of the size of the cow herd has been accelerated, the number of beef cattle breeding stock in December was declining to 2.74 million heads in 1997, 2.38 million heads in 1998 and 1.95 million heads in 1999. Besides, as insecurity of beef cattle farms against a beef market being open completely in 2001 has encouraged the beef cow slaughter and has lowered the birth rate, the total number of beef cattle has rapidly dropped up to 1.59 million head in December, 2000.

The results from livestock products grading in January to November, 2000, show that, while 52% of steers, the highest

¹ Economic Research Service, *ERS Agricultural Outlook*, December, USDA. 2000.

among beef cattle crops slaughtered, have won above the first grade in meat quality, only 38% of beef cows and 2% of bulls have won above the first grade. However, among cattle won above the first grade in meat quality, 89% are Hanwoo(Korean cattle), and 9% are steers, and 2% are bulls. Thus, the beef cows are the major beef cattle crop to produce the high grade meat. The consumers' preference toward meat produced from beef cows and insecurity of the breeding farms against beef market being open induced breeding farms to avoid calf production and to prefer a short-term fattening beef cows. In consequence, beef cow numbers got shrunk rapidly and in turn the foundation of beef cattle farming became weakened.

The beef production in 2000, is expected to have been 211 thousand tons, down 7% from 1999, as the weakened foundation of beef cattle farming has shrunk the total domestic slaughter. Besides, as most of the quota set for beef import in 2000, 225 thousand tons, is expected to have been imported, the degree of self-sufficiency for beef in 2000 is expected to have been fallen off up to 53%. In 2000, a decrease of domestic beef production drove the consumer price of Hanwoo meat up and decreased its consumption by 13%, compared that in 1999. On the contrary, the total beef consumption in 2000 was up 1% from a year earlier, as the consumption of cheap beef import was expanded by above 22%.

3. Effects of Beef Market Opening

While the farm price of 350kg Hanwoo male calves was 2.03 million won in December of 2000, the estimated purchasing price for calves imported is 1.8 million won for U.S. calves and 1.1 million won for Australian calves. Suppose Hanwoo receive B1 grade (as grade for Hanwoo), and U.S. and Australian calves, after fattened up, receive B2 or B3 grade (as grade for beef cattle) in wholesale market. Then, as it is expected that margin per head acquired from fattening calves imported up is lower than that from fattening Hanwoo. Hence, the possibility for import of calves is anticipated to be lower than expected, as long

TABLE2. Comparison of Profitability (per Head) in Calf Breeding

	unit	Live Imports: B3 Grade			Live Imports: B2 Grade		
		Hanwoo	U.S.	Aus.	Hanwoo	U.S.	Aus.
Live Weight	kg	550	550	550	550	550	550
Carcass Wgt.	kg	340	340	340	340	340	340
Unit Cost in Carcass Wgt.	won/ kg	11,550	5,427	5,427	11,550	8,323	8,323
Farm Price	₩10,000 /head	393	185	185	393	283	283
350kg Calf Purchas. Cost	₩10,000 /head	203	180 ~190	110 ~120	203	180 ~190	110 ~120
Income	10,000 won	190	△5~5	75~65	190	103~93	163~173

Note: 1) The average auction price for B1 grade of Hanwoo at the agricultural cooperatives joint market in Seoul in 11/2000 is used as the Hanwoo's unit cost(in carcass weight).

2) The average auction price for B2 and B3 grade of beef cattle at the agricultural cooperatives joint market in Seoul in 11/2000 is used as the unit cost of beef cattle imports (in carcass weight).

3) The income is the revenue net of calf purchasing costs.

4) The rate of conversion between live and carcass weight is 61.8%.

as the farm price of 350kg Hanwoo male calves is around 2 million won.

Some other matters should also be considered in imports of live cattle. They are diseases and quarantine inspection, stress occurred to cattle in transportation, capacity of domestic quarantine inspection service, and reduction of margin attributable to changes in feeding environments. As they are also taken into consideration, the small number of live cattle is expected to be imported, if the live cattle import occurs.

Even if the imports of live cattle become feasible after beef market opens, the possibility for imports of live cattle are low. Because the tariff rate for beef imported is supposed to go down 0.4% annually by 2004, there is a higher possibility for

beef being imported than for live cattle being imported. As beef import is expected to increase, it is expected that large corporates entering the field of the beef marketing are expanded and the existing wholesale dealers in the livestock wholesale market participate in the imported beef market. Thus, it is expected that competition among importers for beef gets keener and competitiveness of the small importers gets weaker.

The increase of the direct trade with exporting countries is expected gradually to shrink the share of frozen beef, imported for regulation of demand and supply, and to expand the share of the high-valued fresh and chilled beef in imported beef market. The share of fresh and chilled beef in imported beef in Japan grew from 39% in 1990 before the market opening to 56% in 1995 after the market opening.

4. Outlook for Beef Industry

As the subsidy on prolificacy and the calf production stabilization program are reinforced from year 2001, it is forecast that the beef cow slaughter decreases and in turn the total number of beef cows increases to 620 thousand heads by late 2001, up above 20 thousand heads from late 2000. In contrast, a decrease in the number of the artificially inseminated and a low birth rate are expected to induce the number of the calves to fall off to 510 thousand heads in 2001, down 13% from 2000 and in turn the total number of beef cattle to drop to 1.46 million heads in late 2001. But, If the reinforcement of the government policies to encourage the calf production induces the farmers to reduce the beef cow slaughter, it is expected that in 2002 the total number of beef cows increases to 658 thousand heads, up 6% from 2001, and the number of calves increases to 595 thousand head, up 17% from 2001, and the total number of beef cattle is 1.54 million heads. After the size of beef cow breeding stock becomes the lowest in 2001, it is forecast to show a moderate growth in next 6~7 years and then a slight decrease corresponding to the beef cattle cycle afterward.

