THE POULTRY AND PIG SECTOR IN SOUTH KOREA

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PREFACE

The Republic of Korea (R.O.K or South Korea) has achieved impressive economic growth in the last three decades. The economy has progressed from a principally agrarian one to an industrialized one. From the beginning South Korea selected a strategy to develop firstly its industry. As a result the agricultural sector has lagged far behind the non-agricultural one.

The Korean markets are closed for many foreign agricultural products. Because of the negotiations in the Uruguay round of the

G.A.T.T, the Korean government wants to make its agriculture internationally competitive as markets have to be opened up in the near future. The poultry and pork production is classified as 'more competitive'. This doesn't mean that the poultry and pig sector is ready to compete with other countries. Modernization of the farms is necessary to lower the costprices further and to improve the quality of the products.

The Korean agricultural industry and its government are developing plans for a rapid modernization of a.o. the poultry and pig sector. Since these developments are of interest and might present opportunities to the agro-industrial sector in the Netherlands the Department for Trade and Industry of the Netherlands Ministry of Agriculture, Nature management and Fisheries has taken the initiative to conduct a survey on the poultry and pig sector in South Korea. The survey was conducted by the Agricultural Economics Research Institute (LEI). It is hoped and expected that the results of the survey as presented in this report will be usefull to the Netherlands agro-industrial sector.

Writing this report would not have been possible without the guidance and assistance of the Agricultural Bureau of the Netherlands Embassy in Seoul, for which I am very grateful.

Den Haag, january 1992

Peter L.M. van Horne

SUMMARY

In the last three decades South Korea has achieved an impressive economic growth. The war-ravaged, underdeveloped nation of the 1950s has now emerged as a prosperous, newly industrialized country (NIC). Between 1986 and 1988 the annual growth rate of the economy was 12%. With a sharp drop to 6.8% in 1989 the growth rate rebounded to 9.0% in 1990. The gross national product (GNP) per capita increased from 2,194 in 1985 to 5,569 US\$ in 1990. Though there is a growth of the economically active population and although Koreans work almost 55 hours a week the labour market is in a state of over-demand in 1991. The monthly wages in industry have increased from an average of 351,000 Won in 1985 to 642,300 Won (Dfl. 1720) in 1990. In 1986 the balance of payment gave a surplus for the first year and continued through to 1989. In 1990, however, the current account recorded a deficit. For 1991 the account is expected to show a deficit of more than US\$ 3.0 billion. For the next five years (1992-1996) Korea will seek a relatively slower economic growth. The average annual growth is projected to be 7.5%. By 1996, the GNP per capita is expected to reach about US\$ 11,000. A surplus in the current account balance will help to enhance the ability of the Korean economy to open its market to foreign companies.

Poultry production

The total number of poultry in Korea increased from 51 million in 1985 to 74 million in 1990. The number of layers, breeders and broilers was respectively 42.4, 4.0 and 26.9 million in december 1990. The number of farms with more than 10,000 chickens increased from 846 in 1980 to 2240 in 1990 holding 69% of the chickens. Most layers are raised on farms with a capacity to keep more than 10,000 hens. In contrast the average scale of broiler farming is much smaller. In 1990 the total production of broilers and eggs in was respectively 171,698 ton and 7,023 million. The total production has gone up rapidly in the last five years through an increasing number of birds and by improving productivity.

A large proportion of the breeding material is imported. The percentage of layer-breeders and broiler-breeders based on domestic varieties were 16 and 28%.

Until fairly recent broiler producers often had many houses, each holding up to 2000 birds to supply a liveweight market. Nowadays the bigger farms still keep the broilers in a relatively large number of houses, but are managed on the 'all-in, all-out' basis. Houses are often build with a steelpipe frame covered by plastic and a blanket type of material of artifical fibers and cotton. Natural ventilation is used. In the wintertime the side-walls are covered and heating is provided. The broilers are kept on the soil covered with e.g rice straw. The building construction on many farms is cheap and for temporary use only as the houses are often build on rented land. The automation level is very low: feeding is often done by hand, but watering is more often automated. Drinkcups or nipples are used only occasionally.

In layer farming units of 10000 to 20000 are very common. Layers, compared with broilers, are kept in more expensive houses constructed

of concrete and wood. Virtually all layers stay in battery cages. Often the cages are of the stair-shape type with an open manure pit below. The cages are placed on a concrete floor. The ventilation is (manually) controlled by curtains along both sides of the house. More recently the vertical cage system was introduced. Many farms use an automatic feeding system. Nipples are very common for watering. Egg collection is mostly done by hand. Only a few farmers use an eggcollection belt.

Broiler breeders are also commonly kept in cages. The percentage in cages is estimated to be 70 to 90%, but as labour costs are increasing the farmers are changing to the floorsystem. Compared with broiler and layer farms the size of breederfarms is big and the production of hatching eggs is combined with a hatchery.

The zootechnical results on Korean poultry farms are 10 to 20% below the farm results in the Netherlands. The results of the Korean sample test station show that in good housing conditions with modern equipment and management the zootechnical results can come close to European standards.

Outlook for the poultry production

According to a forecast of the Minstery of Agriculture the total number of chickens will grow to 83 million in 1996 and to 106 million in 2001.

As labour is rapidly becoming more expensive farmers are investing in mechanization. In broiler production farmers will mechanize the feeding and change to cups and nipples for watering. In egg production the feeding is already mechanized on more farms, these farmers will also change to the egg belt system to save labour in collecting the eggs. It is expected that later more farmers will change to climate controlled housing to minimize the seasonal influence on production. Specialist advise automatic manure handling by using the manure belt drying system. For broiler breeders it is expected that in a short period of time the production will change from cages to the floorsystem.

The government is supporting this development by providing low interest loans. The NLCF which provides these loans has minimum-size conditions. A minimum of 30000 fowls was mentioned. In order to be competitive and to get the full benefit of mechanization it is expected that the average farm size will further increase.

The government wants to stabilize prices and farm income and is promoting the integrated system in which farmers, feedmills and processing plants cooperate. An integrated production will also save costs through optimum planning. Especially in broiler production the government encourages the industry to establish the integrated production and marketing system by providing cheap loans to new integrators.

Pig production

Almost all farms with pigs keep sows and fattening pigs. The number of pigs increased from 2.8 million in 1985 to 4.5 million in 1990. There are 1028 farms with 500 to 999 pigs and 406 farms have more than 1000 pigs.

Compared with Western Europe pighouses in Korea are constructed in a very cheap way. Farmers keep their pigs often in tunnel style steelpipe houses. Feeding is often done by hand. Automatic feeding is getting more popular because the labourcosts are going up or because it's difficult to find people who want to do work at pigfarms. The zootechnical results, as registered by the NLCF, are 15 to 25% below the average Dutch results.

Outlook for the pig production

In the period 1980-1988 the yearly increase in total number of pigs was on average 13.3%. The forecast of the Ministry of Agriculture for the period 1989-2001 is 5.2%. The total number of pigs (4.8 million in 1989) will grow to 7.4 million in 1996 and to 9.4 million in 2001. These figures seem very optimistic. In the same period the number of farms will decrease. The Korean Swine Association expects that a large percentage of the approximately 3500 farms with more than 300 pigs will increase their farm size to an average of 1000 pigs in the next three years. In some areas it may be difficult to expand the farm as no permit is given by the local government when neighbours protest. It should also be mentioned that the government sets a maximum farm size of 1000 sows.

On pigfarms it can be difficult to find the people to do the heavy and often dirty work. Besides labour is becoming more expensive thus providing the incentive for producers to mechanize. On pig farms the feeding and manure handling can be automated. In future farmers will have to invest in equipment to reduce the quantity of manure e.g through better water management. The government is supporting this development by providing low interest loans. The NLCF provides those loans and set a minimum farmsize of 500 pigs.

, Consumption

As in the 70's and 80's the average income has been growing very rapidly the consumption of meat and eggs has also gone up. The egg consumption in 1990 was 9.2 kg per capita. The per capita consumption of chicken meat was 1.6 kg in 1975, but increased 2.5 times to 4.0 kg in 1990. The pork consumption was 2.8 kg in 1975 and rose to 11.8 kg in 1990. The increase in total meat consumption was 38% in the period 1985-1990. Meat consumption is still low compared with Europe and the USA.

Korea's rapid economic growth combined with the urbanization gave a cultural change in which more meals are eaten away from home and more convenience food is used in the home. Western style fast foods are getting popular especially in the cities. Changing the eating habits from rice and fish to bread and meat will be further hastened as the younger generation becomes accustomed to eating more livestock products. In a forecast of the Ministry of Agriculture it is estimated that the consumption per capita in 2001 will grow to 19.6 kg pork, 5.7 kg chicken and 15.4 kg eggs.

Processing and Marketing

Korea has 74 licensed poultry processing plants slaughtering broilers. Many processing plants aren't very modernly equiped. More recent there is much interest for advanced equipment which has to be imported. In order to establish integrated systems the government is giving cheap loans (in 1991 to a maximum of 2.5 Billion Won per company) to companies investing in processing units or improving the distribution and marketing channels within an integrated systems. On the other hand the government is strengthening the regulations to prevent waterpollution caused by processing plants. An example of the development in the processing industry is the HA-LIM project which will be very modern and one of the biggest poultry processing plants in South East Asia. The company is looking at the possibility to export chilled chicken to Japan.

Korea has many specialised chicken restaurants. Besides the American style restaurants the Korean style restaurants are especially 'booming'. Almost one fourth of the poultry is sold by those specialised restaurants.

The marketing system for eggs is not very developed. Many middle men are active and the first egg grading and packing plant (G.P) was opened just 6 years ago. Since than big farms and some organisations, like the NLCF, have been investing in G.P plants.

All the pigs grown in South Korea are slaughtered in approximately 200, by Government regulation, registered slaughterhouses. After slaughtering the carcasses can go four ways, in order of numbers:

- 1. Butchers.
- 2. Cutting and packing plants (300 plants).
- 3. Processing industry: Producing ham, sausages, canned pork and bacon. In Korea there are 13 processingplants, together processing 10% of the carcasses.
- 4. Specialities (Korean style products).

The market for further processed products is growing rapidly as the purchasing power of the consumer increases. Compared with a yearly growth in pork consumption of 7%, the increase in processed products is 38%.

International trade

The agricultural trade balance of Korea is steadily growing worse. Trade deficits in agriculture showed a drastic increase in 1988 and 1989. Of the total import value of 3,656 million US\$ in 1989 the major items were cereals, luxury items and livestock products as beef and canned pork. The USA has always been the major supplier of agricultural imports into Korea with a share of around 50%.

The market of pork is heavily protected. In addition to the import restrictions the import of pork and live pigs from the Netherlands into South Korea is banned due to veterinary reasons. The Netherlands is only allowed to export canned pork and sterilized sausages. In 1990 and 1991, because of high local pork prices, temporary quota were given to import pork. The pork was imported mainly from Taiwan and Denmark. The export of pork started to increase to quantities worth mentioning in 1987. Frozen loin parts in particular are exported to Japan, but the percentage chilled is growing.

The market for poultry products is also heavily protected. At present the import of live fowl (excluding breeding material), live turkey, turkey meat, fresh eggs, egg albumin, dried egg yolk and dried egg powder are liberalized. The import of live fowls, live turkey and fresh eggs is negligible. In 1990 turkey meat (271 ton), egg albumin (347 ton) and dried egg powder (240 ton) was imported from the Netherlands.

The import of breeding material is only possible with the approval of the Ministry of Agriculture. The import of breeding pigs from the Netherlands is not allowed. In regard to the import of poultry breeding material the Netherlands is ranked third after the USA and Germany.

Government

The Korean government was always preoccupied with the development of the manufacturing sector, without giving much attention to the agricultural sector. In these circumstances the agricultural trade liberalization is a hot issue in South Korea as the pressure to liberalize is increasing. The government uses different methods to control the imports of agricultural goods. Firstly there are the tariffs and secondly the non tariff measures, such as special laws e.g to maintain quality and to protect public health. During the 80's the government liberalization program was extended. More items can now be imported with automatic approval.

Although many products are already scheduled to be liberalized before 1995 there are still important items waiting for further import liberalization measures: e.g frozen meat of fowls, frozen eggs, hybrid breeding pigs, frozen pork and processed pork as ham (not canned), bacon and smoked pork. In a GATT agreement of 1989 South Korea agreed to eliminate its remaining restrictions or to bring them otherwise into conformity with GATT provisions by July 1th, 1997. In 1993 Korea will announce another three-year import liberalization program and when this program will be implemented all agricultural products will fall under the automatic import license approval system.

The poultry and pig business is recognized as one of the most internationally competitive agricultural sectors. Although the GATT negotiations and the further opening of the domestic market will have their influence on the farmers, the government and industry are working to improve their competitiveness. The Korea Rural Development Administration (RDA) has classified the poultry and pig industry as 'more competitive'. Rice, barley and dairy products are on the list of 'less competitive' products. This, however, does not mean that the poultry and pig business is ready to compete with other countries. Modernization of the farms is necessary to lower the cost price further and to improve the quality of the products. The government is launching several measures to make the domestic agriculture internationally competitive. In its masterplan, the "Comprehensive Rural Development Plan", the government pays attention to the structural adjustment of the agriculture: increasing the average farm size, price stabilization (through integrated systems in poultry business) and developing export items. Poultry meat and pork are selected as products of which the export to Japan can be promoted. A survey showed that Korea has some advantageous conditions compared with Japan, like cheaper labour costs.

Environmental problems

South Korea has a manure problem similar to the one of the Netherlands. As 60% of the country is mountainous covered by forest and rice farmers don't like to spread manure on the paddy fields not much land is left to put manure on. The poultry and pig farms are working on methods to treat the manure on the farm. This is often done by drying the manure with sawdust or rice bran. After a fermentation process, using stirring equipment, the manure can be sold as fertilizer. At pig farms the solid and dry part of the manure are often separated. The solid part can be treated as explained above. Research looks for ways of treatment of the liquid part. Bigger farms can use the expensive industrial waste water treatment systems, but for small and medium scale farms there is no cheap method available. The government, in close cooperation with the NLCF, is planning to process manure to fertilizer in central factories.

