

Korea

“Dairy Facilities Improvement Project (2)”

Project Summary

Borrower:	Government of Republic of Korea
Executing Agency:	Seoul Dairy Cooperative
Exchange of Notes:	September 1990
Date of Loan Agreement:	October 1990
Final Disbursement Date:	January 1996
Loan Amount:	¥2,448 million
Loan Disbursed Amount:	¥1,507 million
Procurement Conditions:	General Untied
Loan Conditions:	Interest: 4.00%, Repayment period: 25 years (7 years for grace period)

《Reference》

(1) Currency: Won

(2) Exchange Rate: IFS annual average market rate

FY		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Rate	Won/US\$	731.5	671.4	707.8	733.4	780.7	802.7	803.5	771.3	804.5	951.3
	Yen/US\$	128.2	138.0	144.8	134.7	126.7	111.2	102.2	94.1	108.8	121.0
	Won/Yen	5.7	4.9	4.9	5.4	6.2	7.2	7.9	8.2	7.4	7.9
CPI (%)		87.1	92.1	100.0	109.3	116.1	121.7	129.2	135.0	141.7	148.0

(3) Exchange rate at the time of appraisal: 1 Won = ¥0.214 (US\$1.00 = ¥144 = 672 won)

(4) Fiscal Year: January 1 ~ December 31

(5) Abbreviation

SDC: Seoul Dairy Cooperative

NLCF: National Livestock Cooperatives Federation

(6) Terminology

- Dairy farming: Livestock farming that raises dairy cattle to produce raw milk.
- Milk industry: The industry which treats and processes raw milk to manufacture and market milk and milk products.
- Raw milk: Milk as it is milked from the cow. Also known as raw material milk or fresh milk.
- Market milk: A general name for processed milk sold for the purpose of drinking. It is commonly called "drinking milk", a term which includes milk (using raw milk only, processed to make it hygienically suitable for drinking) and processed milk (milk drinks produced using skimmed milk and other milk products as part of their raw material, in addition to raw milk), but the term "market milk" usually includes these types and milk beverages (products based on milk, with flavors such as coffee or fruit added).
- Aseptic milk: Within the varieties of drinking milk, sterilized milk (white milk) is the norm. It can be stored for around five days at 0~10 ° C. Aseptic milk, commonly known as long-life milk, can be stored for around six weeks at room temperature.
- Milk products: "Milk products" is a broad term covering products made from raw milk, but excluding milk, processed milk and skimmed milk. In this project the term refers to butter, cheese and powdered milk.

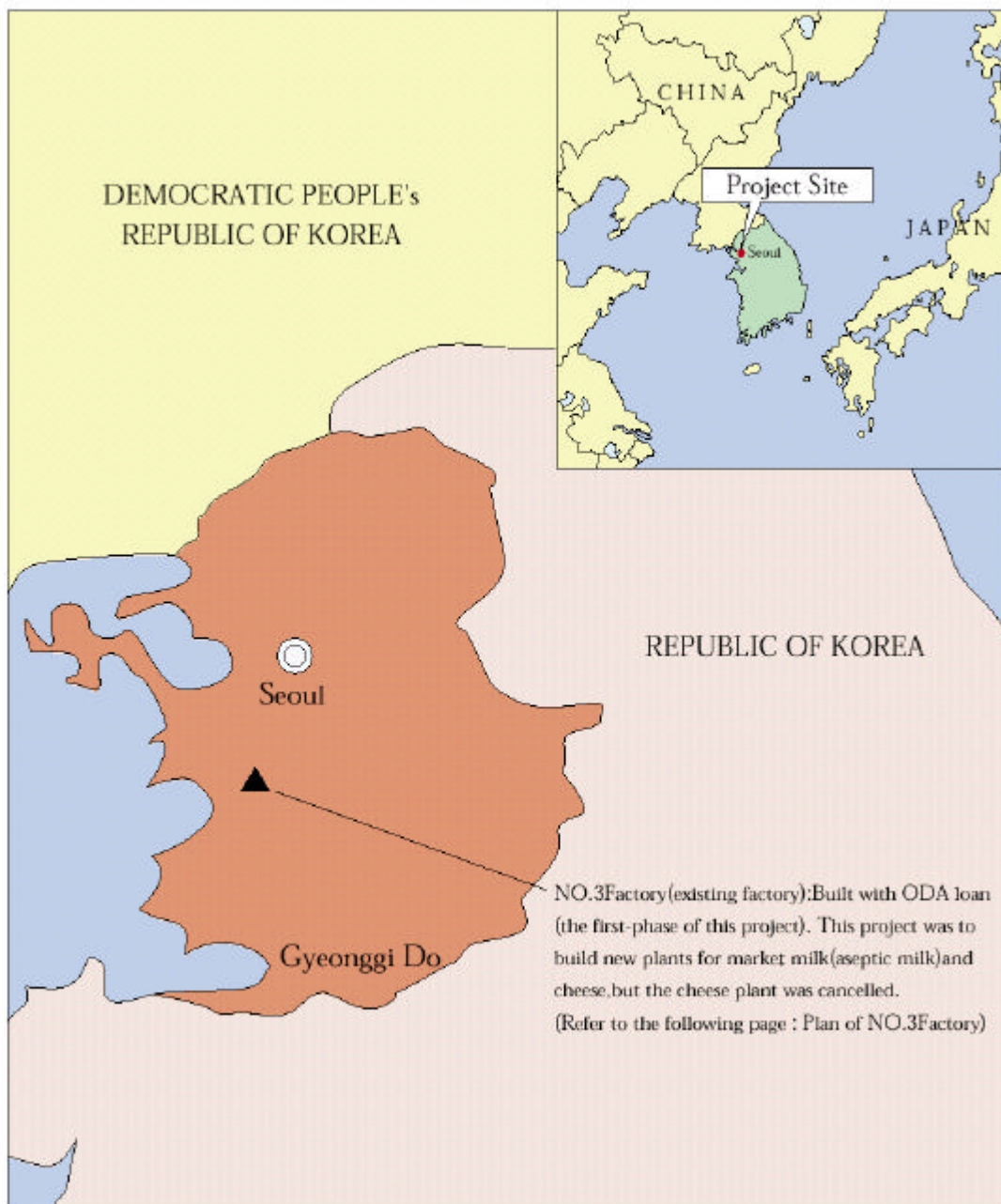
- Powdered milk: A powder removing the water from milk, with efforts to minimize the alteration in the properties of milk. It can be divided by application into home use and business use. Home powdered milk is a powder for drinking and other uses in the home, such as powdered milk for babies, instant cream powder, skimmed milk powder (the raw material for cooking, cakes and yogurt). Business powdered milk is a powder used as the raw material for other products, including milk-related products such as processed milk, milk drinks and ice cream, as well as cakes, bread, pharmaceuticals, animal feed and other products. Business powdered milk is also known as processed raw milk. The powdered milk produced by the Seoul Dairy Cooperative factory which was the subject of this project is all for business use.

