

# The Present Status and Performance of Dairy Farming, and Government Policies and Programmes of Dairy Development in Korea

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## Summary

Dairy farming in Korea has been markedly developed over the last 30 years. In the early 60's there were less than 2,500 dairy cows in entire Korea, but the number increased to more than 460,000 (180 folds) in 1988. This increase was made possible by successful achievement of a series of economic development plans as well as by the nation's improved living standard. The Korean economy has been improved with the average annual growth rate of over 8% since 1962. However, the average annual growth rate in agriculture sector is only 3%. The percentage of agriculture products contributed by livestock products increased from 15 to 27 during 1970 and 1984, and the percentage of livestock products contributed by dairy industry increased from 13.4 in 1977 to 20.1 in 1984. The average number of dairy cattle per household is about 12 in 1988 and tends to increase since 1987. Most dairy farms are small and about 54% of the farms raise less than 10 dairy cattle. Current annual milk production is about 1.3 million M/T which is more than 300 times the production in 1962. This increase was mainly due to an increase in number of cows, but increases in yield per cow are also significant. The average milk yield was 2,800 kg/cow in 1962, but it increased to 4,600 kg in the late 70's. However, the increasing trend almost plateaued over the last 10 years. We speculate that this plateaued milk yield is due to inefficient culling of poor producers and genetic retrogression due to inbreeding or use of inferior bulls. Annual production of formulated feeds for dairy cattle is over one million M/T, which accounts for about 13% of the total formulated feed production. Raw ingredients for the formulated feeds are mostly (over 80%) imported. Native grasses and rice straw are the major source of roughages for dairy feeding, but

roughages supply from cultivated forage lands has been steadily increasing and now reaches almost 15% of the total roughage supply. With all this remarkable development, some difficulties are seen in the future dairy industry in Korea. To overcome with the current problems in dairy farming in Korea, milk producers, processors, government agencies and researchers all should work together to improve management, breeding, processing and marketing so that the dairy industry is more compatible.

## I. Introduction

This is a country paper presented at the Study Meeting on Dairy Farming sponsored by Asian Productivity Organization. Dairy farming in Korea has been markedly developed over the last 30 years. In the early 60's there were less than 2,500 dairy cattle in entire Korea, but the number increased to more than 460,000 (180-folds) in 1988 (table 1). This increase was made possible by successful achievement of a series of economic development plans as well as by the nation's improved living standard. In addition, the Korean government put a limit to the import of milk products from abroad and encouraged milk production, while funding the import of dairy cows and the improvement of grasslands which became a basis for forage supply to dairy farms.

During this period dairy industry in Korea experienced many problems as well. Productivity is still low when compared with that reported in advanced countries, such as USA, Canada, New Zealand and Japan. Dairy cows and semen with good records have been imported. However, the genetic potential has never been achieved because of poor management and lack of good-quality roughages. Other major problems are in transporting, processing and marketing of dairy products. Particularly, many competing milk processing firms collect milk in the same area, resulting in increased collection time and cost. Milk processing plants are not special-

ized for special products, every one producing similar products, so that operation scale is small and marketing is inefficient.

**Table 1. Number of dairy cattle and dairy households**

Year	Raised	Imported	Household	Heads/ household
	..... thousands .....			
1977	109.2	12.2	13.9	7.8
1978	135.8	21.9	16.4	8.3
1979	163.3	16.2	17.2	9.5
1980	179.8	4.4	22.2	10.2
1981	194.2	-	18.2	10.7
1982	228.2	9.5	22.5	10.1
1983	274.8	10.6	29.5	9.3
1984	334.4	11.3	37.6	8.9
1985	390.1	1.2	43.8	8.9
1986	437.3	-	42.7	10.2
1987	463.3	-	38.1	12.2
1988 (Mar.)	467.8	-	36.9	12.7

1986 Livestock Year Book by Nong Su Chuksan Shinbo and Quarterly Review (May, 1988) by National Livestock Cooperative Federation.

similar products, so that operation scale is small and marketing is inefficient.

Dairy farming in Korea is sustaining and has a prospective future if producers, policy makers and researchers work together. This paper will focus on how dairy farming in Korea was led to the present status and how that will develop in the future even with some problems anticipated.