Equipment

On the export of equipment to South Korea there are no clear statistics available. In 1990 the Netherlands exported poultry equipment with a value of 4.1 million, of which half was defined as incubators. In this figure not all items of equipment for poultry farms are registered. Besides eleven Dutch companies many German and American companies attended the Korean Poultry Expo. At this expo the Koreans showed a great interest in cages, feeding, watering, climate control and manure drying systems to be used on the poultry farms. As production in integrated systems in the broiler and egg sector is growing there is much interest in e.g. modern processing equipment and egg grading and packing machinery. In the near future many poultry and pig farmers will modernize their farms to reduce the labour input and improve the productivity and as a result the demand for advanced equipment will grow. Some companies are investing in turnkey projects. There are no restrictions on the import of equipment. Depending from the item the duty is 10 to 15%.

Organisations

Of the different associations the KSA (Korea Swine Association) and the KPA (Korea Poultry Association) have to be mentioned. The KSA negotiates with the government about different issues concercerning the swine sector. More recent the KSA established an organization to import high quality equipment at low margins. The margins on equipment for importers are too high in there point of view. The KPA is involved in improving the marketing system and promoting the consumption of eggs and poultry meat.

The National Livestock Cooperative Federation (NLCF) plays an important role in Korean agriculture. The NLCF is active in many fields: production (feedmills, breeding centres), marketing (slaughterhouses, egg grading/packing plants and processing units), trading (import of equipment, meat) and the banking business. The NLCF executes some government projects e.g. giving cheap loans to selected farmers, organize tenders to import pork and the establishment of central manure processing factories. As the NLCF is involved in importing foreign technology and strongly expands their activities in the livestock sector it can be important for Dutch exporters to clearly understand the position and role of the NLCF in Korean livestock production.

1. INTRODUCTION

Korea is situated in East Asia bordering on China to the west and on Japan by water to the east. Korea was a Japanese colony from 1910 to 1945 and was liberated when Japan surrendered to the Allied forces. However, the northern part of the Korean peninsula was occupied by the Soviet army and the southern part by the United States, with the 38th parallel serving as a demarcation line. In 1948 the Republic of Korea (ROK) was formed in South Korea and three weeks later the 'Democratic People's Republic of Korea' was formed in North Korea under Soviet sponsorship. The Korean war from 1950 till 1953 didn't change the border line of the 38th parallel.

South Korea covers a land area of 99000 square km (2.5 times the Netherlands). The population is still growing from 40.8 million in 1985 to almost 43 million in 1990. The population density per square km is high and ranks fourth among the nations in the world. The population used to be rural, but with increased urbanization nowadays only 28% is living in the rural area. Nearly 60% of the population is centred in 36 cities and the four metropolitan areas of Seoul, Pusan, Taegu and Inchon. More than 10 million people live in the capital Seoul. Appendix 3 shows the map of South Korea with the nine provinces and the main cities.

Mountains and hilly area occupy about 60% of the country's territory. 22% of the country, 2.1 million hectares, is used as farmland. The south-western part is the most important farm area. Rice is the main crop growing on 1.2 million hectares, followed by cereals and vegetables with each 0.4 million hectares. Most of the paddy fields have been improved to fully irrigated farms. The field size varies from very small to more economic square fields of average 0.4 hectare.

The climate is continental, although the country is bounded by the sea on three sides. The coldest month is January (average 1 degree C with minima as low as -10) and the hottest months are July and August (average 22 degree C with maxima up to 38).

2. GENERAL ECONOMIC SITUATION

In this chapter some major economic indicators of the South Korean economy will be discussed. Primarily to give an idea of the fast development of the country's industry, but also to give some background to the more specific agricultural development discussed in the next chapters. Appendix 4 gives an overview of the major economic indicators for the period 1985-1990. Table 1.1 gives a summary.

Table 1.1 Major economic indicators				
	1985	1987	1989	
••••••				
Gross National Product				
(GNP), per capita, US\$	2,194	3,098	4,994	
Economic growth rate, %	7.0	12.8	6.8	
Employment, million persons	15.5	16.9	18.0	
Unemployment rate, %	3.8	2.5	2.4	
Monthly industrial wages,'000 Won	351	446	642	
Balance of payments, US\$ million	1,700	12,175	-274	
Exchange rate, Won per 1 US\$	861	684	716	
Source: National Bureau of Statisti	cs, Econor	nic Planni	ng Board.	

South Korea has achieved an impressive economic growth in the last three decades. The war-ravaged, underdeveloped nation of the 1950s has now emerged as a prosperous, newly industrialized country (NIC). In less than thirty years the economy has progressed from a principally agrarian one to an industrialized one. Today a variety of industrial sectors make up Korea's economy. The main sectors are: electronics, textiles, footwear, automobiles, machinery, iron and steel, shipbuilding, petrochemistry and construction.

Between 1986 and 1988 the annual growth rate of the economy was 12%. This was achieved mainly through a rapid growth of exports which was caused by the so-called three blessings or the three lows: oil price, interest rate and exchange rate to the dollar. After a sharp drop to 6.8% in 1989 the growth rate rebounded to 9.0% in 1990. The forecast for 1991 to 1995 is, depending on the oilprices, 7.0 to 7.5%. The gross national product (GNP) per capita increased from 2,194 in 1985 to 5,569 US\$ in 1990. In the near future South Korea wants to become a full member of the organisation of developed countries (OECD).

Though there is a growth of the economically active population the labour market in 1991 is in a state of over-demand. The Koreans work long days, including Saturday morning. The total number of hours of work per week was, according to UN figures, 54.7 in 1988. The monthly wages in industry have increased from an average of 351,000 Won (Dfl. 900) in 1985 to 642,300 Won (Dfl. 1720) in 1990. The unemployment rate, however, is still very low, the tentative figure for 1990 is 2.2%. Due to the trade deficit the government is campaigning to lower the annual increase in wages to less than 10%. To solve the labour shortage the government is making an effort to bring more married women into the workforce and to create more job opportunities for the elderly.

The balance of payment gave for the first year a surplus in 1986 which continued right through to 1989. In 1990, however, the current account recorded a deficit. The 1991 account is expected to show a deficit of more than US\$ 3.0 billion. The government explains this deficit by a construction boom and overheated private consumption, due to higher wages, which boosted imports. This in combination with a weakening of export competitiveness and a sluggishness of the world economy. The government is making an effort to curtail domestic demand by squeezing money supply and campaigning for single digit increases in wage rates.

The Korean economy is dominated by a small number of industrial conglomerates known as 'chaebol'. Chaebol are huge companies, owned and controlled by one family, working in a wide range of different sectors from electronics, shipbuilding, automobile industry, insurance, hotels to the foodindustry. The ten largest chaebol have a 30% share of the total manufacturing sales. Most wellknown are Samsung, Daewoo, Hyundai and Lucky Goldstar. The Korean government is working to reduce the influence of the chaebol.

For the next five years (1992-1996) Korea will seek an relatively slower economic growth. The average annual growth is projected to be 7.5%. By 1996, the GNP per capita is expected to reach about US\$ 11,000. A surplus in the trade balance will help to enhance the ability of the Korean economy to open its market to foreign companies. Prognoses of the government show that the ratio of the agricultural output to the GNP and the labourforce engaged will decrease further, while those in the manufacturing sector would increase. The government is trying to stabilize the rate of increase in wages. To survive intense competition in the world market, industries should invest more in research and development, automation and computerization. In addition the government should attempt to improve the business environment through deregulation and removal of bottlenecks.

Figure 2.1 The Korean economic situation in a nutshell.



3. PRODUCTION

3.1. Poultry

3.1.1 Number of chickens and farms

The total number of chickens in Korea increased from 50 million in 1985 to 74 million in 1990. Table 3.1 shows that the number of layers (including growers) was 42.4 million in December 1990. The number of layers increased steadily from 1980. The number of breeders was 4.0 million in 1990 compared with only 2.3 million in 1985. The total count for broilers was 26.9 million in 1990. A small number of birds is classified as multi-use, this means more traditional birds used for both egg- and meatproduction.

The number of broilers had a setback in the early 80's but is growing fast again. The reason is that before 1983 most broilers were purchased live at the store. Killing and preparing was done while the buyer was waiting. In 1983 the government enacted legislation which required all birds to pass through a processing plant. For some years this has been reflected in lower sales at retail level.

Table 3.1. Number of chickens per use group. (layers and breeders including growers, december, *1000)							
	layers	breeders	broilers	multi-use	total		
year							
1980	30,410		20,236		50,646		
1985	33,179	2,341	14,365	1,196	51,081		
1988	37,415	3,065	17,187	800	58,467		
1989	38,302	3,509	19,163	715	61,689		
1990	42,430	4,046	26,935	1,052	74,463		

Source: Ministry of Agriculture, Forestry and Fisheries (MAFF).

It should be noted that because of seasonal demand the number of broilers is high in the summer. Table 3.2 gives the numbers at the end of the months of March, June, September and December.

Table 3.2. Seasonal influence on the number of broilers (in mill.)

	March	June	Sept	Dec	
year			-		
1985	14.6	17.1	17.3	14.3	
1988	16.4	23.4	18.5	17.1	
1990	17.0	26.7	25.5	26.9	

Source: MAFF

Total number of farms with poultry was reduced from 302,000 in 1985 to 161,000 in 1990. More than 95% of these farms have less than 3000 chickens. Table 3.3 gives an overview of farm and poultry numbers in relation to the farm size.

Fable	3.3.	Farms	and	poultry	numbers	and farm	size	(poultry *1000)	
									_

	1980		19	85	1990	
	farms	poultry	farms	poultry	farms	poultry
farm size						
3000- 4999	2,188	7,833	1,648	5,987	1,102	4,111
5000- 9999	1,824	11,988	1,709	11,307	2,299	15,762
10000-29999	770	10,993	878	13,447	1,941	28,900
30000-49999	46	1,561	125	4,474	179	6,629
50000-	30	3,576	72	10,334	120	15,647

Source: MAFF

The number of farms of more than 10,000 chickens increased from 846 in 1980 to 2240 in 1990 holding 69% of the chickens.

For the September 1990 data more detailed information per use group is available. Table 3.4 shows the number of farms and percentage of layers, broilers and breeders per farm size group.

Table 3.4 Number of farms and poultry per farm size and use group (September 1990).

farm size	layer farms	2	broile farms	r X	breeder farms *
1 - 4999		8.1		8.8	
5000 - 9999	1105	18.8	1214	26.1	71
10000-29999	838	31.3	887	51.6	98
30000-49999	115	10.6	39	9.2	11
50000-	96	31.2	5	4.3	14
20000	20	J L	5	7.5	▲ ¬ T

* number of farms with breeders is calculated as the total minus the broiler and layer farms. Percentages of breeders per farm size group are not available.

Most layers (73.1%) are raised on farms with a capacity of more than 10,000 hens. This is the minimum size to make efficient use of manure scrapers and automatic feeding and drinking systems for caged layers. 96 farms each with more than 50000 layers have almost one third of the total number of layers. In contrast the average scale of a broiler farm is much smaller. Because of a low level of automation most broiler farms raise 5000 to 30000 chicks. Only 5 farms keep more than 50000 broilers. The average farmsize for farms with breeders is high, compared with the European situation. Keeping breeding birds is combined with the hatching of the produced eggs. The farms sell the one day old chicks. Most of the farms can't be classified as family farms, because of the high labour input to inseminate the breeders kept in cages and because of the work in the hatchery.

Poultry farming is evenly distributed over the country. Though 35% of the eggs and broilers is produced in the Seoul area, Seoul city and Kyonggi province, this is in proportion to the population in this area. The figures in Appendices 5, 6 and 7 give the detailed distribution of the number of layers, broilers and breeders in the nine provinces.

3.1.2 Production

In table 3.5 the development of the total production is given in the subsequent years.

Table 3.5. Total production of eggs (mill.) and broiler meat (ton)

	broiler		eggs	
year	(ton)	index	(million)	index
1975	55,654	100	2,896	100
1980	90,456	163	4,543	157
1985	126,246	226	5,390	186
1986	129,388	232	6,029	208
1987	140,690	253	6,513	225
1988	148,992	268	7,220	249
1989	154,929	278	6,854 *	236
1990	171,698	309	7,023 *	243

* estimated from the production in tons

The total production has gone up rapidly by the increase of the number of animals and by the improvement of the productivity. Between 1981 and 1990 the daily weight gain of broilers increased from 30.8 to 38.0 gram. In the same period the laying ratio of the layers increased from 67.2 to 72.2.

3.1.3 Diseases

Since the majority of the breeds used in South Korea are imported, the disease problems on the poultry farms are not really different from the situation in western Europe. The vaccination scheme advised by the Veterinary Research Institute (VRI) contains the following diseases: New Castle Disease (NCD), Fowl Pox, Avian Encephalomyelitis, Infectious Laryngo Tracheitis (ILT), Gumboro, egg-drop syndrom (EDS) and Infectious Bronchitis (IB).

The main problem at the moment is NCD. EDS has not been reported in recent years, but vaccination is nevertheless advised. The veterinarian worry about the fact that many farmers skip different vaccinations very easily. Looking at the disease problems of other countries the researchers at the VRI are concerned about importing avian influenza. The researchers say that the hygienic standards on the farms have to improve. Especially on broiler farms with the multi-age system and growing broilers on the soil without a concrete floor the situation has to be changed. Those changes have to be combined with an upgrading of the education of the farmer.

3.1.4 Breeds

A large proportion of the breeding material (great-parent and parent stock) for the production of broilers and layers is imported. Between 1985 and 1990 the percentage of layer-breeders from domestic varieties decreased from 31 to 16%. In the same period the percentage for broiler breeders decreased from 40 to 28%. Table 3.6 gives the development.

		1985	1986	1987	1988	1990
Layer bre	eders:					
domestic	(*1000)	137	96	96	107	98
import	(*1000)	302	339	354	293	508
ratio		31:69	22:78	21:79	27:73	16:84
Broiler b	oreeders:					
domestic	(*1000)	609	542	732	781	1009
import	(*1000)	918	1165	1621	1691	2518
ratio	. ,	40:60	32:68	31:69	32:68	28:72

Table 3.6. The ratio of breeders based on imported and domestic varieties.

Source: Livestock Experiment Station. Dr.Sun Boo Chung.

The domestic breed for layers and broilers is produced by the Chunho group. In Appendix 8 the results are given of the 23rd random sample test of laying hens and broilers. The test was carried out at the Poultry Random Sample Test Station at Suwon Myon and finished in 1990. It shows the results of the domestic manina layer and the maniker broiler. At the same time one gets an idea of the foreign strains used in South Korea at the moment.

The percentage of white hens is decreasing very rapidly in favour of coloured hens. As in 1987 the ratio white/coloured was 55:45, in 1991 it was 19:81. According to poultry specialist Sun Boo Chung most egg producers prefer coloured laying hens, because coloured hens have the same overall production as white hens, but their eggs are heavier, and are therefore preferred by consumers.