Classification Chart

Milk Industry Products	Market Milk	Drinking Milk	Milk	White Milk
				Aseptic Milk (Long-life Milk)
			Processed Milk	
		Milk Beverage		
	Milk Products	Powdered Milk		
		Cheese, Butter, Ice-cream, Yogurt, etc.		

1. Project Summary and Comparison of Original Plan and Actual

1.1 Project Location



1.2 Project Summary and ODA Loan Portion

The purpose of this project were to meet growing demand for milk and dairy products in Republic of Korea and to protect and nurture small dairy farmers.

The initial plan for this project¹ was to expand the capacity of the existing factory in order to increase the raw milk treatment and processing capacity of the Seoul Dairy Cooperative. Specifically, it planned to add a market milk plant (with treatment and processing capacity of 360 tons per day), a powdered milk plant (180 tons) and a cheese plant (30 tons). The No.3 Factory is situated in Gyeonggi Do Ansan city, around 35km southwest of Seoul. It was financed by an ODA loan and completed in September 1991² with a market milk plant capacity of 720 tons per day and a cheese plant capacity of 60 tons per day.

As it was anticipated that the consumption of market milk would go on rising (the prediction was that demand would exceed supply by 1993), the project plan was to fill the demand surplus by expanding raw milk treatment and processing capacity to 570 tons per day, and the project was to be implemented accordingly.

Within the total project cost of ¥3.139 billion, the JBIC loan covered the entire foreign currency portion (¥1.885 billion) and part of the local currency portion (¥563 million).

1.3 Background

1.3.1 The status of agriculture and farmers in Republic of Korea (from the food production and supply side)

(1) The status of agriculture and farmers and their position in policy

Since 1982 the rate of growth in Republic of Korea's agriculture, forestry and fisheries industries has been lower than GNP growth and their share of GNP has been declining (see Tables 1 and 2).

The proportion of the national population who are farmers declined from 20.9% in 1985 to 17.3% in 1988. This is still a high proportion, even though it declines annually. Therefore maintaining the vitality of rural areas is an important policy issue and it is needed to strengthen the country's agricultural base. In the Seventh Five-Year Plan for Economic and Social Development (1992~1996) that was announced in January 1992, just after the follow-up reappraisal, it is clearly stated that increased income for farming and fishing communities and greater investment in those communities are required as policies to promote "structural improvements in farming and fishing communities" to achieve "social equalization and balanced development".

¹ The content of this project was revised twice after the loan agreement was signed. For details, refer to "1.3.3 History of the Project".

² Dairy Farming Facilities Improvement Project, loan agreement signed August 1987.

Table 1 Growth Rate in GNP and Agriculture, Forestry and Fisheries

(Unit: %)

Year	79	80	81	82	83	84	85	86	87	88
GNP growth rate	7.0	-4.8	5.9	7.2	12.6	9.3	7.0	12.9	12.8	12.2
Agriculture, forestry and fisheries	7.4	-19.9	14.3	7.4	7.7	-1.5	3.8	4.6	-6.8	9.0
For agriculture	8.9	-23.8	15.6	10.3	7.9	-2.2	4.4	5.0	-8.0	10.6

Table 2 Composite Ratio of GNP and Agriculture, Forestry and Fisheries

(Units: GNP; 1 trillion won, Others; %)

Year	79	80	81	82	83	84	85	86	87	88
GNP growth rate	31.2	38.0	47.5	54.4	63.8	72.6	80.8	93.4	108.0	125.3
Agriculture, forestry and fisheries	18.8	14.9	15.6	14.7	13.6	12.9	12.8	11.5	10.5	10.8
For agriculture	16.1	12.7	13.4	12.7	11.5	11.0	10.9	9.5	8.6	9.1

Source: 1989 Annual Report on Agricultural Trends for both tables. However, 1988 figures are estimated.

(2) Status of the livestock industry

The share of the livestock industry in the total value of Republic of Korea's agricultural produce rose from 19.1% in 1980 to 27.6% in 1984. The importance of the livestock industry was growing and its continued development was required.

Looking only at the dairy field within the livestock industry, demand for milk and milk products was increasing and dairy technology was advancing, leading to a 2.8-fold increase in the number of dairy cows in the country between 1980 and 1988 (from 173,000 to 480,000). The number of dairy farms doubled over the same period (18,000 to 36,000).

The types of dairy produce were limited by the bottlenecks in distribution. As raw milk and milk products could not be preserved, a large number of dairy businesses, including cooperatives, processed and supplied dairy products regionally within Republic of Korea. However, the volume of production at that time was not able to keep pace with predicted increases in domestic demand and policies were needed to boost processing and treatment capacity. Pressure to open the dairy market to abroad was growing in Republic of Korea and in 1997, the basis for import restrictions would be lost when the country would be removed from the list of countries allowed to prohibit imports of dairy products under GATT18, Article B. Therefore policies to protect and nurture the domestic industry were needed to make domestic products more competitive against imports.

(3) The role of the Seoul Dairy Cooperative (SDC)

The SDC is a cooperative of dairy farmers in the area of Seoul, Incheon and Gyeonggi, comprising 6,963 farms in 1990. It is important for the following reasons:

According to its rules, the cooperative must buy the entire production of its members, which means its members have a reliable buyer for their raw milk. As the cooperative must buy all raw milk produced, regardless of demand, it needed to increase the volume of treatment for surplus raw milk which could be converted into milk powder as a storable form and keep in storage. SDC used its powdered milk processing facilities to bridge the supply-demand gap.