The beef production is forecast to be 153 thousand heads

in 2001, down 17% from 2000, owing to a decrease in the beef cattle stock and the beef cow slaughter. It is forecast to be 130 thousand heads in 2002, down 15% from 2000, owing to a shrinkage in beef cow slaughter in disregard of an expansion of beef cattle stock. But, the beef consumption is forecast to show a moderate increase from 2003.

As the economy is expected to slow down by the first half of 2001, the beef consumption is expected to show a lower growth rate in 2001 than that in the past. In 2001, while the consumption of beef produced domestically is estimated to be 156 thousand tons, down 15% from 2000, owing to a decrease of domestic beef production, the consumption of beef imported is estimated to be 253 thousand tons, up 35% from 2000. Thus, the per capita consumption of beef in 2001, at 8.58kg, is forecast to go up 2.5% from 2000.

In 2002, the decrease in domestic beef production is also forecast to diminish the consumption of beef produced domestically to 131 thousand tons, down 16% from 2001, and to push the consumption of beef imported up to 296 thousand tons, up 17% from 2001. As a whole, the per capita consumption is forecast to be 8.89kg, up 3.6% from 2001. From 2003, per capita consumption of beef is forecast to show a steady increase with a growth rate of 3% in average.

TABLE 3. Outlook for Beef Demand and Supply, 2000-11

		2000	2001	2002	2004	2011
Consumption (1,000ton)	Domestic	209	156	131	154	208
	Imported	187	253	296	293	386
	Total	396	409	427	447	594
Per Capita Consumption(kg)		8.37	8.58	8.89	9.16	11.67
Farm Price(real term) (10,000/500kg)		228	240~250	230~240	205~215	160~170

Note: 1) The farm price is a real price deflated by GDP deflator.

2) Consumption includes beginning stock.

3) The farm price in 2001 is around 280~300 won in terms of nominal price.

In 2001, the farm price of beef cattle in real term is forecast to be 2.4~2.5 million won, up around 5% from 2000, owing to a decline in beef cattle breeding stock, and a insufficient number of beef cows is expected to induce the farm price of beef cows to be higher than that of steers. It is forecast that the farm price in 2002 decreases owing to an expansion of beef cattle breeding stock but continues to be higher than its level in 2000. After 2003, an expansion of beef cattle breeding stock is forecast to induce the farm price to gradually fall off to become stable. The degree of self-sufficiency in beef is forecast to drop to 37% in 2001 from 53% in 2000, and to 31% in 2002 owing to a fall in domestic production. However, the degree of self-sufficiency is forecast to hold 35~36% in average in 2003~2011 owing to an increase in domestic production resulting from an expansion of beef cattle breeding stock.

III. Milk Cows

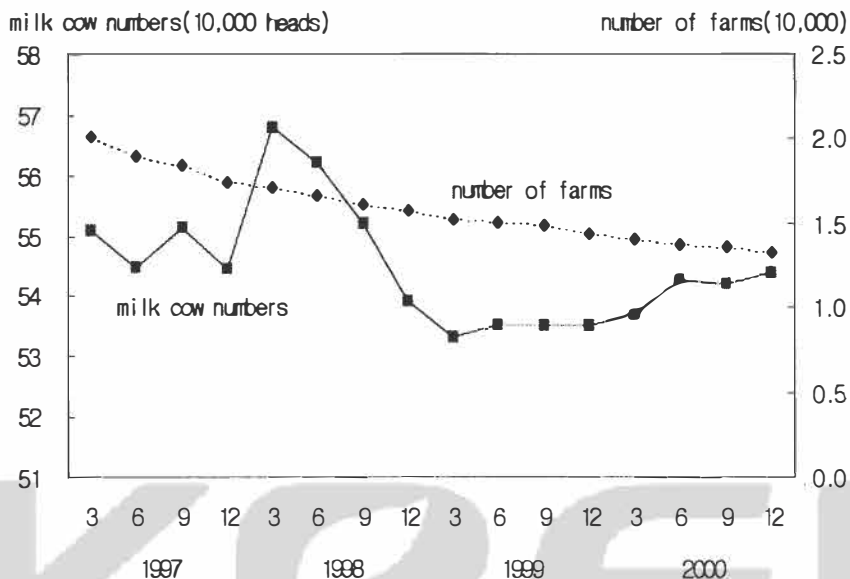
1. Situation for Dairy Industry

As a drop in feed price and an easing of the penalty on somatic cell count had stabilized the breeding conditions since 1999, the milk cow numbers had increased to be 544 thousand heads in December of 2000, up 1.7% from a year earlier. The number of 1-year old or older milk cows was 372 thousand heads in December of 2000, up 2.2% from a year earlier.

The number of dairy farms has been steadily decreasing. There were 13 thousand dairy farms in December of 2000, down 2.2% from 3 month earlier and 7.6% from a year earlier. Among dairy farms in December of 2000, the number of the farms with less than 50 milk cows were down 12.7% from a year earlier, but that of the farms with more than 50 milk cows were up 8.2%. Hence, the milk cow numbers per farm continued to increase to be 40.7 milk cows in December of 2000.