3.1.5 Feed

The quantity produced by 80 feedmills, owned by 58 companies, increased from 6.5 ton in 1985 to 10.4 million ton in 1990. The share of poultry feed is around 30% of the total amount. The total production of poultry feed rose from 2.3 in 1985 to 3.0 million ton in 1990. Divided over the different poultry sectors, 53% of poultry feed is used by the laying hens, 9% by the rearing hens, 33% by the broilers and the remaining 5% by the breeders. Appendix 9 gives more detailed information of the feed quantities.

The ingredients for the compound feed are mainly imported, as the domestic farming focuses on rice production. Corn, wheat and rye are imported in large quantities especially from the USA.

3.1.6 Production method.

Until fairly recently broiler producers had often as many as seven houses each holding up to 2000 birds of different ages. The main reason for this was the supplying of a liveweight market, which is now prohibited. Nowadays the bigger farms, even with 20000 broilers or more, still house the birds in a relatively large number of small houses, but are managed on the all-in all-out basis.

Many broilers are kept in so-called steel-pipe houses of a steel pipe frame covered by plastic and a couple of layers of a thick blanket type material of artificial fibres and cotton. These houses have a low insulation value which is to low to withstand the freezing winter temperatures. Natural ventilation is used. In the wintertime the side-walls are covered and heating is provided. The stocking density is 12-15 birds per square meter. The birds are kept on the soil covered with e.g rice straw.

The building construction is very cheap and often for temporary use only. Farmers don't invest much money as the financial results are fluctuating and the houses have been built on rented land. The NLCF reports that in broiler production 37% of the farmers have broiler houses on rented land. The same group of broiler farmers borrowed only 3% of the total capital invested. It was mentioned that broiler farmers move their farm regularly. Using no concrete floor this has veterinary reasons. Cheap and temporary housing can make moving economic.

The automation level in broiler farming is very low. The feeding is often done by hand. Watering is more often automated. Drinkcups or nipples are used only occasionally.

In the past there were 3000 to 5000 birds in one layerhouse. In the current situation units of 10000 to 20000 layers are more common. Layers, compared with broilerfarms, are kept in more expensive houses constructed of concrete and wood. The cages are placed on a concrete floor. The ventilation is controlled by curtains along both sides of the house. The curtains are manually controlled.

Virtually all layers are kept in cages. Those cages are build in two or three tiers. Each cage contains two birds. Often the cages are of the stair-shape type with an open manure pit below. More recently the vertical cage system was introduced to increase the density per square meter, althought the ventilationsystem in this type of cages has to be more advanced.

Many farms use the auger- and cabledisc-style feeding system. The feeding amount is based on volume not on weight. The hopper system is rapidly getting more popular. Nipples are very common for watering. In the summer, with its very high temperatures, the nipple system can cause some problems as the needs of the hens can't be met. Egg-collection is mostly done by hand. Only a few farmers use an egg-collection belt.

In the 80's the manure scrappers were introduced and became popular. The manure is treated outside the layerhouse. Dried with sawdust the manure is often fermented. To stimulate the fermentation process farmers use stirring equipment.

Breeders are commonly kept in cages. It is estimated that at the moment 70 to 90% of the broiler breeders are kept in cages. As labour costs are increasing the farmers are changing to the floorsystem. It was mentioned also that the fertility results of artificial insemination are very poor. It was estimated that in case of investments 90% of the farmers changed to the floorsystem. Breeder production is combined with a hatchery. The farm size is big compared with the broiler- and layerfarms.

3.1.7 Zootechnical results

The NLCF collects zootechnical and economic data from 90 sample households with broilers and 90 households with layers. Table 3.7 gives the zootechnical results of broiler farms. Table 3.7. Zootechnical results on broiler farms.

	farm siz	e		
	< 5000	5000-10000	>10000	average
market weight (kg)	1.89	1.87	1.81	1.83
feeding period (days)	50.3	48.4	47.9	48.2
daily gain (g)	37.6	38.6	37.8	38.0
mortality (%)	4.3	3.8	4.4	4.2
feedconversion	2.38	2.28	2.24	2.27

Source: Report of Livestock Production Cost Survey, NLCF 1990.

The results of the random sample test of broilers (Appendix 8) show that in 6 weeks the body weight was 1,960 gram with a feedconversion of 1,82 as average for all the strains,.

Table 3.8 Zootechnical results of pullet/layer farms.

	farm size						
	< 3000	3000-7000	> 7000	average			
feeding days of pullet	163	157	154	157			
feed quantity pullet (kg)	10.0	9.8	9.9	9.9			
egg production (number)	268	264	263	263			
Laying ratio (%)	73.3	72.3	72.0	72.2			
egg weight (g)	60.7	60.5	60.5	60.5			
feed quantity layer (kg)	45.0	43.4	43.7	43.7			

Source: Report of Livestock Production Cost Survey, NLCF 1990.

The results of the random sample test of layers (Appendix 8) show that the average hen-day egg production (72 weeks) is 279, the egg weight is 61.4 gram and the feedconversion is 2.47. The results of the Dutch random sample test Lelystad 1990 gave a hen-day egg production (72 weeks age) of 302, egg weight of 62.2 and a feedconversion of 2.22.

The general conclusion can be that the zootechnical results on Korean poultry farms with layers or broilers are 10 to 20% below the farm results in the Netherlands. The results of the Korean sample test station show that with good housing conditions and modern equipment and management the zootechnical results can be close to European standards.

3.1.8 Prices and farm income.

The NLCF gives the production costs of broilers for the three farm size groups. Appendix 10 gives an example. The feed- and chick cost account for respectively 63% and 26% of the total costs. Costs for veterinary & medicine, hired labour and family (which aren't expenses) are also substantial. Building costs are relatively low. Appendices 11 and 12 give an overview of the production costs of pullet and layer per head. Figure 3.1 gives the market price for broilers (Won per kg live weight) and eggs (Won per 10) for the last ten years.



Figure 3.1. Market prices for broiler and eggs

When marketprices and production costs are known it's possible to calculate the net income of poultry farms. The production costs include the costs for housing, hired labour and family labour. The NLCF gives the net income for broiler and layer farms in their 1990 Livestock Production Cost Survey. Figure 3.2 gives the results for the last ten years.

Figure 3.2. Net income of poultry farms



Figure 3.2 shows that the farm income fluctuates through the years. The income for broiler farmers was negative in 1981 and 1982, for the layer farmers in 1981, 1982, 1986, 1987 and 1988. It should be noted that some costs aren't expenses. This means that in case of a negative income the farmer still has a (part) compensation for his input of capital and labour. The average net income for the last five years for broiler farms was 90 Won/head. For a farm with 20000 broilers this equals to 9 million a year (23000 guilder). The average income for the last five years for layer farms was 742 Won/layer. Keeping 10000 layers the yearly income is 7.4 million Won (19000 guilder)

3.1.9 Outlook

The Ministry of Agriculture, Forestry and Fisheries gives a prognosis of the size of the animal population till the end of this century. The yearly increase in the total number of chickens in the period 1980-1988 averaged 4.8%. The forecast for the period 1989-2001 is 4.7%. The total number of chickens in 1989 was a little above 60 million (see table 3.1) and will grow to 83 million in 1996 and to 106 million in 2001.

Some farms have difficulties to find people to do the heavy and often dirty farmwork. Moreover labour becomes more expensive and thus provides an incentive to producers to mechanize. In broiler production the farmers will mechanize the feeding and change to cups and nipples for watering. In egg production on a large number of farms the feeding is already mechanized, those farmers will change to the egg belt system to save labour collecting the eggs. It is expected that later on more farmers will change to climate controlled housing to minimize the seasonal influence on production. The government is supporting this development by providing low interest loans. As the demand for those loans is very high not all farmers can be satisfied. The NLCF which provides these loans has minimum-size conditions. Although there is no fixed minimum, a minimum of 30000 fowls for poultry farms was mentioned.

In order to be competitive and to get the full benefit of automation the farmsize has to be increased. A specialist stated that an economic size for broiler farms is 30000 broilers and for layerfarms 20 to 30000 layers. The layerfarms have to use the vertical battery cages with the manure belt drying system. With this system the manure drying can be fully automated. Also the extension service advises the vertical cage type and a minimum size for a layer farm of 20000 to 30000 birds. Feeding, watering, egg collection and manure handling should be mechanized in a natural ventilated curtain type layerhouse. For broilerfarms the extension service advises a minimumsize of 30000 broilers. The broilerhouse should have a concrete floor and feeding, watering and heating (using a sensor) should be mechanized. For breederfarms a minimumsize of 10000 broilerbreeders per worker is advised using the floorsystem and automatic feeding and watering. The breederfarms are already integrated with hatcheries and the average size is large enough to make fully use of 'economics of scale'. Expansion of the farm gives problems with the neighbourhood in the some areas. Several times it was mentioned that a village or town refuses to give a permit to enlarge the farm when the neighbourhood protests.

The government wants to stabilize prices and farm income and therefore promotes the integrated system in which farmers, feedmill and processing plant cooperate. Integrated production will also save costs through optimal planning. Especially in broiler production the government encourages the industry to establish the integrated production and marketing system by providing financial support to new integrators. Annual and seasonal fluctuations are still destabilising the broilerindustry. Because of the low prices of 1991 many broiler houses were empty, causing problems for breederfarms who even had to give away one day old chicks. Further growth of the fast food industry will help to create an all year round demand and thus bring stability to the broiler market. At present 16 integrations have a market share of approximately 34%.

In the egg industry the traditional chain: farmer, collector, wholesaler, retailer has to be shortened. Big egg producers are cooperating to set up grading, packing and distribution centres.

3.2 Pigs

3.2.1 Number of pigs and farms

Almost all farms in South Korea with pigs keep sows and fattening pigs. This means that the piglets produced are fattened on the farm of their origin and that there is no piglets market.

The number of pigs in Korea increased from 2.8 million in 1985 to 4.5 million in 1990. Table 3.9 gives the numbers by age and sex for the last five years.

Table 3.9. Number of pigs per age and sex (December, *1000).

total	< 6 month	> 6 mon	ths
		female	male
2,853	2,365	492	36
3,347	2,742	625	44
4,281	3,526	774	52
4,852	4,052	820	55
4,801	4,103	692	53
4,528	3,852	683	49
	total 2,853 3,347 4,281 4,852 4,801 4,528	total < 6 month 2,853 2,365 3,347 2,742 4,281 3,526 4,852 4,052 4,801 4,103 4,528 3,852	total < 6 month

Source: MAFF

In december 1990 the number of females older than six months was 683,000. Table 3.9 shows that the number of pigs grows fast. Between 1985 en 1990 the increase was almost 60%. The little setback in 1990 is probably caused by lower pork prices during 1988 and 1989. The estimated number for december 1991 is 4,970,000 pigs.

At the december 1990 census the total number of farms with pigs was 161,000 having 4,528,000 pigs. Almost 95% of these farms have less than 100 pigs and can't be classified as professional farms. The division of the remaining farms into three groups of different sizes is shown in table 3.10.

	100-49	19	500-99	9	above	1000
year	farms	pigs	farms	pigs	farms	pigs
1980	n.a	n.a	na.		66	259
1985	4206	812	343	235	189	661
1988	6802	1501	730	481	306	952
1990	7333	1710	1028	686	406	1053

Table. 3.10. Number of farms and pigs (*1000) by herd size (december)

Source: MAFF

The total number of farms is decreasing fast as farmers have to decide to expand their farm to a professional size or cease their business. The number of farms with more than 100 pigs is increasing as table 3.10 shows.

Almost one third of the pigs are kept on farms in Kyoung gi province, concentrated in two areas north and south-east of Seoul. Chungnam and Kyoungnam province have also large numbers of pigs. The map of Appendix 13 gives the number of pigs per province and shows the five regions of concentration.

3.2.2 Diseases

For many years South Korea imported pure bred pigs from Europe and the USA. The disease problems are therefore not really different from those in these countries. The vaccination scheme advised by the Veterinary Research Institute (VRI) contains the following diseases: hog cholera, Transmissible Gastro Enterititis (TGE), Japanese encephalitis, porcine parvo, swine erysipelas, atrophic rhinitis and colibacillosis. Hog cholera is the main disease causing many problems. Japanese encephalitis is only occurring in East Asia and is transferred by the mosquito. Two shots in May and June should be sufficient to protect the pigs.

Looking at the disease problems in other countries the veterinarians worry about foot & mouth disease, african pig cholera and the mysterious swine disease. The last one is causing many problems in Western Europe at the moment.

3.2.3 Breeds

The Korean pig industry is importing breeding material, especially great parent stock, from W.Europe and the USA. The main breeds are Yorkshire, Landrace, Duroc and Hampshire. Two and three way crossing is practiced. Specialized farms are producing Fl sows to replace the sows at the farms.

3.2.4 Feed

In the total feed production of 10.4 million ton of 1990 pigfeed has a share of 34%. The feed production for pigs rose from 1.9 million ton in 1985 to 3.6 million ton in 1990. Appendix 9 gives more detailed information. The ingredients for the compound feed are mainly imported.



Figure 3.3 Feedproduction (in 1000 ton) for pigs, poultry, beef and dairy cattle.

3.2.5 Production method

Compared with Western Europe pighouses in South Korea are constructed in a very cheap way. Farmers keep their pigs often in tunnel style steel-pipe houses. The steel pipe frame is covered by a thick blanket type material of artificial fibres and cotton. Other farmers have more expensive housings using concrete and wood constructions. Natural ventilation is sometimes supported by vans.

Feeding is often done by hand. Automatic feeding is getting more popular because labour costs are going up or and, in some cases, it's difficult to find people to do the work at pigfarms. Both the diskchain and the flex-auger feedingsystem are used. The sows are kept in simple farrowing crates.

On many farms the solid and liquid parts of the manure are separated. The solid part can be mixed with sawdust and fermented with a stirring machine to be sold as fertilizer. The main problem for the small and middle farms is the liquid part, because 'fresh' manure can't be spread on the land. See paragraph 6.2 for more information.