SDC had a high share in collection of raw milk and sales in Republic of Korea. Its membership represented 19.2% of dairy farmers in 1988 and owned 23% of the number of dairy cattle in that year. In 1989, SDC had a 23.5% share in raw milk collection and a 25.5% share in market milk sales by volume. In determining milk prices, SDC acted as the leader of the dairy farmers in summing up the opinion of the Dairy Federation, which is a grouping of dairy-related cooperatives, and in petitioning the government for price revisions. Thus it held an important position as the representative of small dairy farmers nationwide.

The geographical proximity of the factories made it the main supplier of milk and dairy products to Seoul, the main consumption center.

In addition to above, as seen from the fact that the SDC receives support from the Republic of Korean government as a model case, its influence in the Republic of Korean dairy industry is extremely strong. It was anticipated that if SDC could obtain the latest raw milk treatment technology, it would have strong impact throughout the country.

1.3.2 Structural Changes in Food Consumption and the Growing Demand for Dairy Products (from the food consumption and demand side)

With the rise of the national income, the consumption patterns of the Republic of Korean people have been changing rapidly. The consumption of rice, barley and other grains, which were the staple foods, was gradually declining, and demand for products such as milk, dairy products, meat and oils was growing. The annual per capita consumption of milk rose from 1.9kg in 1971 to 31.9kg in 1988, an average annual increase of 19.6%. The total volume of milk used rose from 62,000 tons to 1,351,000 tons over the same period, an average annual growth rate of 21.5%. This trend of rising consumption volume was expected to continue. The estimate of demand made at the time was that in 1991 the per capita annual consumption of market milk would be 48kg, for a total nationwide volume of 2,145,000 tons, and that the per capita annual consumption of milk products would be 19kg, for a total nationwide volume of 867,000 tons. That level of demand would have resulted in increasing demand-supply.

1.3.3 History of the Project

1987	August	L/A signing for “Dairy Facilities Improvement Project ”
1989	August	Preparation of F/S for this project (prepared by Republic of Korea, Agricultural Economy Research Institute)
	November	Formal request by Republic of Korea
1990	Jan. ~ Feb.	Government mission JBIC appraisal mission
	March	Prior notification
	September	E/N concluded
	October	L/A signing
1991	May	(Project completed. Seoul No.3 Factory started operation)
	August	Reappraisal carried out to check changes in project scope
	November	L/A revised ³ (project scope revised: Raw milk treatment capacity reduced from 570t/day to 410t/day)
1995	September	L/A revised ⁴ (project scope revised: Raw milk treatment capacity reduced from 410t/day to 200t/day)
1996	January	Final disbursement date

1.3.4 Need of the Project

In light of the state of production, supply, consumption and demand at the time of the appraisal, there was a need to meet Republic of Korea's domestic increasing demand for milk and dairy products and to protect small dairy farmers. In addition, a previous project (Dairy Facilities Improvement Project) had intention to strengthen the role of the SDC in Republic of Korea and this project was needed to reinforce that effect.

³ The petition to revise the scope of the project was received in June 1991. Under the original scope of the project it was to include the following: a market milk (white milk) plant with treatment capacity of 360 tons/ day, a powdered milk plant (180 tons/ day), a cheese plant (30 tons/ day) and construction of 2,372m² of building. The revised plan called for the following: a market milk (aseptic milk) plant (180 tons/ day), a powdered milk plant (180 tons/ day) (replacement of the condenser at No.2 Factory), a cheese plant (30 tons/ day) (no change) and construction of 3,954m² of building. The change was made because the consumption of market milk slackened off, prompting a review of the demand forecast. Within the overall project cost, the local currency portion increased, but the amount of the loan was not changed. No.2 Factory was built with funds loaned from KfW, and was completed in December 1975. It is located in Gyeonggi Do Young-in city, around 30km southeast of Seoul.

⁴ An application to cancel a portion of the ODA loan unused was received in September 1995. Within the planned scope of the project, the purchase and installation of the powdered milk and cheese plants were cancelled, as was half of the planned purchase of filling and packing equipment for market milk. As demand had leveled off and even the existing equipment was over capacity, any further investment was unnecessary.

There were a total of four projects⁵, including this one, to support the dairy sector in the last period of ODA loans to Republic of Korea (the late '80s, up to 1990), a pattern not seen in loans to any other country. All these projects were formulated on the basis of estimation of future demand that included many unknown factors, and they all had a high probability of alterations in their scope. As mentioned earlier, in Republic of Korea at the time of the appraisal "increased income for farming and fishing communities" and "greater investment in those communities" were urgent and essential tasks to make the country's agricultural produce internationally competitive in the face of internationalization. As these fields were not highly profitable, they required the support of public funds.

1.4 Comparison of Original Plan and Actual

1.4.1 Project Scope

	Plan		Actual	Difference (in comparison with 1990)
	At the time of appraisal in 1990	At the time of appraisal in 1991		
(1) Expansion of raw milk treatment/processing facilities				
• Market milk plant	360 tons/day	200 tons/day	200 tons/day	-160 tons/day
• Powdered milk plant	180 tons/day	180 tons/day	0 (cancel)	-180 tons/day
• Cheese plant	30 tons/day	30 tons/day	0 (cancel)	-30 tons/day
Capacity total	570 tons/day	410 tons/day	200 tons/day	-370 tons/day
(2) Expansion of buildings	2,420m ²	3,954m ²	7,607m ²	+5,188m ²

Source: Materials at the time of appraisal, PCR.

⁵ Dairy Facilities Improvement Project (L/A signed in 1987). Compound Feed Factory Construction Project
(L/A signed in 1990). This project (L/A signed in 1990). Meat Processing Facilities Expansion Project
(L/A signed in 1990).