As the stable feed price and the easing of the penalty on somatic cell count had stabilized the breeding conditions since

FIGURE 1. Number of Milk Cows and Dairy Farms



Source: Statistics for Livestock, National Agricultural Products Quality Management Service.

TABLE 4. Demand and Supply of Raw Milk

Unit: 1000 tons

	Total Supply				Consumption	Inventory	Per capita consumption (kg)
	Beginning stock	Production	Imports	Total			
1995	15	1,998	196	2,209	2,144	66	47.8
1996	66	2,034	475	2,574	2,465	109	54.5
1997	109	1,984	444	2,537	2,451	86	53.3
1998	86	2,027	282	2,395	2,299	96	49.2
1999	96	2,244	456	2,796	2,752	44	58.6
2000	44	2,400	520	2,964	2,822	133	60.1

Note: The projections for 2000 are KREI's preliminaries.

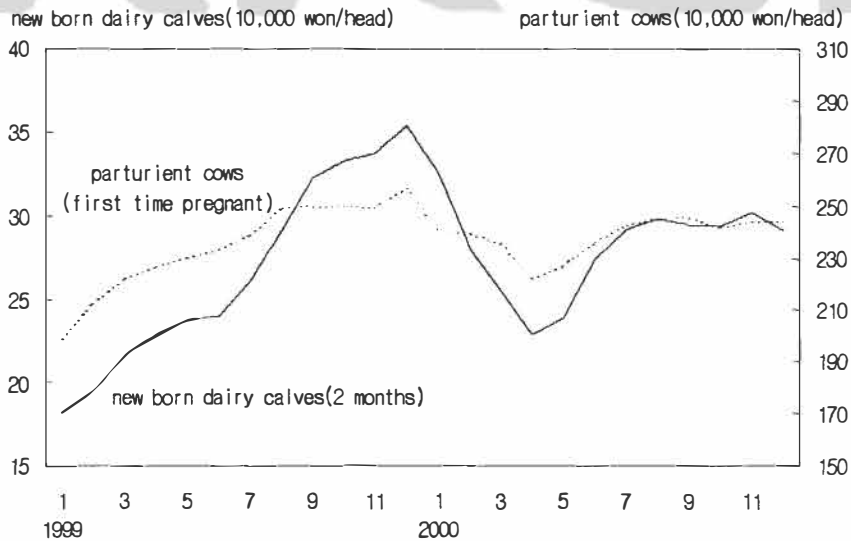
Source: Data for Demand, Supply and Price for Livestock Products, National Livestock Cooperations Federation

1999, the milk cow numbers had increased to be 544 thousand heads in December of 2000, up 1.7% from a year earlier. The number of 1-year old or older milk cows was 372 thousand heads in December of 2000, up 2.2% from a year earlier.

The improvement in the breeding conditions in 2000, attributable to the stable feed price and the easing of the penalty on somatic cell count encouraged the dairy farms to increase the milk cow numbers. Besides, the progress on the breeding skill, resulting from a upscale of dairy farm sizes and conversion to full-time dairy farmers increased the milk production per head. As a result, the production of raw milk grew by 7% over a year earlier.

Since, in addition to an expansion of the domestic milk production, total raw milk imports was also up 14% from a year earlier owing to removal of import barriers, the total milk supply is expected to increase by 6.0%. The total imports of dairy products until November of 2000 was 107 thousand tons, up

FIGURE 2. Milk Cow Price



Source: Hanwuri Data, National Livestock Cooperations Federation.

24.8% from a year earlier. Especially, the imports of skim milk powder and whole milk powder was expanded by 41.8% and 63.4%, respectively.

Being the breeding condition improved owing to the lowered milk powder stock and the easing of the penalty on somatic cell count, the price of the parturient cow, being pregnant first time, had shown an upward trend until the end of 1999 but dropped a little in early 2000. After the outbreak of FMD, it fell off to 2.22 million won in April but remained steady at about 2.4 million won from July. The outbreak of the FMD caused the price of new born dairy calves(2 months) to drop up to 227 thousand won but it was steady at 290 thousand won from July.

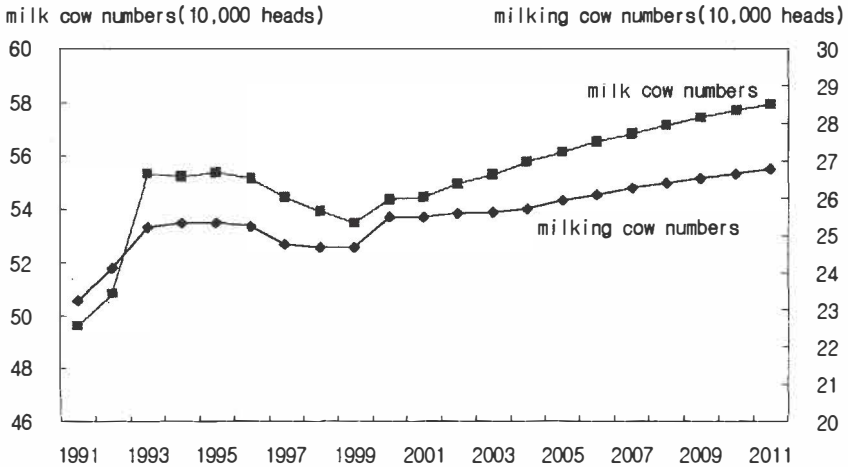
2. Outlook for Dairy Industry

The total number of the artificially inseminated until October in 2000, at 192 thousand heads, was down 20.5% from a year earlier. But, as the total number of the milk cow slaughtered until October of 2000 was down 7.5% over a year earlier, the milk cow numbers in 2001 are forecast to expand by 0.1% over December of 2000. And, after 2001, the cow numbers are forecast to show a steady growth of 0.5~0.9% until 2011. It is forecast that the number of new born dairy calves(2 months) in 2001 is 255 thousand heads, close to its numbers in 2000, and shows steadily an slight increase.