## II. Present Status

### 1. Contribution of the livestock sector to the gross national products

The Korean economy has been improved with the average annual growth rate of over 8% since 1962. However, the average annual growth rate in agriculture sector is only 3%. The percentage of GNP contributed by agriculture decreased from 23.1% in 1970 to 11.6% in 1984, but the percentage of agricultural products contributed by livestock products increased from 15 to 27 during the same period, and the percentage of livestock products contributed by dairy farming and products increased from 13.4 in 1977 to 20.1 in 1984.

### 2. Animal population

According to Quarterly Review (March, 1988) published by National Livestock Cooperative Federation, the number (households) of beef, dairy cattle, swine and chickens is 1,759,000 (817,000), 460,000 (37,000), 4,274,000 (281,000) and 60,000,000 (231,000), respectively. The average number of respective animals per household is 2.2, 12.4, 15.2 and 260. In Asia where GNP per capita is less than \$500, their staple is grain. But when GNP per capita exceeds \$500, the demand for livestock products tends to rapidly increase. Korea has followed the suit. After 1975 when the GNP became higher than \$500, the demand for animal products rapidly increased irrespective of supply so that frictions between producers and consumers were inevitable in marketing and policy making. However, as GNP per capita reached \$2,000 in the early 80's, the increase in

the demand for animal products became blunt with the relationship between the demand and supply stabilized. During this period livestock production in Korea becomes a more independent industry rather than an industry within agriculture.

### 3. Profile of dairy industry

The average number of dairy cattle per household is about 12 in 1988, indicating that most dairy farms are small (tables 2 and 3). More than a half of farms (54%) raise less than 10 dairy cattle, 18% of farms less than 5 cattle, 30% of farms 10-19 and 16.5% of farms more than 20 cattle (table 2). Although the farms raising more than 20 dairy cattle occupy only 16.5%, they own more than 44% of the total. In the meantime the farms raising less than 5 dairy cattle occupy 18%, but own only 4% of the total. Although the rate is slow, the average dairy farm size is increasing recently, the number of farms raising less than 10 cattle was more than 71% of the total in 1979 but only 54% now. These small farms raising less than 10 cattle are run as a part-time job. Among these farms, those who work in other agriculture sectors were 81%, indicating that they have a multiple agriculture operation, white-color workers 8% and others 11%.

### 4. Production and yield of milk

Current annual milk production is about 1.3 million M/T, which is more than 300 times the production in 1962 (table 4). This increase was mainly due to an increase in number of cows, but increases in yield per cow is also significant. The average milk yield was 2,800 kg/cow in 1962, but it increased to almost 4,600 kg in the late 70's. This remarkable

**Table 2. Number of dairy cattle raised on farms of different sizes (heads).**

Year	1 ~ 9	10 ~ 19	20 ~ 49	> 50	Total
	..... thousands (%) .....				
1977	40.2 (36.8)	27.9 (25.5)	24.0 (22.0)	17.1 (15.7)	109.2 (100)
1978	48.7 (35.9)	33.6 (24.7)	30.5 (22.5)	21.9 (16.1)	135.8 (100)
1979	53.0 (32.5)	43.8 (26.8)	38.9 (23.8)	27.6 (16.9)	163.2 (100)
1980 (Jun)	57.9 (33.0)	47.7 (27.2)	41.6 (23.7)	28.2 (16.1)	175.2 (100)
1981	56.9 (29.3)	55.8 (28.7)	51.7 (26.6)	29.8 (15.3)	194.2 (100)
1982	69.7 (30.5)	65.5 (28.7)	60.4 (26.5)	32.6 (14.3)	228.2 (100)
1983	90.8 (33.0)	80.9 (24.9)	68.3 (23.9)	34.8 (12.7)	274.8 (100)
1984	116.8 (34.9)	99.4 (29.7)	81.6 (24.4)	36.5 (10.9)	334.6 (100)
1985	135.7 (34.8)	105.5 (27.0)	97.2 (24.9)	39.3 (10.1)	390.1 (100)
1986	136.9 (31.3)	131.0 (30.0)	122.2 (27.9)	47.3 (10.8)	437.3 (100)
1987	117.2 (25.3)	144.6 (31.2)	146.9 (31.7)	54.7 (11.8)	463.3 (100)
1988 (Mar.)	110.7 (23.7)	151.0 (32.3)	148.9 (31.8)	57.3 (12.2)	467.8 (100)

Livestock Statistics (1978) published by Livestock Industry Development Corporation and Quarterly Review (1983, 1988) by National Livestock Cooperative Federation.