3.2.6 Zootechnical results

The NLCF collects zootechnical and economic data of 90 sample households with pigs. Tables 3.11 and 3.12 give the zootechnical results for breeding sows and fattening pigs. Table 3.11 Zootechnical results of sows.

heads weaned 1 suckling days 3 weaning weight(kg) 1	6.3 8.8 3.0	17.5 35.0	18.0	17.7	
heads weaned 1 suckling days 3 weaning weight(kg) 1	6.3 8.8 3.0	17.5 35.0	18.0	1/./	
suckling days 3 weaning weight(kg) 1	8.8 3.0	35.0		20.0	
weaning weight(kg) 1	3.0	11 /	30.9	32.2	
		11.6	10.2	10.7	
Source: Report on Li	vestock	Production	n Cost Su	rvey, NLCF	1990.
Table 3.12 Zootechni	cal resu	alts of fat	ttening p	igs.	
		farm size < 50	(head) 50-100	> 100	average
Purchase weight (kg)		12.7	11.5	10.3	10.7
Marketed weight (kg)		90.7	89.8	90.6	90.5
Feeding period (days)	133	133	132	132
Daily gain (kg)	-	0.58	0.59	0.61	0.61
mortality (%)		2.2	2.1	1.5	1.7
feedconversion		3.10	3.05	2.93	2.96

The zootechnical results in South Korea as registered by the NLCF are 15 to 25% below the average Dutch results. Some farms have far better results than shown in the tables. In good housing conditions, with modern equipment and high level management the zootechnical results can be comparable to Western European standards.

3.2.7 Prices and farm income.

The NLCF gives for the three farm size groups the production costs of piglet production and fattening pigs. Appendices 14 and 15 give an example of the costs per breeding sow and per fattening pig.

Figure 3.3 gives the marketprice for pigs (Won per kg live weight) over the last ten years.

Figure 3.3 Market price for pigs



When marketprices and production costs are known it's possible to calculate the net income of pigfarms. The production costs include the costs of housing, hired labour and family labour. The NLCF gives the net income per head for breeding sows and fattening pigs. Figure 3.4 gives the results of the last ten years.



Figure 3.4 Net income on pigfarms

Figure 3.4 shows that the net income fluctuates through the years. The income was negative in the years 1984 and 1989. As low prices and/or high production costs for the fattening pigs cause a low net income this has an effect on the income for the breeding sows because of the piglet price. The average net income in the period 1986-1990 was 77,400 Won per breeding sow and 13,600 Won per fattening pig. With 500 pigs (sows plus fattening pigs) the yearly income was 19.2 million Won in the said period.

3.2.8 Outlook

The Ministry of Agriculture, Forestry and Fisheries gives a prognosis of the size of the animal population. The yearly average increase in the total number of pigs in the period 1980-1988 was 13.3%. The forecast for the period 1989-2001 is 5.2%. The total number of pigs, in 1989 4.8 million (see table 3.9), will grow to 7.4 million in 1996 and to 9.4 million in 2001. At the same time the number of farms will decrease. Table 3.13 gives a detailed overview.

Table	3.13 Nun	nber of fan	cms and pi	igs till 2	2001.	
year		1980	1985 ·	1988	1990	2001
farms	(*1000)	503	251	261	133	108
index		100	50	52	26	22
pigs	(*1000)	1784	2853	4852	4528	9422
index		100	160	272	254	528

The KSA (Korean Swine Association) expects a large percentage of the approximately 3500 farms with more than 300 pigs to increase their farm size to an average of 1000 pigs in the next three years. The farms with more than 100 pigs, 8300 in number, will quit or expand their farms. Most of the farms with less than 100 pigs will stop farming when the market gets extra competitive. A specialist stated the minimum farmsize has to be 100 sows (plus fattening pigs) in order to survive. By the Ministry a farm size of 500 to 1000 pigs was preferred. In some areas it can be difficult to expand the farm as no permit is

given by the local government when neighbours protest. It should be mentioned that the government set a maximum farm size of

1000 sows.

On pigfarms it can be difficult to find people to do the heavy and often dirty work. Besides that labour is becoming more expensive and thus providing the incentive to producers to mechanize. On pig farms the feeding and manure handling can be automated. In future farmers will have to invest in equipment to reduce the quantity of manure e.g through better water management. The government is supporting this development by providing low interest loans. As the demand for those loans is very high not all farmers can be satisfied. The NLCF providing those loans has minimum-size conditions. Although there is no fixed minimum a minimum of 500 pigs was mentioned.

4. CONSUMPTION, PROCESSING AND MARKETING.

4.1 Consumption

The Ministry of Agriculture, Forestry and Fisheries (MAFF) publishes figures of the total meat and egg consumption as well as the consumption per capita. Table 4.1 gives a survey of the development through the years.

Table 4.1 Total (*1000 ton) and per capita (kg) meat and egg consumption in South Korea (meat in edible weight).

	tot	al meat	be	ef	por	k	chi	cken	egg	S
	tota	l /cap.	tot.	/cap.	tot.	/cap.	tot.	/cap.	tot.	/cap.
year										
1982	443	11.3	107	2.7	238	6.0	 99	2.5	248	6.3
1983	530	13.3	115	2.9	295	7.4	120	3.0	271	6.8
1984	564	13.9	107	2.6	340	8.4	118	2.9	272	6.7
1985	593	14.4	120	2.9	346	8.4	126	3.0	296	7.2
1986	598	14.4	148	3.6	320	7.7	129	3.1	332	8.0
1987	665	15.8	152	3.6	373	8.9	141	3.3	362	8.6
1988	716	17.0	142	3.4	425	10.1	149	3.5	397	9.5
1989	770	18.2	143	3.4	472	11.1	155	3.7	381	9.0
1990	854	19.9	177	4.1	505	11.8	172	4.0	393	9.2

Source: MAFF

The increase in total consumption is caused by a growing population, but more important is the growing demand per capita. As explained in chapter 2 the average industrial wage almost doubled between 1985 and 1990. Figure 4.1 gives the development of meat consumption per capita over a longer period of time.

As the average income has been growing very rapidly in the 70's and 80's the consumption of pork and beef has also gone up. The consumption of chicken meat per capita was 1.6 kg in 1975, but increased 2.5 times to 4.0 kg in 1990. The pork consumption was 2.8 kg in 1975 and rose to 11.8 kg in 1990. The increase in total meat consumption in the period 1985-1990 was 38%.

Meat consumption is still low compared with Europe and the USA. In 1990 the consumption per capita in Japan of pork, poultry and eggs was respectively 11.5, 10.3 and 16.5 kg. Surprisingly the pork consumption in Korea is equal to Japan. The poultry and egg consumption in Japan is much higher.

Korea's rapid economic growth combined with the urbanization gave a cultural change, more meals are eaten away from home and more convenience foods are used at home. Western style fast foods are getting popular especially in the cities. Changes in eating habits, from rice and fish to bread and meat will be hastened further as the younger generation becomes accustomed to eating more livestock products. The government pays attention to the fact that chicken is a cheap protein source compared with pork, beef and eggs.



Figure 4.1 Development of the meat consumption (kg) per capita.

The Ministry of Agriculture (MAFF) is publishing figures estimating the total consumption in 1996 and 2001. Table 4.2 gives the forecasts.

Table 4 capita	4.2 Ou (kg) of	tlook f meat	on the and eg	consu gs in S	mption outh l	in to Korea (m	tal (* eat in	1000 t edible	:on) a e weig	nd per ht).
	tota total	l meat /cap.	be tot.	ef /cap.	poi tot.	rk /cap.	chi tot.	cken /cap.	eg tot.	gs /cap.
year		, <u></u>		, F .		/ r		,		,
1991	863	20.0	163	3.8	531	12.3	169	3.9	454	10.3
1996	1095	24.2	208	4.6	679	15.0	208	4.6	566	12.5
2001	1461	31.0	267	5.7	925	19.6	269	5.7	726	15.4
Source:	MAFF									

The outlook for the egg consumption seems very optimistic. The Korea Poultry Association (KPA) stated that the yearly increase in demand for eggs will be lower compared with the growth of meat consumption. Egg consumption showed already little growth recently. That's why the Korean Poultry Association has launched an table egg promotion campaign aimed at popularising eggs with the general public. By the campaign the Association is trying to encourage Koreans to have eggs for breakfast instead of the traditional dishes.

In general the monthly chicken meat consumption is highest during the summer months of July and August. During these months there is a increase in demand of 30 to 40% over the monthly average (1986-1990). During these months chicken is used as a summer food such as Samgye-Tang, a chicken stew stuffed with ginseng. This dish is very popular in the summer, since it's widely believed to be effective in overcoming the ill effects of hot weather. In the main tourist season, the months of May and June and also September, there is a good demand for chicken meat. Prices of chicken are therefore lowest in the winter period.

Seasonal changes in egg consumption are less noticeable. The egg consumption is highest in the tourist season of May, June and September. The celebration of Chusok (Thanksgiving day of Korea) in September is another explanation for higher prices. Prices are lower during the hot period and in the winter time.

Table 4.3 has been added to give an idea of the consumer prices of livestock products.

year	beef Won/500 g	pork Won/500 g	chicken Won/kg	eggs (large) Won/10
1986	3204	1942	1646	558
1987	3303	1577	1573	547
1988	4040	1463	1610	513
1989	5107	1545	2038	648
1990	5574	2137	2208	744

Table 4.3 Consumer prices of meat and eggs (in Seoul).

Source: MAFF

4.2 Processing and Marketing

4.2.1 Poultry

Korea has 74 licensed poultry processing plants slaughtering broilers. Many processing plants aren't very modernly equipped. More recently there is much interest for advanced equipment which has to be imported. In order to establish integrated systems the government is giving cheap loans to companies investing in processing units which are part of an integrated system. On the other side the government is strengthening the regulations to prevent waterpollution caused by the processing plants. An example of development in the processing industry is a recently opened very modern poultry processing plant. The plant, designed with the assistance of engineers of a Dutch company, is based on the newest technology, with full automatic killing and evisceration lines, computer-guided weighing and grading, poultry waste rendering plant, bio-filters to reduce odours and waste water cleaning equipment. When the second line is installed the plant, with a capacity of 14,000 broilers per hour, will be one of the biggest poultry processing plants in South East Asia. The company is looking at the possibility to export chilled chicken to Japan.

In their information booklet the Korean Poultry Association (KPA) gives a scheme with the marketing channels for broilers. In Appendix 16 a copy has been added. It is estimated that 60 to 70% of the broilers is marketed as chilled and 30-40% as frozen product. A cold-chain system has to be developed. At present the storage temperature and hygienic conditions are low especially at retail level. The chain from farmer -> collector -> processing plant -> wholesaler to retailer

has to be regulated.

Korea has many specialised chicken restaurants. 56% of those restaurants is part of a chain either of USA origin (e.g Kentucky Fried Chicken and Popye) or Korean styled. Especially the sales of the Korean style restaurants, selling all kind of boiled chicken with flavoring and spices, are 'booming'. Almost one fourth of the poultry is sold by specialised chicken restaurants.

For the broilers there are six different classes based on the size of the broilers. Table 4.4 gives an overview of the classes and the market ratio.

Table 4.4 Weight classes of chickens and there market ratio.

ame	weight (kg)	market ratio	(%)
Young chicken	0.5-0.7	\	
Samgye	0.7-1.0	/	30
Small	1.0-1.4	Ň	
Medium	1.4-1.8	/	31
Large	1.8-2.2	Ň	
Extra large	> 2.2	1	39

Source: Livestock Experiment Station, Dr. Sun Boo Chung.

The Samgye type is used for Samgye-Tang. The small and medium broilers are eaten as fried chicken or as chicken barbecue, while the large ones and extra large ones are used for household cooking or in the meat processing industry.

Appendix 16 gives a scheme with the marketing channels for eggs. Although the grading and packing (G.P) centres are included in this KPA scheme it should be mentioned that their number is still very small. The marketing system for eggs is not very well developed. Many middle-man are active in the egg business. In 1985 the first egg grading plant (washing, grading and packing) was established with financial backing from the government. Since then some big farms and other organisations have been investing in G.P. plants. The ultimate objective is to shorten the chain: farmer -> 1st wholesaler -> 2nd wholesaler -> retailer -> consumer.

The grading system divides the eggs into six classes according to their weight. From Jumbo (>70 gram), extra large (60-70), large(54-60), medium (48-54), small (42-48) to Peewee (<42 gram). Depending on the price level the difference in price between extra large and jumbo increases (high prices) or decreases (low prices). The grading is done mostly on the farm by hand or with small scale equipment. When more eggs are to be graded in the G.P plants more attention can be given to improve the quality.

Of the total egg consumption 70% is sold through retailers for household consumption and 30% to the foodindustry (bakeries, fish processing etc.). There is, according to information from a specialist, no egg-powder industry at the moment.

4.2.2 Pigs

All pigs grown in South Korea are slaughtered in approximately 200, by Government regulation, registered slaughterhouses. After slaughtering the carcasses can go four ways (in order of quantity):

- 1. Butchers. The butcher cuts the parts 'ready to go consumer' (often in front of the buyer).
- 2. Cutting/packing plants. The carcasses are cut up in primarily products and mostly packed to be sold by supermarkets. The Korean Meat Industries Association (KMJA) estimates the total number of plants at 300.
- 3. Processing industry. In KMJA terms processing means producing the products: ham, sausages, canned pork and bacon. In Korea there are 13 processingplants, which together process 10% of the carcasses. Three firms, of which two belong to a 'Chaebol', account for 85% of the total amount processed.
- 4. Specialities. Many small units further process carcasses into specialities, often Korean style products.

The market for further processed product grows rapidly as the purchasing power of the consumers increases. Compared with a yearly growth in pork consumption of 7%, the increase in processed products is 38%. Especially the three big companies are growing while other groups, e.g the NLCF, are building processing plants. Table 4.5 gives an overview of the development in the processing industry.

year	sausage	ham	bacon	other (a.o canned p	total ork)
1980	1895	728	80	3076	5779
1985	5385	4369	280	26611	2695
1986	5904	4849	388	2618	13759
1987	7748	7203	417	3301	18669
1988	15068	11977	516	4171	31732
1989	20499	16435	530	n.a	n.a
1990	27456	21606	540	n.a	n.a

Table 4.5 Amount of processed meat per product (in ton)

n.a = not available Source : KMIA

The KMIA expects that the Korean demand for further processed products will grow in future. The industry is exporting frozen pork to Japan. The share, however, of chilled pork grows. In exporting chilled pork Korea will have an advantage in transport-costs and -time compared with the main competitors, Taiwan, Denmark and the USA. As the Japanese meat processing industry is very competitive the KMIA has no expectations on the export to Japan of sausage, ham and bacon and will therefore concentrate on the local market.