1.4.2 Implementation Schedule

	1990	1991		1992		1993	
International procurement							
1. Bidding, contract	11		8				
Plan							
Actual			12	3			
2. Manufacturing		9		4			
Plan							
Actual				3		2	
3. Transport, installation					8		
Plan							
Actual						2	3
Domestic procurement							
1. Bidding, contract			1	2			
Plan							
Actual					8	10	
2. Manufacturing				3	7		
Plan							
Actual						11	3
3. Installation					8		
Plan							
Actual						2	3
Civil works							
1. Bidding, contract		7	9				
Plan							
Actual				3	5		
2. Civil works			10		8		
Plan							
Actual				5			4
Test run							4
							5
							6

Source: PCR

1.4.3 Project Cost

Units (Foreign currency: ¥1 million, Local currency: 1 million won)

Item	Plan				Actual		Difference (in comparison with 1990)	
	1990 at the time of appraisal		1991 at the time of appraisal					
	Foreign currency	Local currency	Foreign currency	Local currency	Foreign currency	Local currency	Foreign currency	Local currency
1. Civil works cost	-	1,680	-	2,575	-	3,947	-	2,267
2. Procurement cost of equipment	1,595	1,109	1,616	1,214	843	1,509	-752	400
3. Equipment installation cost	200	40	179	61	100	50	-100	10
4. Import tax, miscellaneous	-	2,512	-	2,250	-	668	-	-1,844
5. Others	-	211	-	540	2	333	2	-207
6. Contingency	90	308	90	332	-	-	-90	122
Total	1,885	5,860	1,885	6,972	945	6,507	-940	647
(For JBIC portion)	1,885	2,680	1,885	2,630	945	3,670	-940	990

Exchange rate: Plan 1 won = ¥0.214 (1990)

Actual: 1 won = ¥0.153 (Average for 1991-93)

Source: PCR

2. Analysis and Evaluation

2.1 Evaluation on Project Implementation

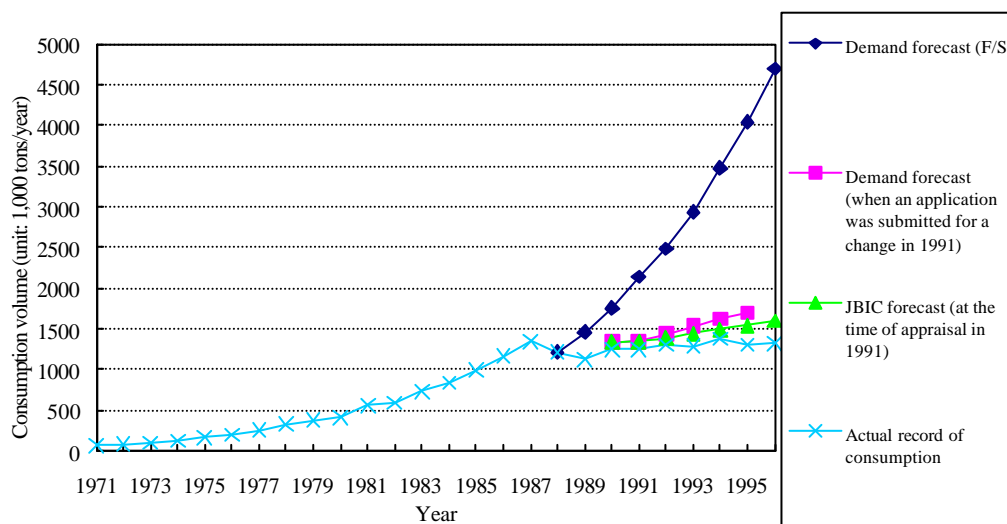
2.1.1 Divergence Between Initial Demand Forecast and Actual Demand

After the L/A for this project was signed in October 1990, an application was submitted in June 1991 for a change in project scope (a reduction in the size of the market milk processing plant). The application was prompted by stagnation in the volume of market milk consumed, which left it far below the initially forecast level of demand. In September 1995, an application was submitted for a further reduction in the scale of the market milk plant and the cancellation of the powdered milk and cheese plants. This step was taken because in the previous few years the demand for milk and dairy products had fallen below even the level of the forecast made in the follow-up study.

In this project, the scope was set on the basis of demand forecasts made before the project was implemented, and the implementation schedule and the project cost was determined based on this scope. Therefore analyzing the reasons behind the divergence between the initial demand forecast and actual developments is a key point of this evaluation.

Table 3 shows the market milk demand forecasts conducted in the appraisal in 1990 and the reappraisal in 1991 and compares them to recorded figures (see the attached table for figures).

Table 3 Demand Forecast and Actual Demand for Market Milk



(Source: Appraisal materials, responses from SDC)

Clearly the demand forecast made at the F/S stage was far too high. This demand forecast used the same method that was applied at the time of the phase one project plan for this project. It is based on estimated disposable income derived from Economic Planning Institute data, and took

into account future growth in per-capita income and population growth rates⁶. However, as a result, actual consumption of market milk corresponding to the first phase project greatly exceeded the forecast made at the time of the appraisal, necessitating a change in the scope of the project (an expansion of the market milk treatment facilities). The same forecasting method produced an underestimate of demand in the first phase and an overestimate in this project. When five hypothetical factors (see Table 5) concerning this demand forecasting method were examined to find whether there were unconsidered factors in this project, the following three factors were found to have been the main reasons for the divergence between the forecast and actual figures.

Per-capita consumption reaching a ceiling.

Changes in population composition were not considered.

Increased imports of dairy products following the Uruguay Round agreement.

Hypotheses	Test result	Factors
Per-capita consumption reaching a ceiling	Connected	Demand in Republic of Korea as a whole
Changes in population composition	Connected	
Demand suppression by rising prices for milk and dairy products	No connection	
Increased imports of dairy products following the Uruguay Round agreement	Market milk: no connection Powdered milk, cheese: connected	Demand for SCD
Reduced role for SDC due to the emergence of private sector operators.	No connection	

Per-capita consumption reaching a ceiling (a limit of per-capita consumption for milk and dairy products)

At the time of the demand forecast, there was no awareness of a possible ceiling in the per capita consumption of milk and dairy products. The consumption of milk was expected to reach 48kg in 1991 and 86kg in 1995. However, as the divergence between the plan and reality

⁶ In general, there are three models for predicting demand for foodstuffs.