**Table 3. Number of dairy farm households of different sizes (heads)**

Year	1 ~ 9	10 ~ 19	20 ~ 49	> 50	Total
	..... hundreds (%) .....				
1977	108.2 (77.6)	21.1 (15.1)	8.4 (6.0)	1.6 (1.1)	139.3 (100)
1978	123.4 (75.3)	26.4 (16.1)	10.9 (6.7)	2.1 (1.3)	163.9 (100)
1979	122.3 (71.2)	33.2 (19.3)	13.8 (8.0)	2.5 (1.5)	171.7 (100)
1980	160.0 (72.3)	39.8 (18.0)	17.9 (8.1)	3.5 (1.6)	221.2 (100)
1981	119.3 (65.4)	41.8 (22.9)	18.3 (10.0)	2.9 (1.6)	182.3 (100)
1982	151.4 (67.2)	49.3 (21.9)	21.5 (9.6)	3.2 (1.4)	225.4 (100)
1983	206.4 (69.9)	61.0 (20.6)	24.6 (8.3)	3.4 (1.2)	295.4 (100)
1984	269.1 (71.5)	74.4 (19.8)	29.3 (7.8)	3.6 (1.0)	376.5 (100)
1985	310.0 (70.8)	88.3 (20.2)	35.3 (8.1)	4.1 (0.9)	437.6 (100)
1986	282.4 (66.1)	95.4 (22.3)	44.3 (10.4)	5.2 (1.2)	427.4 (100)
1987	216.8 (56.9)	104.6 (27.4)	53.6 (14.1)	6.2 (1.6)	381.3 (100)
1988 (Mar.)	199.1 (53.9)	109.2 (29.6)	54.5 (14.8)	6.6 (1.8)	369.3 (100)

Livestock Statistics (1978) published by Livestock Industry Development Corporation and Quarterly Review (1983, 1988) by National Livestock Cooperative Federation.

**Table 4. Annual milk production (M/T) and average yield (kg/cow)**

Year	Production	Yield/cow	Yield/cow in performance test area
1977	260,547	4,679	-
1978	320,867	4,571	-
1979	380,730	4,556	-
1980	452,327	4,532	4,957
1981	512,875	4,605	5,340
1982	576,236	4,694	5,418
1983	712,205	4,788	5,398
1984	840,543	4,765	5,355
1985	1,005,811	4,808	5,412
1986	1,154,460		
1987	1,336,594		

Dairy Cow Performance Test Report (1986), and Quarterly Review (May, 1988), both published by National Livestock Cooperative Federation.

increase was obtained through improvement of feeding and management as well as import of cows with good pedigree records in the 1970's. However, the increasing trend almost plateaued over the last 10 years without obvious explanation. Considering there has been definite betterment in feeding and management during that period, we speculate that inefficient culls of low milk producers, and genetic retrogression due to an in-breeding and/or use of genetically inferior bulls have resulted in the plateaued milk yield.

### 5. Production of buffalo, sheep and goat milk

The production of buffalo, sheep and goat milk in Korea is negligible, although some goat milk was produced before 1970, which was unable to compete with cow's milk.

### 6. Production of other dairy products

Among dairy products, fermented milk, butter, cheese and icecream are the major products. Fermented milk has been produced since 1971 and has reached about 170,000 M/T in 1987. Butter was produced for the first time in 1964 and its production has been alternating to be in excess and shortage of consumption and has reached 2,900 M/T in 1987. Annual cheese production is now over 800 M/T, and icecream production is over 20,000 M/T, which is decreasing while non-dairy icecream production is increasing.