5. INTERNATIONAL TRADE

5.1 General introduction

The agricultural trade balance of Korea is steadily growing worse. Trade deficits in agriculture showed a drastic increase in 1988 and 1989. Agricultural exports in 1989 amounted to 781 million US\$. The proportion of agricultural exports is about 1% of the total export. More than half of the agricultural exports are only a few luxury items such as ginseng and tobacco, while other major items are refined sugar, fruit, nuts, processed fruit and vegetables. The value of agricultural imports began to rise in 1987 when it doubled compared with the year before. In the total value of 3,656 million US\$ in 1989 the major items were cereals as corn, wheat and soybean (49.1%), luxury items as cigarettes and coffee (20.7%) and livestock products as beef and canned pork (9.3%). The USA has always been the major supplier of agricultural products to Korea with a share of around 50%. Second and third are Australia and Thailand with 10% and 6% respectively. The imports of the products mentioned, except corn and soybean, have recently been liberalized, or expanded by increasing the import quotas. To a lesser extend the appreciation of the Korean currency and the growing demand for quality food have been factors accounting for increase of imports.

5.2 Livestock products

5.2.1 Pork import

The market of pork is heavily protected. In addition to the import restrictions the import of pork and pigs from the Netherlands into South Korea is banned due to veterinary reasons (foot & mouth disease vaccination). As the vaccination has been stopped in the Netherlands the matter is under negotiation between the Dutch and Korean governments. At the moment import is allowed from: US, Canada, England, Ireland, Sweden, Japan, Taiwan, New Zealand and Australia. The Netherlands is allowed to export canned pork and sterilized sausages only.

- CANNED PORK (liberalized, tariff 40%)

The import of canned pork was liberalized in July 1987 and the imported quantity increased sharply in the years 1988 and 1989. As a result the government increased the tariff from 30% to 50% to protect the domestic farmers and the processing industry. After a strong protest of the US, the tariff was recently reduced to 40%.

country	1989 quantity (ton)	value (1000 US\$)	1990 quantity (ton)	value (1000 US\$)
Denmark	1211	1962	1513	2675
US	919	3848	423	1932
Netherlands	343	644	45	74
Others	485	652	578	798
Total	2560	5477	2560	5478

Table 5.1 Export of canned pork to South Korea in 1989 and 1990.

- SAUSAGE (liberalized, tariff 30%)

The regulations concerning the sterilization of sausages are clearly defined. Table 5.2 gives the quantity imported in 1990 and its value.

Table 5.2	Export	of sausages	to South	Korea in	1990.
country		quant (ton)	ity	value (1000	US\$)
US		904		2388	
Denmark		29		23	
Australia		2		7	
Others		5		20	
Total		940		2438	

- PORK OFFAL and PIG FAT (liberalized)

The import of pork offal was liberalized from the beginning of 1991. However, in the first eight months of 1991 only 93 ton was imported from the US and Canada.

In 1990 the import of pig fat to be used in sausages was 796 ton (562,900 US\$), mainly from Canada and Taiwan.

- PORK (exceptional)

Because of the high pork prices in South Korea the government opened two additional ways to import pork in 1990:

a) Temporary quota were given to exporters of pork to a maximum of the value of their export. The purpose was to promote the sharply reduced export of pork to Japan. The imported pork should be supplied to the meat processing industry. In case, however, the domestic price of pork would fall below a certain level the import should be stopped. At the moment (october 1991) the price is lower than the limit and import is banned. It is estimated that 3000 to 4000 ton was imported, mainly from Taiwan and some from Denmark.

b) Import quota were given to the National Livestock Cooperatives Federation (NLCF). By lowest international bid 10,741 ton from Taiwan and 450 ton from Denmark were imported. Since the domestic pork prices have dropped it's not expected that more import quota will be given to the NLCF.

5.2.2 Pork export

In 1987 the export of pork started to increase up to quantities worth mentioning. Table 5.3 shows there were further increases in 1988 and 1989 and a sharp drop in 1990. This drop can be explained by a sharp price increase in the domestic pork prices in 1990 (2574 Won versus 1648 Won per kg in 1989).

Table 5.3. Export of pork.

year	quantity (ton)	value (1000 US\$)
1985	226	768
1986	892	4472
1987	3161	15860
1988	7937	40658
1989	12276	57585
1990	5877	31680

Especially frozen loin parts are exported to Japan. It was mentioned that the percentage of chilled pork increases.

5.2.3 Poultry import

The market for poultry products is also heavily protected. At the moment the import of live fowl (excluding breeding material), live turkey, turkey meat, fresh eggs, egg albumin, dried egg yolk and dried egg powder is liberalized. The import of live fowls, live turkey and fresh eggs is negligible.

- TURKEY MEAT

In 1990 a total of 5124 ton (8.5 million US\$) was imported of which 271 ton came from the Netherlands. In the first eight months of 1991 5683 ton (9.4 million US\$) was imported mainly from the US and France. 200 ton came from the Netherlands.

- EGG ALBUMIN

In 1990 3935 ton was imported of which 347 ton came from the Netherlands. Most of the imported egg white is used by the food industry, especially in fish processing.

- DRIED EGG YOLK

In 1990 the total quantity imported was 109 ton. The exporters were the US (61 ton), France (24 ton) and Belgium (24 ton). No import came from the Netherlands.

- DRIED EGG POWDER

In 1990 Korea imported a total of 1182 ton (3.8 million US\$) of which 856 ton from Belgium and 240 ton from the Netherlands. In the first eight months from 1991 the import was 777 tons, mainly from Belgium and the Netherlands.

5.2.4 Poultry export

The Korean export of poultry products is negligible.

5.3 Breeding material

5.3.1 Pigs

The import of breeding pigs is only possible with the approval of the Ministry of Agriculture, Forestry and Fisheries (MAFF). The MAFF issues quota to the breeder companies. The quota system is more or less flexible, without strict maximum numbers. To give an idea of the totals imported table 5.4 has been added. As only pure bred animals are allowed to be imported, the animals are of well-knows breeds e.g. Yorkshire, Duroc, Landrace and Hampshire.

 Table 5.4. Import of pig breeding material in 1989.

 country
 head
 value (US\$)

 US
 308
 675,700

 UK
 341
 921,600

 Other
 40
 110,600

 Total
 689
 1,707,900

Due to the mysterious pig disease (MPD), the import of British breeding pigs is unofficially banned at the moment. As mentioned in paragraph 5.1 the import of pork and pigs from the Netherlands is banned because of veterinary reasons.

From 1992 the import of live swine will be liberalized. Although the import of pure bred pigs is regulated by quota and the import of hybrid material is excluded from the liberalization it is expected that some farmers will try to import live pigs to use them as hybrid breeding material. In practice it will be difficult for the authorities to check the intended use of imported pigs.

5.3.2 Poultry

The import of poultry breeding material is regulated by an annual quota system of the Ministry of Agriculture, Forestry and Fisheries. The quota of breeding fowls in 1990 was: 140,000 heads of broiler and 10,000 heads of layer great parent stock (GPS) and 500,000 heads of broiler and 150,000 heads of layer parent stock (PS). In 1991 the total quota is 950,000 heads without specification. Although the market share of imported breeds is high, 84% for layers and 72% for broilers in 1990, the quota system probably doesn't restrict the numbers imported. To give an idea of the quantities and value involved table 5.5 has been added.

Table 5.5. Import of poultry breeding material in 1990.

country	head	value		
US	295,169	2,273,600		
Germany	166,973	548,400		
Netherlands	122,953	566,500		
France	79,600	459,000		
Other	61,505	359,500		
Total	726,200	4,207,000		

5.4 Equipment

No specific data are available on the import of equipment in South Korea. Through the EXMIS database from the Agricultural Economics Research Institute (LEI) output was generated to find the total value of the export from the EC-12 to South Korea. Appendix 17 gives the complete data. Table 5.6 gives a summary of the total values in the last five years and a division between the different countries for 1990.

Table 5.6. Export of poultry-equipment from EC-12 to South Korea (in million Dfl.).

	1986	1987	1988	1989	1990
Belgium/Lux					0.3
Netherlands					4.1
Germany					0.2
Total EC-12	0.0	0.4	0.0	0.7	4.6

Table 5.6 shows that the value of export was negligible till 1990. In 1990 the value exported was 4.6 million Dfl. The Netherlands exported poultry equipment with a value of 4.1 million, of which half was defined as incubators. It should be mentioned that the number of items registrered in the statistics under poultry equipment is limited. The figure of 4.6 million guilders is very low as the number of a.o Dutch and German companies doing business with South Korea is taking into account.

The import tariff on equipment is 10 to 15%, depending on the item in question.

Appendix 2 with a complete list of the companies which attended the Korea Poultry Expo 1991 gives an idea of the Korean and foreign companies active on the Korean market. 6. GOVERNMENT

6.1. Trade Liberalization

South Korea exports have changed from labour-intensive goods to more technology-intensive products. In the 80's it became one of the leading countries in terms of trade volume. It is not surprising that trading partners put more and more pressure on South Korea to open her domestic market. The Korean government was preoccupied with the development of the manufacturing sector without giving much attention to the agricultural sector. As a result Korea has a strong industrial sector and a more traditional agriculturial one. Under these circumstances the agricultural trade liberalization is a hot issue in South Korea as the pressure to liberalize is increasing. South Korea is, to protect the interest of the industry, in favour of agreements in the Uruguay Round of the GATT (General Agreement on Tariffs and Trade).

In the paragraphs 6.1.1 and 6.1.2 an overview will be given of the measures to control the import of agricultural products and the liberalization schedule for the coming years. <u>Its important to remark</u> that the regulation system is too detailed and complex to give a complete overview. This chapter can only provide a general outline.

6.1.1 Measures to control agricultural imports

To control imports of agricultural goods the government uses different methods.

a) Firstly the tariffs. High tariffs on imported agricultural products which compete directly or indirectly with domestic products e.g tomato, onion, apple and pork. On the other hand, in order to reduce the costs of agricultural production and processing, low tariffs are levied on agricultural inputs such as seeds, mixed feed, breeding animals etc. Some are exempt from duty while the remaining is subject to a tariff of less than 10%. In the 80's the average tariff rate for agricultural products dropped from 31.4% in 1983 to 26.6% in 1989. The Ministry of Commerce and Industry estimates 16.6% for 1993.

b) Non tariff measures have been implemented by the Import

Surveillance System (ISS) and special laws. The ISS, introduced in 1977, was used to protect domestic industries from imports. In the 80's the number of items under import surveillance was curtailed, because of criticizing trade partners. In 1987 the ISS was replaced by the more transparent Import Relief System.

South Korea has special laws, which regulate the import of certain goods in order to maintain quality and to protect public health and safety, or the interests of national security. The government is revising these special laws to develop more transparent standards and to reduce their number. To mention some of these laws concerning livestock:

- Feed Control Law:

restricted item a.o. feed grains.

- Livestock Law:

items a.o. swine and fowls for breeding, swine semen.

- Laws to Control Infectious Diseases of Domestic Animals:

restriction of the sources of import of poultry and poultry meat.

6.1.2 Import liberalization

During the 80's the government expanded its liberalization program. More items may be imported with automatic approval. Table 6.1 gives an overview of items liberalized in the different years.

Table 6.1. Agricultural items (concerning livestock) liberalized during 1978-1991 and the items scheduled for 1992-1994. -----Year Item 1979 live sheep and goats, ducks, turkeys dairy cows and live swine (pure-bred, for breeding) 1985 1986 turkey (dead), edible offal of dead poultry 1987 canned pork, canned poultry meat 1989 goat meat, swine liver, (mixed feed) 1990 sausages, duck cuts, live fowls (exceeding 185 g, not pure bred), (feed additives) 1991 frozen duck, animal guts, edible offal of swine, turkey meat (excl. canned) 1992 Live swine (but no pure bred breeding animals (quota system!) Other poultry preparations (not canned) Meat of fowl, not cut in pieces (fresh or chilled) 1993 Egg yolk (not dried) 1994 Carcasses and half carcasses of swine (fresh or chilled) Hams, shoulders and their cuts, bone in (fresh or chilled) Other meat of swine (fresh or chilled) Cuts of fowls (fresh or chilled)

There is a duty on most products. To give an idea for the livestock products liberalized in 1990 and 1991 the duty was in between 20 and 30%.

6.1.3 Outlook

Although many products are already scheduled to be liberalized before 1995 there are still important items waiting for further import liberalization measures: e.g frozen meat of fowls, frozen eggs, hybrid breeding pigs, frozen pork and processed pork as ham (not canned), bacon or smoked pork. In a GATT agreement in 1989 south Korea agreed to eliminate its remaining restrictions or otherwise bring them into conformity with the GATT provisions by July 1, 1997. In 1993 Korea will announce another three-year import liberalization program and when this program is implemented all agricultural products will be under the automatic import license approval system.

In view of the fixed schedule for liberalization the Korean government is making great efforts to find options to minimize any adverse impact on domestic agriculture and the farm household economy. The government can minimize the effect by postponing, within the fixed period, the introduction of liberalization for items which have the greatest impact on farmer's income. Secondly a new mechanism of restricting imports can be formed of course in conformity with GATT regulations formed in the Uruguay round. Thirdly, Korea will continue to maintain its existing import regulations on certain items by the special laws. The import liberalization program already faced severe opposition from farmers. The farmers are well organised and have political influence. It's evident that in certain sectors the Korean agriculture can't compete with foreign countries, liberalization will therefore decrease the farmer's income. The income disparity between farm households and wage-earning urban households is already at a disadvantage to the farmers. Another argument is food security. The selfsufficiency rate has dropped to less than 40%. Moreover the Koreans are worried about the social and environmental impact of the liberalization in the rural areas. In the GATT negotiations the Korean delegation proposes to consider some items as non trading concerns (NTC) which should be excluded from the import liberalization list. As rice is grown on 60% of the arable land, representing 48% of Korea's total agricultural income it's not surprising that the domestic rice market, with very high prices, is the last bulwark to protect.

The poultry and pig business are recognized as one the most internationally competitive agricultural sectors. Although the GATT negotiations and the further opening of the domestic market will influence the farmers, the government and industry are working on improving the competitiveness. The Korea Rural Development Administration (RDA) has classified the poultry and pig industry as 'more competitive'. This classification has been made on basis of the fact that domestic prices of chicken and eggs are only 41% and 18% higher than international prices. Rice, barley and dairy products are on the list of 'less competitive' products. The domestic price for dairy products is 360% higher than international prices. However, this does not mean that the poultry and pig business is ready to compete with other countries. Modernizing of the farms is necessary to lower the costprice further and to improve the quality of the products.