An increase in milking cows numbers improvement in productivity is expected to have raised the milk production to 2.4 million tons in 2000, up 7% from 1999. It is forecast to be 2,403 thousand tons in 2001, up 0.1% from a year earlier. As milking cows numbers are expected to show a moderate increase after 2001, the domestic milk production is forecast to show a moderate growth of 0.5~0.8% annually.

The milk consumption in 2000 is estimated to be up 2.5% over a year earlier, and that in 2001 is forecast to be 2.9 million tons, up 3.3%. It is forecast to keep rising by 2~3% annually after 2001. The milk powder stock in 2000 is estimated to 130

FIGURE 3. Milk Cow Numbers



Source: Statistics for Livestock, National Agricultural Products Quality Management Service.

TABLE 5. Outlook for Demand and Supply of Raw Milk, 2000–2011

	Unit: 1000 tons				
	2000	2001	2002	2004	2011
Production	2,400	2,403	2,421	2,451	2,568
Consumption	2,822	2,934	3,043	3,291	4,296
Imports	520	502	611	855	1,742
Self-Sufficiency(%)	84.5	81.9	79.6	74.5	59.8
Per Capita Consumption(kg)	60.1	61.6	63.3	67.5	84.5
Inventory	133	88	65	69	81

Note: The projections for 2000 are KREI's preliminaries, and those for post-2001 are its forecasts.

thousand tons(converted into raw milk), up 198% from the end of a year earlier. But, it is forecast to be 88 thousand tons in 2001, down 33% over 2000.

The consumption of the dairy product imports, which are cheaper than domestic products, is forecast to keep a steady growth in 2001. But, the milk consumption is forecast to show a

steady decrease in 2001. Hence, the self-sufficiency is expected to fall off to 85% in 2000 and 82% in 2001. While the consumption of dairy products is expected to keep increasing even after 2001, it is forecast that the domestic dairy products are replaced by the imports and the self-sufficiency keep falling off.

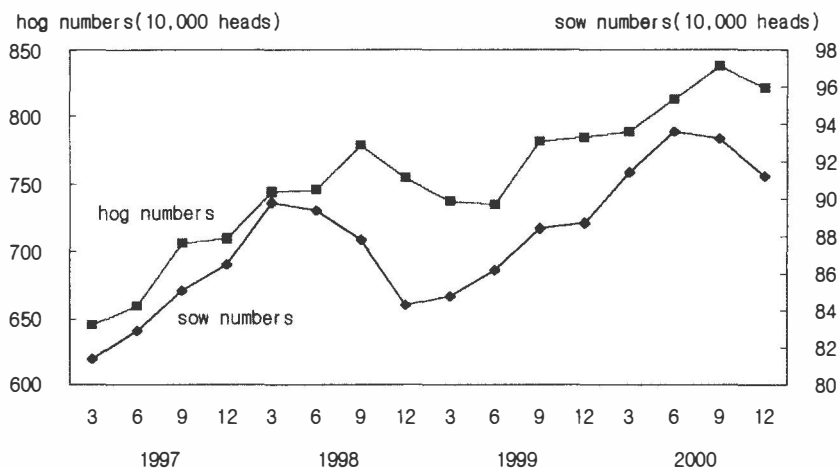
The share of the fluid milk consumption in the total milk consumption is forecast to be 57% in 2001, and to keep falling off after 2001. However, the share of the fluid milk consumption in the total consumption of domestically produced milk is forecast to increase from 70% in 2001 to 71% in 2002, and to keep growing until 2011. Therefore, the domestically produced milk is forecast to be consumed mostly in fluid milk.

IV. Hog

1. Situation for Pork Industry

A large expansion of pork exports since 1997 has helped the hog farm price strong and in turn has raised the total number of hogs.

FIGURE 4. The Number of Hog and Sows



Source: Statistics for Livestock, National Agricultural Products Quality Management Service.

The yearly average number of hogs was 8.14 million heads in 2000, up 7.3% from 1999. In 2000, the number of hogs was expanded to 8.37 million heads in September even with the outbreak of the FMD, but fell off to 8.21 million heads in December, down 1.9% from September, as a drop in hog farm price had discouraged hog farmers.

The number of sow had increased up to 936 thousand heads in June of 2000 but decreased to 912 thousand heads in December of 2000, down 2.6% from June but 2.8% up from a year earlier. The reason why the hog breeding stock expanded in September of 2000 after the outbreak of the FMD in March is that the hog farms expanded the number of sows as the government purchase for the pork produced in the area where the FMD had broken out pushed the farm price up when a temporary decrease of pork consumption in April had caused a slump in the farm price.