### 7. Feed supply and utilization

Annual production of formulated feeds for dairy cattle is over one million M/T, which accounts for about 13% of the total formulated feed production. Raw ingredients for the formulated feeds are mostly (over 80%) imported. Native grasses (not cultivated) are the major source of roughages for dairy feeding, but roughage supply from cultivated pasture has been steadily increasing and now reaches almost 15% of the total roughage supply. In addition to these roughages, rice straw (ammoniated or ensiled with poultry manure) is a significant source of roughages in winter. Some peddy fields are also used for growing forages during the season when rice is not grown. The average amount of formulated feeds fed per cow was 818 kg in 1970, but it increased to 2,549 kg in 1985. In the meantime the amount of roughages fed was 1,950 kg in 1970 and 2,549 kg in 1985. This indicates that concentrates consumption increased 3 folds between 1970 and 1985, while roughages consumption remained almost the same. The percentage of TDN

supplied with concentrates is 62%. This feeding system has increased the occurrence of metabolic diseases and decreased reproductivity resulting in decreased economical lifespan of cows (5 years in Korea vs 8-10 years in advanced countries).

## 8. Consumption of milk and milk products

Milk consumption in Korea has been increasing each year, but the relative rate is decreasing. Total milk consumption is over 1.3 million M/T in 1987, which was 2,600 M/T in 1962. The average consumption per capita increased from 0.1 kg in 1962 to almost 30 kg in 1986. The consumption increases 10-13% each year, which is lower than the production rate, indicating possible surplus. Under a government policy encouraging a multiagricultural operation, too many dairy cows were imported, resulting in the production of surplus milk and storage of excess milk powder. However, milk consumption per capita in Korea is much lower than that in the countries where GNP per capita is similar to Korea. Therefore, there is room to increase milk consumption.

A significant seasonal variation in the production and consumption of milk has been a problem to balance the demand and supply. During the hot summer the production decreases due to the high temperature and humidity as well as reduced forage growth which depresses cow's productivity. Meanwhile the milk consumption increases during the hot season. This brings about an unbalance between the demand and supply. However, the price of raw milk is fixed regardless of the surplus or shortage because the government sets the price; about \$ 0.43 per kg of 3.4% fat milk adding \$ 0.0125

per 0.1% increase in fat content. This pricing policy has protected producers and consumers as well, and has helped maintain stable price in the transitory period of development. But it hinders the free marketing system in which prices are set by the demand and supply and have some effects on the control of production.

Removal of inhibitory factors to milk consumption (e.g. lactose intolerance, high prices, etc.) and political support (e.g. school meal program, marketing, lowering taxes on milk products, etc) will increase milk consumption. The consumption of market milk, flavored market milk, infant formula milk powder, dried whole milk, dried skim milk, condensed milk, butter, cheese and fermented milk is 830,000, 88,350, 17,400, 6,600, 4,500, 1,500, 3,700, 660 and 168,000 M/T, respectively.

## 9. Exports and imports of milk and milk products

Exports of milk or milk products are nil at present. The amount of dried whey imported in 1986 was 10,300 M/T, of which 6,300 M/T was used for infant formula and the rest for animal feeds. The amount of dried skim milk imported in 1986 was 297 M/T which was used to make casein. The amount of milk lactose and casein imported in the same year was 4,400 and 4,700 M/T, respectively.

## III. Performance

In recent years, the dairy industry has been working on balancing the demand and supply, efficient collection of raw milk, price control, raw milk grading procedures and limiting dairy product imports. However, these problems have

yet to be resolved before the dairy industry can be stable and profitable. Over the last 10 years (1977 ~ 87), the number of dairy cattle increased from 110,000 to 450,000. Among the increased number, more than 100,000 heads were imported, owing to the nation's economical growth. This was done to increase farmers' income and to meet the demand for dairy products, as increased with the improved living standard. The average number of cattle per household has been maintained between 8 and 10 because the government encouraged dairy farming as a side-job rather than an enterprise since 1980.

Annual milk production increased from 260,000 in 1977 to 1.3 million M/T in 1987. Milk yield per cow was 4,700 kg in 1977 and 4,900 kg in 1987, indicating no improvement in milk yield per cow over the last 10 years. It is a challenging problem the Korean dairy farming faces today how to increase the milk yield.