The government is launching several measures to make domestic agriculture internationally competitive. In its masterplan, the "Comprehensive Rural Development Plan", the government pays much attention to the structural adjustment of agriculture, increasing the average farm size, price stabilization (integrated systems in poultrybusiness) and the development of export items. Poultry meat and pork are selected as products of which export to Japan can be promoted. A survey showed that Korea has some advantageous conditions compared with Japan, e.g cheaper labour costs.

The government is especially supporting the development of integrated systems in broiler production. From 1985 to 1988 in total nine integrations got support from the government through cheap loans. The maximum loan per company in 1991 was 2.5 billion Won. This money has to be invested in improvement or establishment of processing plants and distribution and marketing channels. In 1991 also six billion Won was available for loans to breeder farms/hatcheries working in integrated systems.

6.2. Environment protection

The regulations to protect the environment are executed by the Ministry of Environment. Concerning agriculture the government gives priority to the protection of the soil and groundwater. One is not allowed to spread 'fresh' manure on paddy fields (rice). In some circumstances treated manure (fermented during storage) can be spread on paddy fields. The main problem in Korea is that rice farmers don't use manure, at the utmost in a very limited amount. As 60% of the country is mountainous, covered with forest and 10% is used as paddy fields there is not much other land to put manure on. The area used by horticulture, vegetable farms and orchards is small. Dairy farms have only small pieces of land and are highly dependent on concentrated feed. On top of all this the numbers of poultry and pigs increases rapidly, the situation is fit for a 'Netherlands-like' manure problem.

The poultry and pig farms are working on methods to treat the manure on the farm, which is often done by drying the manure with sawdust or rice bran. At a dry matter percentage of 30 to 40 the manure is fermented. This process is stimulated with stirring equipment (Appendix 18 gives two examples). The final product, with a dry matter content of 60 to 70%, is sold as fertilizer. On pig farms the solid and the dry parts of the manure are often separated. The solid part can be treated as explained above. Research looks for methods of treatment of the liquid part. Bigger farms may use the expensive industrial waste water treatmentsystems, but to small and medium scale farms there is no cheap method available.

The government is supporting the farms which invest in manure treatment systems by giving them low interest loans. Bigger farms (more than 1000 pigs or 30000 fowls) can't apply for a subsidy. Medium scale farms can get a 100% loan and small farms get a 30% subsidy and a 70% loan on the total investment. The period of repayment is 3 to 7 years and the interest rate of 3% is very attractive compared with the commercial rate of 12%. Asking what kind of system has sofar got a government approval the answer was unclear. It was mentioned that manure drying systems using a belt in cages (laying hens) was not being considered.

For small and medium size pig farms the treatment of manure on the farm is very expensive. The government, in close cooperation with the NLCF, is planning to process manure into fertilizer in central factories and to give subsidy and low interest loans to 'manure treatment factories'. Two different techniques will be used, one for poultry and one for pig and cow manure. The farmers supplying manure will have to pay to the factory in case the revenues of the final product (the fertilizer) would be too low to pay all costs.

7. ORGANISATIONS

The organisations can be divided in three groups. Firstly the associations: for poultry, swine, animal improvement and meatprocessing industry. Secondly the research institutes: livestock experimental station, veterinary research institute and rural economics research institute. Thirdly the very important National Livestock Cooperatives Federation. In this chapter only official and general information is given of some organisations. To fully understand the role of the associations and the NLCF a more detailled survey is necessary.

7.1 Associations

7.1.1 Korea Swine Association (KSA)

The major objectives of the KSA are:

- Development of the swine industry on a stable growth path
- Improvement of the breeding stock and swine performance
- Pork promotion through improvement of marketing system and public relations.

The KSA has nine local chapters and branches. The organisation is headed by a chairman and a executive director. Different sectional committees for e.g swine breeding, diseases, pollution and distribution are working in the fiels mentioned.

The work of the KSA can be divided in seven sections:

1. Policy development and system improvement.

The KSA has been negotiating with the government about liberalization of the butcher shop licence system, financial assistance for waste treatment, establishment of a carcass grading system and liberalization of the government control of pork prices. The KSA has also been active to establish a pork export committee.

- 2. Extension work for management, Training education and informati
- Training, education and information services.
- Statistical work and research. Surveys and studies on trends.
- 4. Promotion.
- Programs to increase consumption by advertising on radio, TV, in magazines and to distribute leaflets for consumer education.
- 5. Marketing improvement of swine products.
- E.g the establishment of a system for grading and packing of pork. 6. Publications

Publish the monthly magazine 'Swine Industry', the weekly 'Swine Bulletin', and also technical books.

- 7. Swine improvement and performance testing of breeding stock.
- The KSA opened the first Testing station in 1983. Recently a second station was established. At those stations performance test of breeding stock are conducted. The KSA registers also breeding stock farms.

The most recent activity of the KSA is the creation of the Korea Swine Promotion Co, Ltd. The chairman Yong Dong, Jeon explained that the margin for importers on equipment is to high. The new organisation should supply high quality equipment to the farmers against a small extra price. At the moment vaccine and feed for piglets is supplied by the new company.

7.1.2 Korea Animal Improvement Association (KAIA)

In 1966 the Korea Swine Registry Association was established. This association merged later with the KAIA. The main functions of the KAIA are:

- Maintenance of Herd Books for cattle, swine and rabbits.

- Type classification and performance testing.
- Survey and analysis of the genetic improvement.
- Extension and training.

The main breeds registered are Landrace, Yorkshire, Duroc and Hampshire. For sows there is a pedigree, performance and a breeding performance registration. For boars there is a performance, pedigree, meat production and breeding registration.

In 1989 the number of people employed by the KIAI was 33, but at the end of 1991 the number was 102. The reason for this is the adding of the task of grading in processing units.

7.1.3 Korea Poultry Association (KPA)

The KPA opens its information booklet with the following sentence: The KPA was established to expedite the development of the poultry industry by cooperating among members and improving feeding and management practices for poultry farming, thus to enhance the social and economic status as well as welfare of poultry farmers.

The KPA has three different kinds of membership:

- * Organisation membership of corporations and cooperatives.
- * Special membership of those engaged in education and research.

* Regular membership of:

Hatcheries:	Those licenced and engaged in hatching business.
Breeders:	Poultry breeding farms.
Layers:	Table egg producers.
Broilers:	Broiler producers.
Sexing members:	Licenced sexers.

The KPA is involved in many activities, among which are:

- the improvement of the poultry product marketing system. For the egg sector this means the operation of grading and packing centres. For the broiler sector it means the application of an integrated broiler production and marketing system.
- A campaign for an increase in consumption: advertising, cooking demonstrations, new product development.
- the prevention of poultry diseases: e.g inspection of blood serum.
- the training of sexing technicians and arrangement of overseas employment.
- Publishing: e.g the monthly Poultry Journal.
- Performance testing: with financial support of the government the KPA runs a layer and broiler performance testing station.

7.1.4 Korea Meat Industries Association (KMIA)

In 1986 the 'Meat Industries Association' and the 'Meat Packers Industries Association' merged into the KMIA. The KMIA is working for the interests of processing plants. A processing plant in their definition is not slaughtering pigs, but produces products as ham, sausage and corned pork out of carcasses. All the processing companies, 13 in number, are members.

Another group of companies cuts and packs pork. Their total number is estimated at 300, of which a total of 20 companies is a member of the KMIA. The reason for the low membership-ratio is the KMIA being occupied with the interests of the first group mentioned.

7.1.5 Korea Feed Association (KFA)

The feed association wants to expedite the development of the livestock industry by improving the quality of compound feed. This is done by:

- Guiding to the improvement of feed manufacturing technology.
- Research and publishing materials on the feed industry.
- Joint purchase of feed ingredients for its members.
- Securing and raising funds for imports of feed ingredient.
- Survey and quality analysis to develop sources of domestic feed ingredients.

The KFA has an own research institute with many lab. facilities. The principal operations are chemical analyses of ingredients and compound feed, tests of toxic elements and training of lab. technicians of member companies. In 1991 the total number of feedmills was 80, owned by 58 companies. 60 plants are members of the KFA and 19 belong to the NLCF (National Livestock Cooperation Federation). In 1990 the production quantity of the KFA plants was 8,4 million ton (80%) and of the NLCF plants 2,0 million ton (19%).

7.2 Research

The research on livestock production is organised by the Rural Development Adminstration (RDA) as part of the Ministry of Agriculture, Forestry and Fisheries.

7.2.1 Livestock Experiment Station

The livestock experiment station has a total staff of 155. There are eight divisions doing research on beef cattle, dairy, animal nutrition, grassland, forage crop, poultry and swine. The eighth division is a general services division. At the station fundamental and applied research is done. One exception is made for the applied research on breeding, which is done at the National Animal Breeding Institute. The ultimate objective of the experiments is to reduce production costs and to improve quality to compete in the international markets. Research is done on breeding, nutritional physiology and feeding systems, but also on processing and utilization of animal products.

The poultry division, headed by Dr.Soo Hwan An, is working on the induction of triploid chicks by chromosome manipulation and on seasonal adjustment of feed to meet the nutritional requirements of the birds. In future more attention will be given to research on housing and manure treatment.

The swine department does research on artificial insemination, ways to produce leaner pork and the minimal use of antibiotics. No research was done on pigbreeding, as this is done by the breeding companies. Dr Ki Seuk Kim is very concerned about the manure problem and his department is looking for methods to treat manure on farm level.

7.2.2 Veterinary Research Institute (VRI)

The VRI has as main objective the study of prevention, treatment and surveillance of animal diseases. The institute has divisions for bacteriology, virology, pathology, parasitology and poultry pathology. More recently a division for food safety and residues was added. Besides its research the institute does some extension work and is involved in education of veterinarians and farmers. In paragraphs 3.1.3 and 3.2.2 the vaccination scheme for poultry and pigs is reported as explained by the VRI. For the researchers the biggest concern regarding poultry is the avian influenza and regarding pigs foot & mouth disease, african pig cholera and the 'mysterious swine disease'.

7.2.3 Korea Rural Economics Institute (KREI)

The KREI is a non-profit research institute which undertakes problem-orientated research and policy studies in the field of the national food policy and the agricultural and rural development with a view to assist farmers, government and agri-business firms in their decision making. The KREI conducts both long-term and short-term research projects concerning production-, marketing- and resource economics as well as rural sociology. One of the unique functions of the KREI is to conduct rural opinion surveys. Surveys are carried out to gather information on the attitude and value of farmers to different issues and agricultural policies. The KREI is also involved in training of e.g. government officials and publishes the academic journal 'Korea Rural Economics Review'.

7.3 National Livestock Cooperatives Federation (NLCF)

The NLCF has a unique position in the Korean agriculture. In 1981 the Livestock Industry Development Cooperation and 100 local livestock cooperatives were incorporated into the NLCF. In 1990 the number of member cooperatives had increased to 167 with 237,000 affiliated farmers. At the end of 1990 the total turnover, including the output of 167 member cooperatives, had reached 6,820 billion Won (approximately 20 billion Dfl.). The total staff was 2,791, whilst 8,977 employees were working in the member cooperatives.

The NLCF is active in four major fields:

- Guidance and training.

The NLCF encourages the establishment of cooperatives for effective livestock activities. The management of the local cooperatives is advised on management and the NLCF provides funding and technical assistance. Member farmers can be trained on a large training farm. More generally the NLCF is engaged in public relations and research on marketing.

- Production assistance. The NLCF is constantly working on increasing the production and the supply of superior livestock. The pig breeding centre is an example of an activity which supplies the member farmers with inexpensive semen for artificial insemination. Another very important production activity is the feedmills, eight run by the NLCF and eleven by member cooperatives, producing 20% of the total Korean production. The feedmill activity includes the import of feed grain.

- Marketing business.
 - The NLCF runs or provides:
 - * Livestock market operations.
 - * Storage capacity, to control the supplies.
 - * Livestock product marketing centres to reinforce the distribution function.
 - * Slaughtering houses and processing plants.
 - * Sale outlets especially in large cities.

The integrated marketing system is promoted to reduce the influence of middlemen and thus to increase the revenue. The system contributes also to price stability.

- Banking and mutual credit business.

Through a network of 48 bank branches the NLCF is offering full banking services. Apart from the general banking business the mutual credit business is important mainly in the small cities and agricultural towns. In total 456 branches of 164 cooperatives handle savings and credit.

Some NLCF activities mentioned in the annual report of 1990: In 1990 the main issues concerning livestock policy were the Uruguay Round (GATT) negotiations and the pressure for import liberalization and internally the burden on livestock farming due to environmental contamination caused by manure.

To improve international competitiveness the NLCF is trying to expand the scale of livestock farms, especially of hogs and chickens.

In october an agreement was executed for a Japanese loan to construct new feedmills and to expand existing ones, to modernize facilities and to construct a integrated meat processing plant.

Appendices:

- 1. Travel plan
- 2. Korea Poultry Expo 1991 (List of companies)
- 3. Map of South Korea
- 4. Major economic indicators 1985-1991
- 5. Number of layers per region
- 6. Number of broilers per region
- 7. Number of breeders per region
- 8. Performance of poultry (random sample test 1990)
- 9. Korean feed production
- 10. Production costs of broilers
- 11. Production costs of pullets
- 12. Production costs of layers
- 13. Number of pigs per region
- 14. Production costs of breeding sows
- 15. Production costs of fattening pigs
- 16. Marketing channels of eggs and broilers
- 17. EC-12 export of poultry equipment
- 18. Pictures of manure treatment equipment

Appendix 1

Program

oct 9	10.00 14.00	Arrival in Seoul Royal Netherlands Ambassy, meeting: Mr.J.Huber, Charge d'affaires a.i Mr.J.Bijl de Vroe, third secretary Mr.Il Yong, Ha, agricultural trade officer (discuss draft program)
oct 10	10.00	Korea Poultry Expo 1991
oct 11	9.00	Korea Poultry Expo 1991 (meeting Mr.J.Landstra, agricultural counsellor)
oct 12		Free saturday
oct 13	8.30	Field trip with Mr. Il Yong, Ha. Visiting different poultry and pig farms.
oct 14	8.30	Report writing and preparation for oct.15
oct 15	9.00	Korea Animal Improvement Association (KAIA) Mr. Weon, Lee, Manager Dept. of Swine and Rabbit Registry
	11.30	Korea Swine Association (KSA) Mr. Dong Yong, Jeon, Chairman Mr. Noh Young Han, Executive Director
	15.00	Korea Poultry Association (KPA) Mr. Lee Kyu Sung, Managing Director
oct 16	10.00	National Livestock Cooperatives Federation (NLCF) Mr. Cho So Yun, Assistent Manager of the Integration marketing development dept.
	14.00	Choi Institute Mr. Jin Ho Choi
oct 17	10.30	Livestock Experiment Station Mr. Sun Boo Chung Director Poultry Research Division
	14.00	Mr. Thak, Tae Young Director Swine Research Division
oct 18	10.00	Veterinary Research Institute Mr. Ki Seuk Kim, Senoir researcher Dept. of Poultry Diseases Mr. Soo Hwan An, Virolgy Division
oct 19	9.30	Visit to Poultry farm in Pochom with Mr. Yoo, Jae Heung, President.