The number of hog farms in December of 2000, at 24 thousand farms, increased over three month earlier, but decreased 2.5% from a year earlier. The average number of hogs per farm was 344.5 heads in December of 2000, up 7.1% from a year earlier.

The number of hog slaughter went up 4.4% in 2000 owing to an increase in the size of hog breeding stock. The pork consumption in 2000 was expected to increase to 800 thousand tons, up 6.4% from a year earlier, owing to economic and population growth. The pork consumption fell off under the financial crisis of 1988, but pork export and size of hog breeding stock were expanded by an appreciation of the Korean currency. The domestic pork production in 2000, at 740 thousand tons, showed an increase of 5.5% over 1999 owing to an increase in hog slaughter.

As the pork production was decreased and the hog farm price rose and the exchange rate got stable, the amount of pork imported in 1999, at 142 thousand tons, went up 155% from a year earlier. While the imports had risen until April of 2000, it has sharply fallen off since May owing to a drop in hog farm price after the outbreak of the FMD and thus total pork import in

2000 was expected to be 94 thousand tons, down 33.7% from a year earlier.

The share of belly in total pork imports increased from 38% in April to 68% in November. This indicates that parts of high preference has been mainly imported. Ninety thousand tons of pork were expected to be exported in 2000. However, the pork export has been discontinued after March by the outbreak of FMD so that the total export in 2000 was just 15 thousand tons. Hence, the net import in 2000, at 79 thousand tons, showed an increase of 17 thousand tons over 1999.

The discontinuance of pork export caused by the outbreak of the FMD increased the inventory of the parts exported and the government purchase for pork produced in the areas where the FMD had broken out were held to be counted as an inventory. Thus, the total inventory in 2000 was 40 thousand tons, an increase of 15 thousand tons over 1999. The consumption for picnic, which is the part used as a material for processing, has been expanded owing to a drop in its price. Thus its demand and supply have been well balanced. In contrast, the over-supply of bacon and ham, the parts of low preference, has been the main cause for an increase in an inventory.

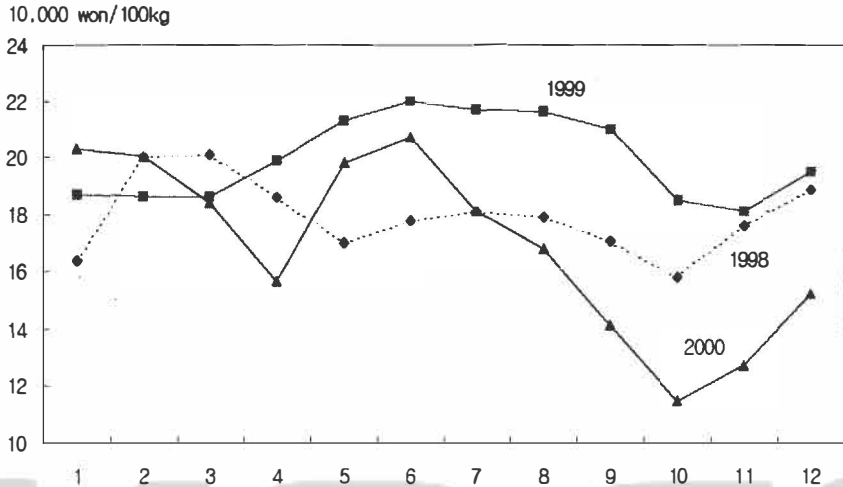
TABLE 6. Pork Demand and Supply, 1995-2000

	Unit: 1000 tons					
	1995	1996	1997	1998	1999	2000
Production	639.3	691.8	698.8	732.7	701.4	740.0
Imports	34.4	41.4	64.8	55.7	142.3	94.3
Total Supply	680.5	733.2	767.5	806.1	860.6	834.3
Consumption	661.7	696.9	698.2	700.8	755.4	803.7
Exports	14.3	36.9	51.6	88.3	80.3	15.6
Per Capita	14.8	15.4	15.3	15.1	16.1	17.0
Consumption(kg)						
Inventory	4.4	3.8	17.6	17.0	25.0	40.0

Note: The projections for 2000 are KREI's preliminaries.

Source: Data for Demand, Supply and Price for Livestock Products, National Livestock Cooperations Federation

FIGURE 5. Hog Farm Price



Source: A Report for Livestock Product Prices, National Livestock Cooperations Federation

While the hog farm price was bullish at 203 thousand won in January of 2000, the outbreak of FMD in March had caused a temporary drop in the farm price. But, the government purchase for the pork produced in the area where the FMD had broken out and the decrease in the shipment of hogs to wholesale markets the designation of areas restrained in movement have restored stability to the farm price.

In the second half of 2000, although the designation of areas restrained in movement was removed, the size of hog breeding stock expanded and thus the hog farm price began to show a sharp drop from mid-July. The farm price fell off even below the production cost in September and up to 100 thousand in the end of October. The farm price fell off even further as the pork consumption was slack and the parts of low preference, such as bacon and ham, which had been mainly exported the part, were left over as an inventory. However, as the government purchase of pork for storing purpose, had been carried out from 5th of October to reduce the shipment to the wholesale markets, the farm price began to rebound from the end of November.

2. Outlook for Pork Industry

As the farm price, which has been below 1999 production cost, 157 thousand won, since September of 2000, has discouraged the hog farms, the average total number of hogs in 2001 is forecast to be 7.99 million heads, down 1.9% from 2000. But, from 2002, the size of hog breeding stock is forecast to expand as the hog farm price is expected to steadily rise.