Milk consumption well reflects GNP per capita, which was \$853 in 1977 and \$2271 in 1986. Annual milk consumption per capita was 7 kg in 1977 and 28 kg in 1986, and increased by 1 kg each year during the late 70's, but it increased by 2.4 kg in the 80's. As indicated above, the rate of increasing production is higher than that of increasing consumption.

Therefore, it is critical to stimulate milk consumption in order to keep the dairy farming stable.

Several means of increasing milk consumption may be considered: 1) The volume of a cotton pack unit can be increased from the present 200 ml to 250 ml (The 180 ml unit was increased to 200 ml unit in 1985, which increased milk consumption by 29% as compared to that in the previous year.) 2) Incorporating more milk into school and military meal programs.

- 3) Cooperative advertisement.
- 4) Improving management and processing (cost effective).
- 5) Developing variety of dairy products.

## IV. Government Policies and Programmes

### 1. Early stage of dairy farming

Dairy industry in Korea has taken off after the law on dairy development was enacted and the livestock development plan was included in the second economical development plan in 1967. The law on dairy development was declared in 1967 and the law on grasslands in 1969. About 64,000 dairy cows between the years 1976 and 1980 were imported, thanks to the rapid economical growth. After 1983, only registered cows were imported to increase productivity. For the import of cows, building of dairy farms and processing plants and technology transfer, foreign loans have been used: \$15 million (IBRD) in 1976, \$2.4 million (private loan) in 1977, \$5.3 million (private) in 1978, and \$25 million (KFW) and \$4.7 million (private) in 1980.

The main frame of the early dairy development plan was: 1) import of unregistered cows for the time being as farmers' financing and technical ability was considered to be poor, 2) import of 1000 cows each year and 3) Office of Rural Development and Agriculture Cooperative Federation are in charge of providing technical guidance and training. This policy was effective until 1981. Through these years the major goal of dairy farming was to bring pregnant heifers from abroad, to produce milk and breed the next calves, not realizing the importance of bulls or semen. This might have led to poor milk producers.

## 2. Policies on genetic improvement and artificial insemination

Although Livestock Experimental Station and National Institute of Breed Livestock are responsible for the supply of breeding bulls and semen, they have not done enough to improve performance and had not had the concept on the importance of pedigree or performance certificates. They supplied farmers with ordinary growing bulls for the breeding purpose. Artificial insemination is a basis of improving dairy cows. In 1962 an artificial insemination center was opened by Agriculture Cooperative Federation. Licensing system was applied to artificial insemination technicians in 1964 and artificial insemination centers were open in every cities and counties in 1966. Frozen semen have been used since 1974 and 76,000 cows were fertilized by artificial insemination in the year of 1978.

Artificial insemination is an efficient means of genetic improvement of livestock. However, the means should be evaluated qualitatively as well as quantitatively. The artificial insemination in Korea has grown under the government support and the semen used were not priced by genetic quality but by per straw. This could not be an incentive to semen suppliers to improve the genetic quality so that the artificial insemination was used for reproduction, not for genetic improvement.

## 3. Activities of some related organizations

Holstein Registration Association was founded in 1965 and its main project was registration of Holstein dairy cows, performance test, research on improvement and mediation between suppliers and buyers of registered cows. The registration procedure was divided into basic, preparatory

and pedigree registration and 4,092 cows were registered between 1966 and 1968. The association was incorporated into Korean Federation of Breed Livestock Improvement in 1969 which was operated mostly by professors and worked more on education to build the basis for livestock improvement than on practice. Including imported cows, 120,620 dairy cows were registered until 1983 and performance test was done on 3,000 cows. In addition, the federation has published newsletters and bulletins, and sponsored many training courses and technical exchanges.

Dairy judging became a more common practice for dairy breeding after two workers were trained for linear judging in USA for 3 weeks in 1983 and introduced a new concept on dairy judging. The performance test has also been done by the Livestock Cooperative Federation, and National Institute of Breed Livestock publishes the record on the performance test of its own dairy cows. However, problems are yet to be solved so that the registration and performance test can be more closely related and used for improvement of milk production.