The single equation method: The prediction is based on past variation patterns in a time series model, or a regression model is used to explain movements in other factors.

The supply and demand equilibrium model: Both the supply and demand sides are determined simultaneously and a certain balanced state is recreated through variations in price. Food supply and demand tables are used and a range of variables are taken into account in a simulation analysis. This is a suitable model for studying a single product.

The general equilibrium model: Using data on trading markets, labor markets, and consumption trends in the domestic budget, this model predicts overall supply and demand for foodstuffs. It is suitable for analysis of overall trends but it uses highly processed data such as the table of inter-industry relationships, which makes it unsuitable for detailed analysis for individual products.

Of these methods, the phase one project and this project used model [1]. The demand prediction used recorded data for the previous 14 years (1970~1983) together with disposable incomes and prices to calculate the future per-capita demand according to the formula below. The result was modified to give a total demand volume that takes population growth into account.

$$\log_e Z = -17.8774 + 2.9566 \log_e X - 0.0643 \log_e Y$$

Where X = per-capita disposable income, Y = price and Z = demand.

illustrates (Table 4), there is a limit to the amount of milk and dairy products that can be consumed per capita, a fact that was overlooked when the plan was drawn up. In Japan's case, growth in the volume of market milk consumption has been stagnating since it exceeded 35kg in 1985.

Table 4 Forecast and Actual for Per-capita Market Milk Consumption

		1988	1989	1990	1991	1992	1993	1994	1995	1996
Forecast	Demand forecast (1,000 tons)	1,213	1,455	1,749	2,145	2,485	2,937	3,472	4,046	4,696
	Population forecast (1,000 people)	43,073	43,667	44,261	44,856	45,541	46,042	46,631	47,219	47,804
	Per-capita consumption (kg)	28.2	33.3	39.5	47.8	54.6	63.8	74.5	85.7	98.2
Actual	Demand in actual (1,000 tons)	1,213	1,123	1,242	1,247	1,302	1,288	1,377	1,308	1,317
	Population in actual (1,000 people)	42,031	42,449	42,869	43,296	43,748	44,195	44,642	45,093	45,545
	Per-capita consumption (kg)	28.9	26.5	29.0	28.8	29.8	29.1	30.8	29.0	28.9

Changes in population composition (reduction in the young population, who consume more per capita, and increasing numbers of old people)

The rate of population growth was anticipated at the time of the demand forecast, but it is not clear how that information was used in the demand forecast. Even if it was used, the population growth rate did not take into account of changes in the age composition of the population and merely assumed 15.7% growth in the population as a whole between 1985 and 1995. In fact the population only grew by 9.9% over that period. Furthermore, looking at the population in each age bracket, the population under 20 decreased by 14.2% while that over 60 increased by 46.8%. Thus the growth in total population was due to lengthening lifespan, and the growth rate dropped in the young population who consume larger amounts of milk and dairy products. This shift appears to be one factor suppressing demand growth (Table 5).

Table 5 Changes in Population Composition

(Unit: 1,000 people)

CY	Overall forecast	Overall actual record	Below 20	20-59	60 or more
1985	40,806*	40,806	16,713	21,341	2,751
1995	47,219	44,851	14,342	26,473	4,038
Growth rate	15.7%	9.9%	-14.2%	24.0%	46.8%

(The figure for *1985 is actual.)

(From Republic of Korea Statistical Yearbook)

Demand suppression by rising prices for milk and dairy products

The market price for market milk rose by 47% between 1991 and 1997, which is not much higher than the increase in the consumer price index over the same period (39%). Considering the increase in nominal wages over the same period (92%) there appears to have been little suppression of demand by rising market milk prices (Table 6).

Table 6 Price Movements

	1991	1992	1993	1994	1995	1996	1997
Market price for market milk (Won)	850	850	1,150	1,150	1,150	1,250	1,250
Consumer price index *	109.3	116.1	121.7	129.2	135.0	141.7	148.0
Nominal wage index	116.9	135.2	149.9	173.1	190.2	213.5	224.6

(set at 100 for 1990)

(Market price was obtained from SDC.)

Increased imports of dairy products following the Uruguay Round agreement (liberalization of international trade in agricultural produce increased imports of dairy products reducing the required volume of domestic supply)

Since the 1995 Uruguay Round accord, the volume of dairy product imports and exports has grown rapidly. Cheese exports rose from one ton in 1994 to 65 tons in 1995, while imports surged from 3,121 tons to 11,074 tons. For powdered milk, the volume of exports rose from 300 tons to 900 tons between 1994 and 1995 while the volume of imports rose from 27,142 tons to 35,537 tons. The total domestic production volume and the imported volume exceeds domestic demand, reducing the required volume of domestic supply. Therefore the demand for SDC products was reduced.

Nevertheless, while the volume of market milk imports rose from 18 tons in 1994 to 180 tons in 1995, they are restricted by limitations on storage periods, and the share of domestic consumption taken by imported market milk is negligible. Therefore imports could not have been a factor in the divergence between the demand forecast and actual demand for market milk.

Reduced role for the SDC due to the emergence of private sector operators. (A reduction in the SDC's share of total volume supplied by the milk industry)

On the basis that the production volume of milk and dairy products is counted as the sum of sales and inventory volumes, the SDC had a 14.2% share of Republic of Korean domestic production in 1985 and its share grew to 24.7% by 1997. Thus the emergence of other private operators has not diminished the role of the SDC, and demand for the SDC's products has actually risen (Table 7).

Table 7 SDC's Shares

(Unit: ton/year)

CY	Domestic production volume	SDC production volume	SDC share
1988	1,960,985	277,765	14.2%
1997	2,186,456	539,222	24.7%

(Obtained from SDC)

2.1.2 Project Scope

At the time of the appraisal in 1990, the plan called for the construction of facilities with the capacity to treat and process 570 tons of raw milk per day (comprising a 360 ton plant for market milk (white milk), a 180 ton plant for powdered milk and a 30 ton plant for cheese), but after the reappraisal the capacity was reduced to 410 tons (comprising a 200 ton plant for market milk (aseptic milk), a 180 ton plant for powdered milk and a 30 ton plant for cheese). In fact, only the 200 ton plant for market milk (aseptic milk) was constructed. As stated above, the reason for the change was that actual demand fell far below the demand forecast, removing the need for further investment.