The pork production in 2001 is forecast to be 727 thousand tons, down 1.7% from a year earlier, owing to shrinking size of breeding stock. And, the pork import is also forecast to fall off by 33% from a year earlier as the domestic production is expected to substitute picnic and pork grounds imported for materials for processing owing to the low domestic farm price. In consequence, the total pork supply in 2001 is forecast to be 791 thousand tons, down 5.2% from 2000. From 2002, as the size of breeding stock is expected to be on the increase, the pork production is forecast to continue to grow steadily. And, the growth of pork consumption is forecast to induce the expansion of the pork import.

In 2001, as the economic growth rate is estimated to be around 5%, it is forecast that the consumption, at 815 thousand tons, shows an increase of 5% over 2000 and the per capita consumption is 17.1kg, up only 0.6% from 2000. The average hog farm price in 2000, at 168 thousand won, was low. But, it is expected that the size of breeding stock shrinks and the parts of pork in a low preference domestically produced are getting to substitute those imported used as materials for processing. Hence, the hog farm price in 2001 is forecast to increase by 14.2% over 2000.

The domestic hog farm price is expected to be dependent on its world price owing to a complete opening in pork market. The domestic hog farm price is forecast to rise until 2002 as an increase in its world price is expected to lower the pork imports. However, the domestic hog farm price is forecast to be on a decrease from 2004 as a fall in its world price is expected to expand the pork imports.

TABLE 7. Outlook for Pork Demand and Supply and Its Price, 2000-11

Unit: 1000 tons

	2000	2001	2002	2004	2011
Domestic Production	740	727	730	748	869
Imports	94	64	111	158	292
Ending Stock	25	40	16	18	22
Total Supply	834	791	841	906	1,161
Consumption	804	815	840	906	1,160
Per Capita Consumption(kg)	17.0	17.1	17.5	18.6	22.8
Beginning Stock	40	16	17	17	23
Farm Price(1000 won/100kg)	143	155	157	160	149

Note: The projections for 2000 are KREI's preliminaries, and those for post-2001 are its forecasts.

Source: The farm price is a real price deflated by GDP deflator.

V . Layer

1. Situation of Egg Industry

The layer numbers have shown an increasing trend since 1990, except for 1998 when it went down 5% from a year earlier owing to a rise in an exchange rate and a low egg price. It was 5 million and 60 thousand in 1999 and 5 million and 540 thousand in 2000, up 9.3% and 1% from a year earlier, respectively.

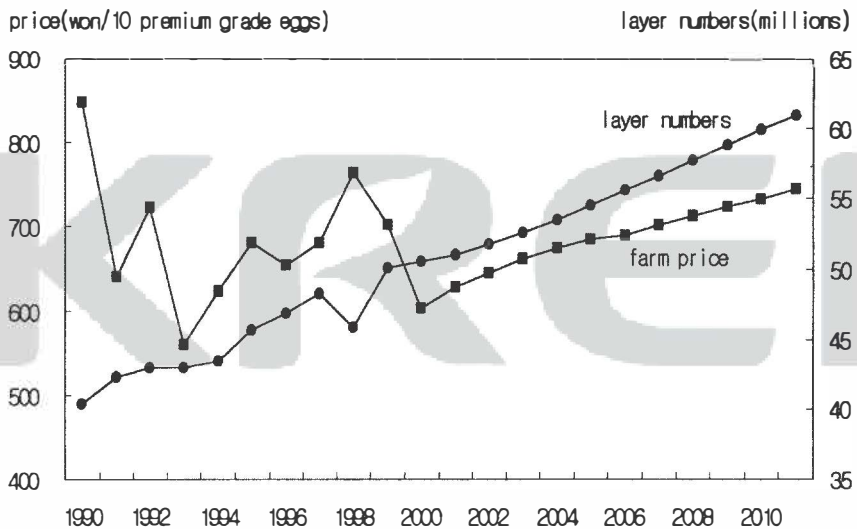
The number and average size of layer farms have showed a same trend as seen in the layer numbers. The number of layer farms was 2,913 farms, down 4.8% from a year earlier. And, even though their average size had shrunk to 16 thousand in 1998, it started to expand from 1999 to reach 18 thousand in 2000, which was as large as that in 1997.

While the egg production and consumption have shown an increasing trend since 1990, its consumption was contracted owing to an economic slump and its production was diminished owing to the unfavorable operation conditions in 1998. But, from

1999, as the economy was recovered from an economic slump and the operation conditions was improved, the egg production and consumption began to increase.

The egg (premium grade) price, a real price deflated by GDP deflator, has climbed up to 904 won per ten eggs in 1989. From 1990, the government developed many poultry breeding complexes in order to improve the competitiveness of the poultry

FIGURE 6. Layer Breeding Stock and Egg Farm Price



Note: 1) The projections for 2000 are KREI's preliminaries, and those for post-2001 are its forecasts.

2) The farm price is a real price deflated by GDP deflator.

Source: Ministry of Agriculture and Forestry.

TABLE 8. Egg Demand and Supply, 1990-2000

	unit	1990	1995	1997	1998	1999	2000
Production	kt	393.3	454.5	478.0	456.2	461.7	473.2
Per Capita Consumption	kg	9.2	10.1	10.4	9.8	9.9	10.0

Note: The projections for 2000 are KREI's preliminaries.