## 4. Education and research

Development of the dairy industry in Korea owed much regular education at universities, junior colleges and agricultural high schools, and irregular training programs done by Office of Rural Development, Livestock Experimental Stations and other organizations. Owing to dairy development plans by the government in the 1960's, many universities and colleges newly opened Dairy Science Department in addition to existing Animal Science Department and produced many existing dairy farmers, technicians and teachers. Some dairy processing firms also contributed to education and training of dairy farmers. Two



model dairy farms were established by technical cooperation, each with West Germany and New Zealand, and used for training extension staff and dairy farmers.

Research on dairy science has been relatively slow. One reason for this is that experimental animals are expensive and that funds from the government or industry have not been so great. However, number of papers on milk yield, feeds, reproduction and management have been published, and research on milk composition, milk processing, dairy products, dairy chemistry and dairy microbiology was also significant.

### 5. Support on forage production

With the increasing demand for animal products, in 1966 the cultivation method of forages including recommended forage species, their combination and planting methods, etc. was taught through extension programs, and also grasslands were cultivated under the auspice of the government for the first time. In 1968 a 4-year plan for grassland development was set and the law on grassland enacted in 1969 designated forage cultivation areas, including permission procedures and financial support for forage production. The Forage Day was declared on September 5, 1969, drawing national attention to the importance of forage production. The forage production areas were classified into three groups: intensively cultivated grassland, temporary grassland and improved wild grassland. The government financed 75~100% for the cultivation.

In 1972 the Korean-German Grassland Research Project was established to develop technology for pasture-based livestock production. This project contributed to technical development on selection of proper forage species and their combinations,

and planting methods through exchange training programs and applied research. In 1973 the law on grassland was partially revised including the mandatory management of grasslands after cultivation. In 1980 the law was again revised allowing farmers to remove forest and to rent undeveloped public lands at 1% of the land price per year.

## V. Perspectives

As indicated above, the scale of the dairy farming in Korea is relatively small because of the government policy that has encouraged dairy farming as a complement to agriculture rather than an independent operation or enterprise.

However, this small-scale operation has been proved incompetent and hence the number of cows per household tends to increase since last year (table 1). Labor cost has been relatively low, but is rapidly increasing with rapid industrialization and increasing living standard in recent years. Democratization achieved this year allows free labor movement or free bargaining which also becomes a major factor to the increasing labor cost. Yet the milk price is the same as that three years ago. Many of the trade partners are pressing to open our market for their dairy products in exchange of their imports of our industrial products. How can the Korean dairy farmers survive these difficult problems? The followings may be suggested to alleviate the pressing burdens:

- 1) Dairy farmers should be willing to be informed of new development of technology;
- 2) Mechanization should be done to decrease labor cost (Scaling up to optimum operation should be done to apply this);
- 3) Genetic improvement can be achieved through pedigree records and progeny

tests; and 4) Record keeping and analyses should be done to improve management. By doing these the farmers would be able to keep the production cost down.

In addition to the above, importation of dairy products must be delayed until the dairy industry becomes more competent. Current concentrated dairy farming areas in suburbs of big cities should be moved to country sides where lands are cheaper and more grasslands are available to produce good-quality forages, which will improve milk quality, depend less on imported feeds, increase cow's economical lifespan and eventually decrease production cost. During this process, some farmers may not be able to survive, but those who can cope with economical difficulties will stand on their feet, stabilizing milk production.

Other areas to be improved are the current milk collection system (different farms collecting in the same area, competition or rejection in milk collection depending on the demand, poor facilities for milk storage and transport and lack of objectiveness in milk grading, etc), and milk pricing (should reflect seasonal change in production and milk quality including protein and solid nonfat contents, bacterial counts and somatic cell counts). Milk consumption should also be increased by use of more effective advertisement and education, and by producing more dairy products, such as cheese, yogurt, etc.

As indicated in this presentation, some difficulties are seen in the future dairy farming in Korea. However, with cooperation among

farmers, relevant government agencies and academicians will overcome all the stumbling blocks and make the dairy farming more prospective.

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