On the other hand, the floor space of the constructed building was increased. This change was made because the white milk plant was changed to an aseptic milk plant, enabling longer storage of the products. The warehouse space was increased in order to expand product inventory.

Given that the change in project scope was a response to a slowdown in demand growth after 1988, it was judged appropriate that the scope change was handled flexibly after the L/A was signed.

2.1.3 Implementation Schedule

The schedule at the time of the appraisal was for the civil works to start in October 1991 and to complete in May 1993 (in this project "completion" is defined as the end of trial operation), but

the start was delayed by seven months by the need for a reappraisal concerning the change in project scope. Therefore the civil works began in May 1992 and were completed in June 1993 (a reduction of six months in the construction period). The construction was completed before the demand season (March to September in Republic of Korea) ended by efforts of SDC. The construction period, including the civil works and the procurement of equipment, was shortened because SDC used the minimum tender invitation period (45 days rather than the 90 days usually used) and had the contractors work two shifts a day on the installation of the equipment.

In Republic of Korea the winter period between mid December and end of February is generally avoided for civil works, because possible congelation of water in concrete makes concrete fragile which may lead to inferior quality of the buildings constructed in winter. However, SDC agreed with the contractors to continue working through the winter, which shortened the implementation schedule. The person in charge of the factory stated that there had been no significant problems on the quality of the building, at the field survey.

2.1.4 Project Cost

The total cost of this project was planned to be ¥3.139 billion (for which the JBIC loan would be ¥2.448 billion), but the actual total cost was ¥1.943 billion (with the JBIC loan of ¥1.507 billion) (see 1.4.3). This substantial cost underrun was largely due to the reduction in project scope. Looking at individual cost items, the cost of equipment procurement was around ¥600 million less than the plan. The reduction occurred because the initial plan called for four machines for filling 200ml cartons and two for 1,000ml cartons, but the final order was halved to two and one respectively. The cost of customs duties and miscellaneous expenses was around ¥400 million less than estimated, mainly because of the reduction in procurement of imported equipment. Conversely, the cost of construction using local currency actually increased due to expansion of the factory building space.

The disbursement of JBIC's loan was as shown in Table 8, which compares the plan with actual execution. The loan was disbursed ahead of schedule to keep pace with the progress of construction.

Table 8 Loan Disbursement Plan and Actual

(Unit: ¥1 million)

Year	Plan	Actual
1992	518	1,005
1993	1,734	422
1994	187	79
Total	2,448	1,507

The final loan disbursement was made in September 1994, over a year after the completion of the construction. This was due to the one year guarantee period with the contractors, after some final adjustment. The completion of loan disbursement was confirmed on 9th January 1996, but in fact all disbursement was complete by 16th September 1994. At that stage the construction of the powdered milk and cheese plants were still scheduled to take place, so the loan was not treated as complete. The L/A revision concerning the cancellation of the remaining facilities was made in December 1995.

2.1.5 Implementation Scheme

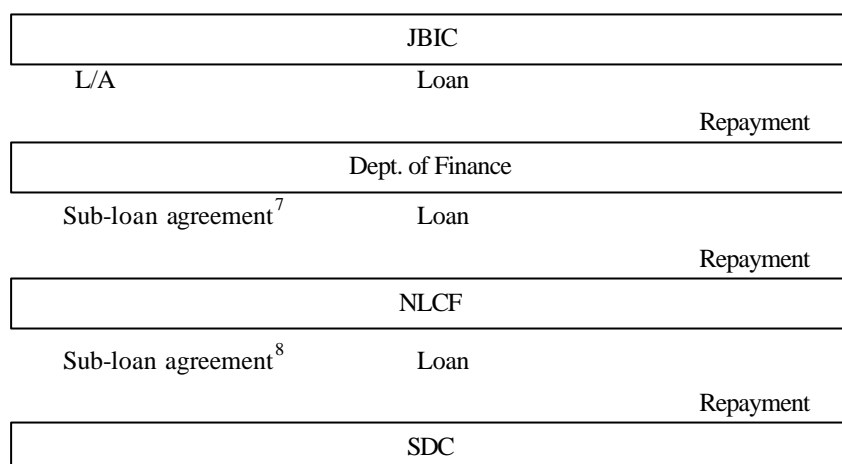
(1) Executing agency

The executing agency for this project was the Seoul Dairy Cooperative (SDC), but as SDC is under the authority of the National Livestock Cooperatives Federation (NLCF), the official documents etc. describing the name of executing agencies were made in the name of NLCF (the same arrangement was used to carry out phase one of this project. The specimen signature and evidence of authority were furnished by the NLCF general manager). As for procurement, the tender announcements were made in the name of NLCF, but the contracts were signed by SDC. No consultants were employed for this project and SDC prepared all tender documents and evaluated the bids. SDC already had experience of building two dairy factories under KfW loans (No.1 and No.2 Factories) and one under an JBIC loan (No.3 Factory) and at the time of the appraisal, no significant problems were found in any of its work, including tender-related operations. There was no problem with the procurement process either.

The departments in charge of the implementation in SDC and operation of this project were as follows: The construction project section was responsible for overall plan formulation for the project, the loan administration and the international tendering administration. The engineering section was responsible for the basic design of the facilities and their processes, and for supervision of the installation. The construction section was responsible for the basic design for the civil works and for the supervision of their execution. These tasks were carried out as planned at the time of the appraisal, without any problems. The construction section has now been incorporated into the engineering section.

The flow of funds for this project was as shown in Figure 1.