Source: Ministry of Agriculture and Forestry.

industry. However, the egg price had showed a rapid decrease from 1990 to 1993 because its over-production.

From 1994, the egg price had been on a gradual rise to reach 763 won in 1998 as its supply had become stable and its consumption had steadily expanded. But, as the layer numbers has grown considerably over last two years, the egg price has dropped off to a great extent to be 603 won in 2000.

2. Outlook for Egg Industry

The layer breeding stock at the first half of 2001 is expected to go down by low productivity resulting from diseases and cold dry weather, and bad operating conditions caused by rising exchange rate and feed costs. But, a rise of the number of egg-type hen in the hatchery supply flocks at the second half of 2000 is expected to increase the total number of layers at the second half of 2001. Hence, it is forecasted that the average layer breeding stock in 2001, at 51 million, is up 1% from a year earlier. While the increasing trend of the layer breeding stock is expected to continue until 2011, the number of layers in 2004 is forecast to average 53 million, up 6% from 2000.

Because the layer breeding stock is expected to continue a moderate growth over the baseline period, the egg production is forecast to continue to increase over the baseline period. The egg production is expected to be 470 thousand tons in 2001 and 510

TABLE 9. Outlook for Egg Demand and Supply and Its Price, 2000-11

	unit	2000	2001	2002	2004	2011
Supply						
Layer numbers	10,000	5,050	5,100	5,170	5,350	6,100
Egg production	kt	473.2	480	490	510	580
Egg per capita consumption	kg	10.0	10.1	10.2	10.4	11.3
Egg farm price	₩/10 eggs	600	630	640	670	740

Note: 1) The projections for 2000 are KREI's preliminaries, and those for post-2001 are its forecasts.

2) The farm price is a real price deflated by GDP deflator.

3) The number of breeding stock is a quarterly average.

thousand tons in 2004, up 2% and 7% respectively from 2000. As the per capita consumption of egg is expected to hold a growth in the past over the baseline period, it is forecast to grow 10kg by 2001 and 10.4kg by 2004, up 1% and 4% from 2000.

The egg's farm price has been fallen off from 765 won in 1998 to 600 won in 2000. But, it is expected to begin to gradually go up by around 2% from 2000 to be 670 won in 2004 and to recover its 1998 level in 2011.

VI. Broiler

1. Situation of Chicken Industry

The broiler numbers has been on the upward trend overall over last 10 years. The 1998 broiler number was down 5.2% from a year earlier owing to the bad operation conditions caused by a rise in feed prices. But, from 1999, it began to increase again as the economy became stable and the operation conditions got improved. The number of broilers was 42 million in 1999 and 47 million, up 17.7% and 12.2% from a year earlier, respectively.

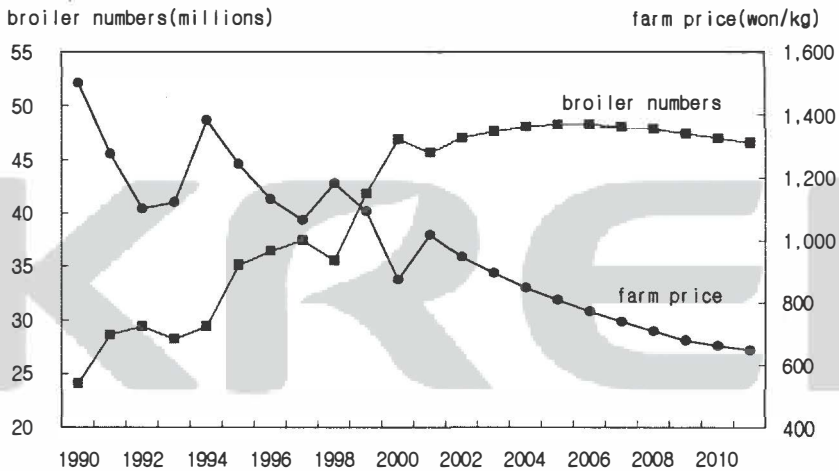
The number of broiler farms in 2000 was 2,452 farms in the first half and 2,066 farms in the second half, up 6.4% and down 4.1% from a year earlier. On the contrary, as the size of broiler farms kept enlarged in 2000, it was 21 thousand broilers per each farm, up 10.5% from a year earlier, in 2000.

While the domestic chicken supply had been on the increase until 1996, it declined during 1997 and 1999 owing to a raise in exchange rates. The domestic chicken supply in 1999 was down 14.6% from 1996. But, the stability of exchange rates improved the operation conditions to induce the domestic chicken supply in 2000 to increase by 11.8% over 1999. But the domestic chicken supply in 2000 was less than its 1996 level.

The chicken imports had steadily grown until 1997, but declined in 1998 by 35.6% from a year earlier owing to a rise in exchange rates and a decrease in chicken consumption. As the exchange rate has been stabilized and chicken consumption has

increased from, the chicken imports has expanded to 45 thousand tons in 1999 and 66 thousand tons, up 292% and 44.3% from a year earlier, respectively. While the share of the imports in chicken market had been below 7% until 1997, the recent increase in imports pushed it up to 16.2% in 1999 and is expected to be 21% in 2000.

FIGURE 7. Broiler Numers and Farm Price



Note: 1) The projections for 2000 are KREI's preliminaries, and those for post-2001 are its forecasts.