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oct	20		Free sunday
oct	21		Analysing statistics, discussion with Mr. Ha and report writing.
oct	22	10.00	Korea Meat Industries Association (KMIA) Mr. Dong-Kon Kim, Vice Presicent
		15.00	Rural Economics Research Institute Mr. Yoo, Chul Ho, Chief Livestock Economics Divison
oct	23		Office work and report writing
oct	24	10.00	Visit to Jeil Farm (pigs) in Ichon Mr. S.D. Yoon, Director
		14.00	Visit to Darby Pig Breeding Farm Mr. Huh, Moon-Do, Director
		17.00	Pig Research Co, Ltd (Journal of Pig Reearch) Mr. Woo, Young-Je, President.
oct	25	10.30	Ministery of Agriculture, Forestry & Fisheries Mr. Kim, Chang Seub, Veterinary Officer of Animal Health Division (disc:'manure problem') Mr. Kim, Kyung-Nam, Director of Livestock Products marketing Division Mr. Choi, Yeom-Soon, Livestock Specialist of Livestock Policy Division
		13.30	Mr. Choi, Han Livestock Management Division (disc:'integration')
oct	26	9.00	Final discussion with and translation by Mr. Ha.
oct	27	9.00	Departure.

Appendix 2

Korea Poultry expo 1991

From 10 to 12 october 1991 the Korean Poultry Association organised the Korea Poultry Expo for the first time. A list of companies which attended this expo is given below. The whole range of equipment used by poultry farmers with layers, broilers and breeders was shown. Cages, feeding and drinking systems dominated the expo. Besides the Chunho group, whicht brought its own Korean breed, most leading breeding companies from Europe and the USA were present.

Especially companies from the USA, Germany and the Netherlands were represented on the expo. The Netherlands had a 'Holland' stand with six Dutch companies: Moba (egg grading/packing), Meyn (processing), Hollam (nests), Euribrid (breeding material), Vencomatic (nests) and Impex (drinknipples). Through there agents and sometimes assisted by Dutch people the following Dutch companies were also present: Farmtec (cages), EMI (ventilation systems), Heesen (feeding systems), Reform (incubators) and Fancom (climate computers).

The KPA estimated that 30,000 visitors came to the expo. The KPA said that the expo was a success for exhibitors and visitors and KPA is already planning a second expo in two or three years time.

Companies attending the KOREA POULTRY EXPO 1991

Detailed addresses are available from the agricultural section of the Royal Netherlands embassy.

Giant star trading company, Korea Feeder and drinker systems (Kuang Huel, Taiwan) Gochang machinery system co.,Korea Layer/grower cages, feeder and drinker systems, ventilation system, farmpacker (Diamond, USA) Agent layer breeders (Dekalb Poultry Research Inc, USA) K.I System ,Korea Layer cages, Pan and chain feeder, drinking system (nipples) (Big Dutchman/Cycclone, USA) Nests (Shenandoah, USA) Ventilation systems (Mulifan, Vostermans B.V, Netherlands) Incubators (Petersime, Belgium) Sangil Corp., Korea Drinking systems (nipples) (Impex Barneveld B.V. Netherlands) Nests (Vencomatic, Netherlands) Samhwa Farm, Korea Layer and broilerbreeders (Euribrid, Netherlands) Taeul Corp., Korea Nests (Hollam Interproducts, Netherlands) Hahsan Corp., Korea Poultry processing equipment (Meyn machinefabriek, Netherlands) Dana Co, Ltd., Korea Manure handling machinery Daeill plastic MFG Co., Korea Feeding and drinking system

Daejin Co., Korea Cages Daehan special machinery MFG.CO, Korea Egg grader, layer cages, farm packer Leo retail marketing Co., Korea Display warmer, fryer etc. for retail use Mujin international inc., Korea Cages, egg cross conveyor, ventilating fan, cooling pad, heater, medicator etc. (agent for Kuhlmann and Farmer Automatic, Germany) Miwon Co.Ltd., Korea Feed mill producing poultry and other animal feeds Bo-il industrial Co.Ltd., Korea Cages with belt (agent Specht, Germany) Bokjee Farm, Korea Cages (agent for <u>Meller, Germany</u>) Layer and Broiler Breeding material (Lohmann, Germany) Samyang Cage, Korea Cages Saeki rtn Company, Korea Pulsfog, Ulva Fan, Agro master, Dosatron, Klorman Chlorine system Shinhan engineering Co., Korea Automatic Feeding system (Cablevey, USA) Chick scale, cooling system Feed Flavors Asia, Korea Feed supplements (Licensed by Feed Flavors Inc, USA) Ohkyung farm Co.Ltd., Korea Egg grading Machines (small scale), Poultry management Program Oksan Sil corp., Korea Feeding systems Wooil Ind.Co., Korea Heating equipment Yoo Kyung Co.Ltd, Korea Cages, feeding and drinking systems (Big Dutchman, Germany), Esap poultry computer (<u>Fancom, Netherlands</u>) Turn key projects (Soldimpex, Germany) Joong Won Trading Co., Korea Drinking systems, nests, Feeding systems (Cumberland, USA) Hye-in GPS Farm, Korea Breeding material broilers (Indian River, USA) Yoonee chemical Co.Ltd Animal health products (distibuted for <u>Alltech Inc, USA</u>) Eujin industrial Co., Korea Egg conveyor belt Yuhan corporation, Korea Animal health care, vitamines Choongang chemical Co.Ltd., Korea Animal health care (a.o. Ivomec) Chunho Group, Korea Breeding material (local) Cages (a.o manure drying on belt) (Farmtec, Netherlands) Ventilation system, climate computers (EMI, Netherlands) Feeding systems (<u>Heesen, Netherlands</u>) Incubators (<u>Reform, Netherlands</u>)

Cheil Poultry system, kyowa machinery Co.Ltd, Korea Layer and grower cages, feeder systems , feeder weigher etc. Egg-processing machinery (Kyowa, Japan) Jeil Vet Chem. Co.Ltd., Korea Animal Health care (a.o. Ciba-Geigy, Switserland) Jeil feed company Ltd., Korea Feed mill Teanung Cage Cages Taeyoung Machinery Mfg, Co., Korea Cages Taeul Corp., Korea Feeding and drinking systems, cages (Chore time/Brock Int, USA) Pyeongdong B.G.C Tech. Co.Ltd., Korea Farm level manure drying/fermentation machine Purina Korea, Inc, Korea Poultry feeds Hankook Vet.Med.Co.Ltd., Korea Animal Health care Bayer vetchem (Korea), Ltd., Korea Animal health care products (Bayer, Germany) Flavor Corporation of Korea, Korea Products from Flavor Corporation of America, USA Korean Poultry technical services, Korea Cages, ventilation fans, egg grading Pfizer korea Limited, Korea Animal health care (Pfizer, USA) Hando engineering Corp. Hydra, mini tractor (Hydra Mac, USA) Hanshin International, Korea Cages (<u>Hellmann, Germany</u>) Equipment (Facco, Italy) Hanil Poultry farm Co.Ltd. Breeding material broiler (Arbor Acres, USA) Breeding material layer (ISA Brown, France) Cages, feeding systems (Roxell, Belgium) Hanil feedmill Ind.Co.Ltd.,Korea Poultry feeds Holland stands:

Vencomatic Nests Impex Barneveld B.V Drinking systems (nipples) Euribrid B.V Layer and Broiler breeding stock Hollam Inter-products, Ins. Nests nest Meyn machinefabriek B.V Poultry processing equipment Moba B.V Egg packing/grading equipment



1 = Kyonggi
2 = Kangwon
3 = Chungbuk
4 = Chungnam
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- 5 = Chonbuk
- 7 = Kyongbuk 8 = Kyongnam

- 9 = Cheju

6 = Chonnam

Major Economic Indicators

Land Area of South Korea: 99,222km² (38,310 sq. miles) Population: 43.21 million (July 1, 1990)

Data: National Bureau of Statistics, Economic Planning Board

and the second	1985	1986	1987	1988	🥪 1989 🌾	1990	1991	😞 Remarks 🕹
GNP, current prices, USS billion Economic growth rate, real, % Per capita GNP, current, US\$	89.7 7.0 2,194	102.7 12.9 2.503	128.4 12.8 3,098	169.2 12.4 . 4,040	211.2 6.8 4,994	237.9 9.0 5,569	268.0 8.7 6,220	*tentative **projections
						<u> </u>	·	
	1986	1987:**	1988	1080	1000			
		alter and	1.10	AND CORES	1. A A A A A A A A A A A A A A A A A A A			
Industrial production, adjusted, 1985 = 100 Producers' inventories, 1985 = 100	121.1 108.6	144.2 120.7	163.3 137.5	168.5 162.1	183.5 190.2			
Employment, million persons	15.51	16.35	16.87	17.52	18.04			
Unemployment rate, %	3.8	3.1	2.5	2.6	2.4			
Monthly industrial wages, '000 won	351.0	386.5	446.4	540.6	642.3			
Consumer prices, 1985 = 100	102.8	105.9	113.4	119.9	130.2			
Wholesale prices, 1985 = 100	98.5	99.0	101.7	103.2	107.5			
Export prices, 1985 = 100	99.6	107.7	122.5	131.0	132.2			
import prices, $1985 = 100$	93.3	103.5	118.2	122.1	118.3			
Merchandise exports, USS billion	34.71	47.28	60.70	62.38	65.02			
Merchandise imports, USS billion	31.58	41.02	51.81	61.46	69.84			
Invisible trade receipts, US\$ billion	8.05	10.01	11.25	12.64	14.27			
Invisible trade payments, US\$ billion	8.68	9.03	9.98	12.43	14.72			
BALANCE OF PAYMENTS								
Current account balance, US\$ million	4.617	9.854	14 161	5 055	-2179			
Trade balance, US\$ million	4.206	7.659	11.445	4,597	-2.004			
Invisible trade balance, US\$ million	- 628	977	1,267	211	-451			
Long-term capital, US\$ million	- 1,982	- 5,836	- 2,733	- 3,363	548			
Short-term capital, US\$ million	- 392	-7	1,336	60	3,334			
Overall balance, US\$ million	1,700	5,202	12,175	2,453	- 274			
Foreign exchange holdings, US\$ billion	7.96	9.19	12.3	15.25	14.8			
Basic exchange rate, won per US\$1	861	792	684	680	716			
(as of the end of the period)								
Domestic credit trillion wop	49.50	57 DA	64 10	70.00	06.90			
Claims on gov't & gov't agency, trillion won	6 10	7.85	676	79.09	90.89			
Claims on private, trillion won	43.40	49.19	57.34	70.26	86.65			
Total money supply (M2), trillion won	33.83	40.28	48.94	58.64	68.71			
Money supply (M1), trillion won	8.85	10.11	12.15	14.33	15.91			
Quasi-money	25.02	30.17	36.79	. 44.31	52.80			
Building permits issued, million m ²	43.5	48.0	59.8	88.6	116.4			
Machinery orders excl. ships, billion won	3,910	5,040	7,844	9,798	12,753			
 Daikway fraight million m/t	50.0	57.0						
Marine caroo unloaded million m/t	55.6	57.9	58.9	57.1	56.4			
Marine cargo loaded, million m/t	78.7	01.0 01.4	191.4	207.0	235.2			
Line ougo logood, minior mit	10.1	31.4	101.5	104.9	110.4	L		







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performances of poultry in Korea (1990)

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	Rearing	Laying-house	Sexual	Hen-day egg	Tered	East amight(g)	Income
Strain	house	viability maturity		production	Pequirement	72 weeks	per bird(won)
مه در امر	viability(%)	72 weeks(%)	(days)	72 weeks	Acquircitoit	12 1000	7. weeks
Shaver	99.38	97.48	163	273.01	2.550	61.20	6.486
Manina	100	94.38	159	286.22	2.424	59.99	7 <i>.</i> 267
Hy-line	100	93.13	165	277.93	2.358	59.48	7.098
Babcock	100	93.75	155	285.68	2.425	59.60	7.101
Нуресо	98.13	90.45	158	293.17	2.340	60.96	7 <i>.5</i> 75
Warren	- 100 -	95.(X) -	169	280.70 **	2.379	61.46	7.403
mean	99.69	92.32	158	279.31	2.422	60.61	7.048
Arbor Acer	100	92.32	168	266.85	2.595	62.42	7.048
Hy-line	99.38	94.38	159	288.81	2.488	61.14	7.637
Nick chick	99.38	93.71	159	287.21	2389	മെങ	8.117
Shaver	100	91.25	167	2 69.64	2.639	61.14	6.790
Manina	100	93.75	165	.263.31		··· 62.93	7.063
Hisex	100	96.25	161	286.49	2.440	62.55	8.082
Isa Brown	99.38	89.94	160	273.75	2.462	ഒക	7.643
Lohman	100	96.25	. 156	296.76	2.380	61.35	8.481
Warren	99.38	93.08	171	270.03	2.682	60.66	6.554
mean	99.72	94.08	162	278.09	2.5164	62.05	7.495
Grean mean	99.71	93.25	160	278.66	2.4722	61.37	7.284

Table 15. The results of 23nd random sample test of laying hens

Table 16. The results of 29th random sample test of broiler

Strain	Liveability 6 weeks (%)	Body weight 6 weeks (%)	Feed requirement 0~6 weeks (%)	Income over feed and chicks cost per bird 6 weeks (won)
Hubbard	98.75	2,037.03	1.813	416
Vedet	99.38	1,851.79	1.842	427
Maniker	99.06	1,847.32	1.867	412
Ross	99.38	1, 9 45.47	1.830	384
Anak	98.75	2,035.32	1.803	41 2
Hy-bro	99.38	2,025.00	1.809	- 05
Tatum	98.00	1,863.27	1.849	337
Indian River	99.06	1,955.62	1.779	-123
Arbor Acer	98.75	2,132.78	17 69	511
Total	99.06	1,959.99	1.915	5