Figure 1 Mechanism of Subrent



Of the ¥3.139 billion required for this project, the JBIC loan covered the entire foreign currency portion (¥1.885 billion) and ¥563 million of the local currency portion, for a total of ¥2.448 billion. The ODA loan funds were transferred to the borrower, the Republic of Korean government, before being lent to the NLCF, which manages and supervises the SDC. The NLCF converted the funds from Yen to Won and further lent it to the SDC, which is the executing agency. However, it was confirmed at the time of the appraisal that the SDC bears exchange risks (at the time of repayment the SDC, must pay an amount of Won equivalent to the Yen-based loan at the exchange rate of the time), and that the SDC and the NLCF had made the necessary arrangements for the local currency funds that would not be covered by the JBIC loan⁹.

No problems arose in the tendering, the procurement, the flow of funds or any other aspects of the implementation of this project, which indicates that the executing agency performed well.

⁷ Sub-loan in Yen. The repayment conditions were the same as the ODA loan conditions, but a handling charge of 0.05% of the sub-loan capital was paid by the SDC to the Department of Finance via the NLCF.

⁸ The Yen were converted to Won and executed sub-loan. The repayment conditions were the same as for the ODA loan, but repayment was made in Won equivalent to the Yen-based amount of the loan using the exchange rate at the time of the conversion. As for a handling charge, 0.8% of the sub-loan capital was paid by the SDC to the NLCF.

⁹ Of the 5.86 billion Won domestic currency portion, the ODA loan from the JBIC covered 2.63 billion Won. The remaining 3.23 billion Won was covered by the SDC's own funds. The funds were provided from a standing fund provided by a levy of 7 Won per kilo of raw milk paid by all cooperative members when they deliver milk to the SDC. There was some opposition from cooperative members when the levy was imposed for the standing fund, but the dividend paid at the end of the term after the completion of the project was increased, and in the end the arrangement was welcomed by the membership.

Also, even if the SDC fell into financial difficulties, it would be able to receive subsidies (with mandatory repayment) for some or all of the funds it needed from the NLCF and the government, which are obliged to support the SDC's projects.

(2) Consultants

No consultants were employed in this project. The technical advisers who had been employed in phase one of this project were not appointed either. This was the case because it was judged at the time of the appraisal that no consultants were required, considering the SDC's past experience, its organization, and the content of the project (an extension to some portions of existing facilities).

The SDC and the contractors were able to handle the design and supervision of the equipment and buildings in the implementation of this project without any problems, indicating that there was no strong need to employ consultants.

(3) Contractors

This project contained two procurement packages (the treatment plant and three packing machines). The suppliers provided the detailed designs for the project, delivery and installation of the equipment and materials, and provided training, monitoring and maintenance operation for one year after completion.

The treatment plant order was determined by international competitive tender, where four companies have participated. One company was disqualified for incomplete bid documentation, and the other three were all deemed technically satisfactory after technical evaluation. Therefore the order was awarded to the Danish company which presented the lowest price.

The packing machinery order was also determined by international competitive tender, but only one company responded. Even at the retender, there was still only one response, from a Singaporean company, which was finally awarded after having confirmed that there were no technical problems.

The construction of buildings and installation of the tank facilities were contracted to Republic of Korean companies which handled the construction of the aseptic milk facilities, the electrical works, and the construction of the waste water treatment facilities. The procurement was arranged by limited domestic tender. The construction of the buildings were completed before the equipment was procured and the performance of the contractors was good.

The contractors were evaluated by the executing agency for their technical and managerial abilities, and the contractors caused no construction delays, managing instead to shorten the implementation schedule. Therefore their overall performance was good.

2.2 Evaluation on Operations and Maintenance

2.2.1 Operations and Maintenance

(1) Operations and Maintenance Scheme (at the time of appraisal)

No.3 Factory is responsible for the operation and maintenance of the project after its completion.

The management of the factory as a whole is handled by the management section.

The maintenance of the engineering work facilities and major repairs are the responsibility of the engineering work section.

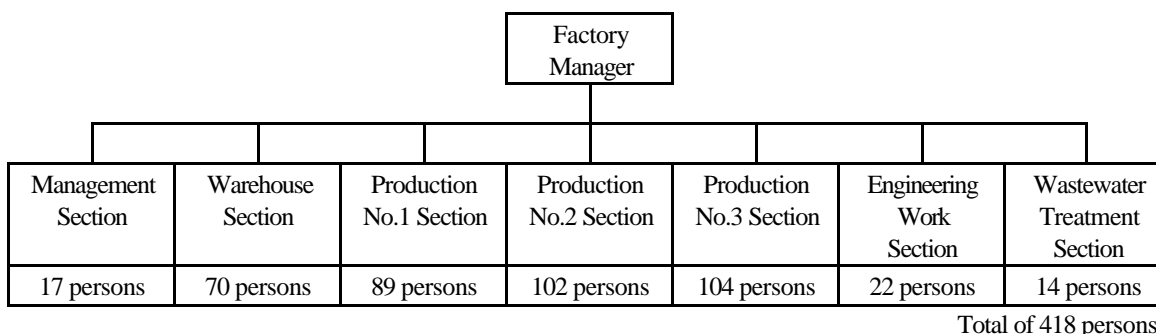
Daily maintenance of the various production facilities is handled by maintenance teams in each production section.

The basic skills needed for the operation and maintenance of this project were already in place. In the course of phase one of the project, two staff were dispatched to Denmark where they completed a course of training in the operation of the central computer control system (four more have been dispatched to Denmark and four to Japan). For new skills needed for this project, the plan at the time when the contract was signed was that two or three workers would be chosen from each production line to learn the equipment operation and management skills before the factory went into operation. This arrangement was planned to allow all staff concerned to operate and manage the equipment rapidly after its installation.

(2) Operations and Maintenance (Present Situation)

No.3 Factory, which was the subject of this project, comprises a market milk plant with the capacity to treat 920 tons per day of raw milk, and a cheese and butter plant with a capacity of 60 tons per day. The factory now has 418 workers under the factory manager, a considerable increase from the 271 workers at the time of the appraisal (organization of No.3 Factory is as shown in Figure 2). Table 9 shows the operational status of each market milk processing plant after the completion of No.3 Factory.

Figure 2 Organization Chart of the Current No. 3 Factory



(Source: SDC, 2-shift per day system was employed at Production Section then.)