2) The farm price is a real price deflated by GDP deflator.

Source: Ministry of Agriculture and Forestry.

TABLE 10. Chicken Demand and Supply, 1996-2000

	unit	1996	1997	1998	1999	2000
Production	kt	276.8	260.3	245.5	239.0	266.0
Import	kt	9.6	17.6	12.2	45.0	66.3
Per capita consumption	kg	6.3	6.1	5.6	6.0	7.0

Note: 1) The projections for 2000 are KREI's preliminaries.

Source: Ministry of Agriculture and Forestry.

The per capita consumption of chicken had showed a steady growth until 1996, but had been on the decreased during 1997 and 1998 owing to the economic slump. However, as the economy has recovered from the slump from 1999, the per capita consumption increased to 6kg in 1999 and is expected to be 7kg in 2000. The farm price of broilers, deflated by GDP deflator, has been on the decreasing trend over last ten years. It was 874 won in a yearly average in 2000, up 41.7% from 1990 and 19.9% from a year earlier.

2. Outlook for Chicken Industry

The broiler farms has suffered a great deal of damage from an outbreak of diseases started from the end of the year 2000 and a heavy snowfall in early January of this year. Moreover, owing to the cold weather in January of this year, the damage from the diseases is getting worsen.

In 2001, not only has the damage occurred from diseases and natural disaster, but also an exchange rate and an oil price are expected to rise. Because of these unfavorable operating conditions, the average number of broilers is forecast to be 45.6 million, down 3% from 2000, and the broiler farm price is forecast to be 1,020 won, which falls short of its 1999 level but goes up 16% from 2000, in 2001. The chicken production in 2001 is expected to be a little lower than that in 2000, as the number of broilers is expected to decline in 2001. But, the chicken import and per capita consumption are expected to stay at their 2000 level.

After 2001, the chicken per capita consumption is expected to continue a moderate decline until 2011 as its retail price is expected to continue to gradually drop owing to the expansion of its import reflecting its low world price. The chicken per capita consumption in 2004 is forecast to be 8kg, up 21% from 2000. The import volume is expected to continue to expand from 2002 to 2011 as the chicken's world price is expected to show a downward trend and its consumption is expected to increase over that period. It is expected that 110 thousand tons of chicken, up 66% from 2000, is imported in 2004.

TABLE 11. Outlook for Chicken Demand and Supply, and Price, 2000-11

	unit	2000	2001	2002	2004	2011
Supply						
Broiler Breeding Stock	10,000	4,689	4,560	4,690	4,800	4,660
Chicken Production	kt	266	260	270	280	270
Chicken Net import	kt	66	70	80	110	220
Chicken Per Capita Consumption	kg	7.0	7.1	7.4	8.1	9.8
Broiler Farm Price	₩/kg, lw	874	1,020	940	850	650

- Note: 1) The projections for 2000 are KREI's preliminaries, and those for post-2001 are its forecasts.
 2) The chicken consumption after 2000 includes its inventory.
 3) The number of breeding stock is a quarterly average..
 4) The net import is import subtracted by export.
 5) The farm price is a real price deflated by GDP deflator.

The broiler farm price is expected to show a big jump in 2001, but to steadily fall off after that owing to an increase of chicken import reflecting its low world price. By 2004, the farm price is expected to drop to its 2000 level. The number of broiler breeding stock is forecast to grow to 48 million by 2004, up 2% from 2000, as the broiler farm price is expected to continue to fall off but to be at least as low as its 2000 level in 2002-2004. However, as the farm price is expected to continue to drop to be even lower than its 2000 level after 2004, the average number of broilers is expected to show a steady decrease in 2005-2011. Following the broiler breeding stock, the chicken production is expected to continue to increase to 280 thousand tons by 2004, up 12% from 2000, and then to decrease from 2005 to 2011.

VII. Conclusions

The insecurity of beef cattle farms against a beef market opening, especially against the imports of live calves, has encouraged the beef cow slaughter to raise its rate up to 40% and has lowered the birth rate up to 65%. Hence, the beef cattle numbers was decreased by 430 thousand heads in 1999 and 360 thousand in

2000. As the current breeding foundation has been excessively contracted, it is forecast that the supply of Hanwoo beef will be steadily declined and the Hanwoo price will be high next a few years.

However, if the possibility of importing live calves is low and the beef imports have little impact on the domestic beef market in disregard of the market opening, the beef cattle farms will be encouraged and thus the beef cow numbers will increase from 2001. Then, the beef cattle numbers are forecast to show a steady growth until 2007. But, if the beef cattle numbers increase excessively, it is possible that the farm price of beef cattle would drop sharply after 2007.

As the milk demand is expected to show a steady increase, the dairy industry is forecast to show a stable growth of 0.5~0.9% in yearly average. And, as the egg demand is expected to increase steadily, the egg industry is also forecast to show a stable growth.

As the pork exports was suspended by an outbreak of the FMD but its imports dropped, export suspension resulted in just 2% increase in the domestic pork supply. However, imbalance in demand and supply by parts of pork induces a decrease in price. While the hog price is forecast to show a moderate increase next 4 years, it is forecast to be on a decrease after 2004. Even though both the pork production and imports are forecast to increase steadily until 2011, the environmental concern could restrain an expansion of the pork production.

For chicken industry, it is forecast that the chicken imports will grow and its price will show a downward trend. But, the chicken production is forecast to keep its current level.

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