KOREAN FEED PRODUCTION

% CHANGE (T/M) 2001 % CHANGE -17.25 + 2.41 + 1.94 +22.02 - 9.67 +14.54 +77.15 + 8.30 MAFF 1992(%) •• Source 262,632 1,788,519 896,231 3,603,712 1,511,630 1,608,423 96,026 (T/M) 8801 9,767,176 % CHANGE 1991(%) (T/M) 1991 3.32 14.05 10.96 34.06 15.99 17.16 17.16 1990(%) + 5.68 +17.29 + 3.46 +35.58 + 3.03 + 1.03 +16.19 +116.49 CHANGE +17.49 PROPORTION OF FEED BY SPECIES 59 (%)6861 2.87 13.80 9.06 39.14 15.02 16.51 1.23 (T/M) $\begin{array}{c} 317,382\\ 1,746,501\\ 879,141\\ 2,953,297\\ 1,673,467\end{array}$ 1,404,23254,2079,018,229 % CHANGE + 1.60 + 2.05 +21.28 -19.19 + 6.67 + 4.18 +12.46 ୟ ୦ 1987 1988(%) 2.69 18.31 9.18 36.89 36.89 15.48 15.48 16.47 0.98 346,662 1,464,952 1,142,960 3,550,938 1,666,783 1,789,611 144,361 (T/M) 0661 10,425,963 % CHANGE + 8.72 +12.77 +19.18 +13.24 +34.34 +21.54 +22.12 +18.86 1987(%) 3.52 19.37 9.75 9.75 32.75 15.57 15.57 0.60 300, 327 1, 489, 074 849, 755 2, 178, 297 1, 624, 258 1, 208, 477 1986 (M/T) 25,039 7,675,241 % CHANGE +13.80 -19.74 + 5.15 +12.97 + 3.37 + 6.80 +33.68 + 6.51 1986(%) 3.91 19.40 11.07 28.38 28.38 21.16 15.75 15.75 0.33 276,227 1,320,508 712,991 1,923,692 1,209,042 (T/M) 6891 298,878 1,435,544 942,415 4,071,291 1,717,740 1,717,740 128,363 1985 (M/T) 994,282 20,504 6.457,246 10,403,173 1985(%) 4.28 20.45 11.04 29.79 18.72 15.40 0.32 Broiler Feed Broiler Feed Broiler Feed Pig Feed Beef Feed Feed Feed Feed Feed Layer Feed Dairy Feed Layer Feed Dairy Feed Layer Feed Dairy Feed Feed Chick Feed Chick Feed Chcik Feed Other Feed Other Feed ITEMS ITEMS TOTAL ITEMS TOTAL Other Beef Beef Pig Pig

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2. 肉鶏 10首當 飼育費

Total cost of broiler per 10 heads

	Total	cost c	of bro	ller per 10 he	ads			單位:원 Unit: won
一 費		飼背	が規模	5.000首未泽 Less than 5.000 head	5.000~ 10,000	10,000首以上 100 head & more	上平均 Average	Raising size Cost item
·	豸	、	費	4.202	4,188	4,115	4,147	Chick
	餫	1 料	큧	10,733	10,169	9,613	9,872	Feed
	*	道光	熱費	503	303	266	293	Water, power & Fuel
÷	經防	运 治非	寮費	451	356	- 295	327	Veterinary & Medicine
	修	: 繕	큧	70	62	52	57	Перак
	小	· 農 貝	7	28	22	9,	15	Small implement
Оре	諸	材料	큧	70	54 .	49	51	Other materials
rating co	き 雇	傭 勞	賃	81	221	403	321	Hired Labor
st	貸	借	科	60	75	. 59	64	Rent
	借	入金₹	リ子	4	7	14	11	Interest on borrowed capital
	其	他雜	費	260	223	183	202	Miscellanecus expenses
n j	? (賞	却	費	(413)	(341)	(282)	(310)	
		建	物	234	210	188	198	Building
		大農	具	179	131	94	112	Large implement
	小		<u></u>	16.875	16,021	15,344	15.670	Sub-total cost
自	家党	5 力	費	2.443	1,979	1,660	1,817	Family labor
固兄	宦資	本 利	子	224	170	152	163	Fixed capital interest
流重	协 資	本 利	子	141	129	123	127	Liquid capital interest
t 土	也 資	本 利	子	77	54	58	59	Land capital interest
費	用	合	<u></u>	19,760	18,353	17,337	17,836	Total cos:

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다. 育成鵄 首當 生產費 Production cost of pullet per head

費	詞音	規模	3.000首未清 Less than 3.000 head	3.000~ 7,000	7,000首以」 7.000 head & more	二 平 均 Average	構成比(% Component Ratio) Raising size Cost item
家	畜	費	609	607	601	. 605	18.1	Chick
飼	料	費	2,095	1,826	1,832	1,877	56.3	ुत्रे Feed
水 道	光熱	큧	33	25	41	33	1.0 ·	- Water, Power & Fue
防疫	治療	賮	42	91	68	73	2.2	Veterinary & medicir
修	、 繕	卖	9	6	23	13	0.4	Repair
小島	上 月	₹	4	2	3	3	0.1	Small implement
諸权	† 料	₹	10	8.	11	9	0.3	Other materials
. 雇. 俱	下	貸	39	73	118	85	2.5	Hired labor
其 他	. 雜	費.	6	7	21	12	0.4	Miscellaneous expens
僋	坦	賮	(158)	(166)	(134)	(150)	(4.5)	Depreciation
建		物	93	92	75	84	2.5	Building
大	農	具	65	74	59	66	2.0	Large implement
小		計	3,005	2,811	2,852	`2,8 60	85.8	Sub—total cost
自家	勞 力	費	436	355	277	339	10.2	Family labor
固定資	で本利	7	39	43	- 35	39	1.2	Fixed capital interest
流動資	、本 利	子	77	70	70	71	2.1	Liquid capital interest
土地資	、本 利	· 子	23	26	20	23	0.7	Land capital interest
費用台	合計 (4	4)	3,580	3,305	3,254	3,332	100.0	Total cost
副產物	收入(B	3)	55	38	29	38		By—products
生產費	(A – E	3)	3,525	3,267	3,225	3,294		Production cost

單位 Unit:

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I	Total cost of lay	er per head				單位:원 Unit:won
黄	飼育規模 目	3,000首未滞 Less than 3.000 head	3.000~ 7,000	7,000首以上 7.000 head & more	- 平 均 Average	Raising size
	家	3,456	3,252	3,202	3,246	Çhıck
	飼 料 費	7,847	8,107	8,089	8,081	Feed
¥	水道光熱費	107	92	85	88	Water, power & Fuel
4	∽ │防疫治療費	113	82	103	98_	Veterinary & Medicine
	修荐费	30	29	36	34	Repair
	小 農 具 費	5	4	5	5	Small implement
Operat	諸材料費	19	22	22	21	Other materials
ing cost	雇傭勞賃	124	345	497	435	Hired Labor
	借入金利子	. 8	15	34	27	Interest on borrowed capital
	其他雜費	104	. 81	108	101	L'iscellaneous expenses
響	償 却 費	(481)	(342)	(367)	(367)	Depreciation
	建物	234	167	206	197	Building
	大農具	247	175	161	170	Large implement
	小計	12,294	12,371	12,548	12,503	Sub—total cost
自自	家劳力費	1,937	1,087	875	991	Family labor
固定	資本利子	335	282	286	287	Fixed capital interest
流動) 資本利子	381	362	358	362	Liquid capital interest
土 地	資本利子	125	113	115	115	Land capital interest
費	用合計	15,072	14,215	14,182	14,258	Total cost

2. 產卵鶏 首當 飼育費 Total cost of layer per head



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2. 繁殖脉 頭當 飼育費 Total cost of breeding sow per head

	То	tal d	cost	oft	oree	ding	sow per h	ead			, 單位: 원 Unit∶won
飼育規模 費 目							10頭未滿 Less than 10 head	10~20	20頭以上 20 head & more	平 均 Average	Raising size Cost item
	•	飼	·	料		費	293,547	289,805	273,392	278,006	Feed
		水	道	光	熱	費	6,170	5,960	6,480	6,364	Water, Power & fuel
		防	疫	治	療	費	15,040	14,861	15,984	15,709	Veterinary & Medicine
	77 2	修		繕		費	4,059	5,526	6,541	6,142	Repair
		小	農	÷	具	費	1,235	1,290	580	759	Small implement
		諸	材	. 3	F]	· 費	4,767	4,111	4,671	4,586	Other materials
Operat	55.	種		付		.料	6,027	1,800	159	977	Breeding fees
ing cost	e	雇	傭		勞	賃 •	1,000	6,997	75,471	57,106	Hired labor
		借	ス	金	利	子	788	1,706	1,005	1,102	Interest on borrowed capital
		其	他	ź	睢	費	7,051	10,043	8,080	8,314	Miscellaneous expeneses
1	費	償		却		費	(25,767)	(23,648)	(25,877)	(25,493)	Depreciation
		Ę	ŧ			物	12,769	11,585	11,721	11,795	Building
		۲	7	晨		具	12,998	12,063	14,156	13,698	Large implement
		小				≣ †	365,451	365,747	418,240	404,558	Sub-total cost
自	5	Ĩ.	勞	ナ)	費	281,878	183,625	61,462	102,314	Family labor
固	定	資	: *	z 7	利	子	51,084	55,176	63,690	60,141	Fixed capital interest
流	動	資	5 本	ب ا	利	子	8,425	8,368	9,725	9,375	Liquid Capital interest
±	地	資	本	ا ک	FIJ	¥	7,221	6,938	5,390	5,821	Land Capital interest
賮		用		合		計	714,059	619,854	558,507	582,209	Total cost

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2. 肥育豚 頭當飼育費 Total cost of hog per head

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	Total cost of hog per head						nead	/	單位: 원 Unit won		
費					飼育	規模	50頭未済 Less than 50 head	50~100	100頭以上 100 head & more	- 平均 Average	Raising size Cost item
	•	家		畜		費	36,935	32,601	29,688 0	31,034	Livestock
		飼		料		費	57,800	56,567	54,753	55,190	Feed
	經	水	道	光	熱	費	462	360	420	417	Water, Power & Fuel
		防	疫	治	療	費	1,214	1,156	1,130	1,140	Veterinary & Medicine
		修	修		780	698 745 743 Repair		Repair			
0		小	農	7	具	·費	149	96	112	113	Small implement
perating	營	諸	材	3	F I	費	580	428	400	417	Other materials
cost	.	雇	A .,	2	勞	賃	324	1,430	1,930	1,748	Hired labor
		借	入 :	金	利	- 子	-	_	158	128	Interest on borrowed capital
Ţ	費 -	其	他	¥	睢	費	1,150	1,090	950	981	Miscellaneous expenses
		償	む 却			費	(2,604)	(2,094)	(1,575)	(1,713)	Depreciation *
		建	ł			物	1,460	1,327	1,208	1 , 241	Building
		大農		<u></u>		1,144	767	367	472	Large implement	
		小				計	101,998	96,520	91,861	93,624	Sub-total cost
崮	豸	ξ	勞	力	J	費	27,026	13,005	9,343	11,143	Family labor
固	定	資	本	7	利	子	3,747	4,111	4,272	4.214	Fixed capital interest
流	勭	資	本	Ą	FIJ	子	2,488	2,311	2,133	2,197	Liquid capital interest
±	地	資	本	1	FIJ	子	976	798	563	621	Land capital interest
費		用	4	<u>}</u>	i	計	136,235	116,745	108,172	111,799	Total cost





EXMIS - tabel C

2-JUL-91

Uitvoer uit totaal EG-12 van pluimvee naar Zuid-Korea

Waarde in min. NLG

Everiese	Daadukt	Jaar							
EAMISH	Produkt	198 6	1987	1988	1 98 9	1990			
Т	Totaal	0.1	0.8	2.1	6.6	21.9			
0123	pluimveevlees, v/g/b	0.0	0.4	0.0	0.1	6.5			
025	eieren/eigeel; eiwit	0.1	0.0	2.1	5.8	10.8			
72195	mach. pl'vee-houdery	0.0	0.4	0.0	0.7	4.6			

Bron: Eurostat

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EXMIS - tabel A

1-JUL-91

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Uitvoer in 1990 van machines voor de pluimveehouderij uit de lidstaten van de EG-12 naar Zuid-Korea

Waarde in mln. NLG

Eumiene	Deadable	Herkomst						
EXINI SIII.	Produkt	Frankryk	B.L.E.U.	Nederlnd	B.R.D.	Italie	Ver.Kon.	
72195	mach. pl'vee-houdery		0.3	4.1	0.2	• • • • • •	0.0	
72195001	broedm./kunstmoeders	•	0.3	2.1	0.1	-	-	
72195002	and.mach. pluimveeh.	-	-	2.0	0.1	-	0.0	
Everience	Drackskt	Herkomst						
Exmisnr	Produkt	lerland	Denemrkn	Grieklnd	Portugal	Spanje	EG-12	
	***************************************	•••••						
72195	mach. pl'vee-houdery	-	•	-	-	-	4.6	
72195001	broedm./kunstmoeders	-		-	-	-	2.5	
72195002	and.mach. pluimveeh.	-	-	•	-	-	2.1	
72195002 Bron: Eur	and.mach. pluimveeh.	-	-	-	-	-		

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하우스 乾燥方式을 改良한 醱酵併用型입니다. 設備費나 運転維持 費도 経済的으로 中規模畜糞処理에 기장 알맞은 機種입니다.





•발효병용이므로 계절, 날씨 등에 의한 効率의 차이가 적습니다.

• 박테리아에 의해 有機物을 분해하고 이때의 발효발열온도는 70~80℃까지 상승하여 수분의 증발도 크고 발효+건조의 効率은 매우 높습니다. • 本機의 프레임부분은 아연용융도금이 되어 있어 . 耐腐蝕性도 우수합니다.

	3, 000	4,000	5,000	6, 000
走行모터	0. 1kW×2	0. 1kW×2	0. 1kW×2	0. 1kW×2
攪拌모티	5.5kW	7.5kW	7.5kW	5. 5kW×2
1 1	2, 000kg	2. 300kg	2, 500kg	3, 000kg
고르기모터 (주문규격)	2.2kW	2.2kW	2.2kW	3.7kW



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