Table 9 Operational Status of No. 3 Factory

	1989	1990	1991	1992	1993	1994	1995	1996	1997
Annual operation days (no. of days)	189	362	362	362	362	362	362	362	362
Raw milk processing volume									
1,000 tons/year	58	140	147	155	155	166	170	187	199
Ton/day	317	383	403	426	426	461	469	516	549
Facility capacity (ton/day)	360	360	720	720	720	920	920	920	920
	Phase I Project					Phase II Project			

(Source: SDC)

No.3 Factory, including the market milk plant built under this project, works two shifts every day, excluding three holidays. Between June and September, when demand is at its highest, the factory operates at full capacity with three shifts per day. The process from receipt of the raw milk to the completion of processing is computer controlled by trained operators, and the workers receive on-the-job training in their tasks. There are two main changes from the situation at the time of the appraisal.

- ◆ The production section, which had 149 workers at the time of the appraisal, has been split into three sections with a total of 261 workers.
- ◆ At the time of the appraisal, the treatment of waste water was handled by the engineering work section, but an independent waste water section has since been established with 14 workers to handle that task (the environmental aspects of this project will be discussed later in this report).

The factory is largely automated and operates efficiently. In 1998 the SDC dispatched study missions to dairy facilities in Northern Europe and Japan (Hokkaido) to study ways of installing equipment in less space and operating it with fewer workers, which is a commendable effort to improve operation and maintenance efficiency.

2.2.2 Financial Position of the Executing Agency

As has already been indicated in the evaluation report for phase one of this project, dairy companies generally run at low levels of profit. The table below examines the ratio between revenue and ordinary profit as an indicator of profitability and compares the SDC against representative Japanese counterparts. They show much the same low level of ratio due to the low profitability of market milk, which is main source of revenues. There is little profit in market milk because the cost of raw materials, including the purchase price of the raw milk, takes a large share of the price of the product (around 80% in the SDC's case), and because milk is a product with little added value. Table 10 shows the recorded figures for 1988, before the completion of No.3 Factory, but the basic trends remained the same after it was completed.

Table 10 Ratio Between Revenue and Ordinary Profit of Dairy Companies

(1988¹⁰, Unit: %)

SDC	Snow Brand Milk Products Co., Ltd.	Meiji Milk Product Co., Ltd.	Morinaga Milk Industry Co., Ltd.
1.4%	3.5% ¹¹	1.8%	2.0%

(Source: SDC's balance sheet, 3 Japanese companies are from "Practical Knowledge of Milk and Dairy Products IV Edition", editing by Toru Takao, Toyo Keizai Shinposha)

Since 1993, when this project was completed, SDC have been making steady profits. Profit in each term is steady, and as far as can be judged from their profit and loss movements, there will be no problems with the future continuation of the SDC's business. The SDC's audits are carried out by internal auditing procedures.

2.2.3 Environmental Impact

The environmental impact that must be considered in this project concerns the quality of the waste water produced. The treatment capacity of the existing waste water treatment facilities was around 1,800 tons per day, and it was planned that the same facilities would be used unchanged after this project. It was decided that the existing plant would be adequate to meet the factory's needs even after it was expanded by this project, for the following reasons:

No significant problems were observed in the existing facilities.

No significant problems were observed in the quality of the waste water.

The anticipated volume of waste water was within the treatment capacity of the existing facilities.

The volume of waste water after the project was executed was 1,800 tons per day, exceeding the volume of 1,700 tons per which was estimated at the time of the appraisal, but it was still within the existing treatment capacity. The reason why the water volume was higher than expected even though the scope of the project was reduced was that the SDC bought a cheese plant with its own funds¹².

According to Republic of Korean regulations, waste water discharged to rivers after treatment must have BOD of 50mg/l or less. This posed no problem as the treated water from the factory was not above 10mg/l. In 1996 the SDC bought two air injectors with its own funds to improve

¹⁰ Figures for Japanese companies are for Japanese accounting years.

¹¹ The profitability of Snow Brand Milk Products Co., Ltd. is higher because market milk is a smaller proportion of their sales, and highly profitable margarine is a higher proportion.

¹² This project was finished with a smaller scope than planned, but a field survey in 1994 found that the SDC had bought a cheese plant with its own funds while a portion of the loaned funds remained unused. The reason they gave was that they had to buy the plant to meet rapidly growing demand for Mozzarella and they judged that the procurement procedures for buying the plant with an ODA loan would not allow them to build the plant fast enough.

the treatment system.

The paper milk cartons used for school meals are collected after use and treated at a facility in No.3 Factory for reuse in order to make effective use of resources.

2.3 Project Effects and Impacts

2.3.1 Quantitative Effects

(1) Increased raw milk reception volume

As Table 11 shows, this project increased the volume of raw milk received by the SDC No.3 Factory.

Table 11 Volume of Raw Milk Received by SDC Factory

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
No. 1 Factory	143	115	121	123	125	126	133	131	140	160
No. 2 Factory	215	175	100	103	105	105	110	132	138	143
No. 3 Factory	-	98	181	185	188	190	199	203	214	221

(Source: Responses from SDC.)

(2) Financial internal rate of return (FIRR)

The FIRR for this project was planned to be 13.7%, but figures produced by the SDC indicate that the actual FIRR is 8.6%, 5.1 points lower than the plan. The difference can be explained by the fact that the FIRR was calculated on the basis of forecasts for the period 1991~2002, while the figures from the SDC were for the shorter period from 1992 to 1997. Supposing the cash flow recorded in 1997 remains unchanged until 2002, the FIRR will be 24.2%.

(3) Job creation

The Production No.3 Section now employs 104 workers in two shifts. Of these, 20 were new jobs created by this project's expansion of the milk treatment facilities. The factory works on a round the clock, three shift basis from June to September, which creates a further ten seasonal jobs.

2.3.2 Qualitative Effects

(1) Strengthening dairy farming base

As Table 12 shows, the SDC's share in Republic of Korea's total number of dairy farms and dairy cattle is rising every year. Table 7 in section 2.1.1 showed that the SDC's share in the Republic of Korean market for milk and milk products is also rising, but the implementation of this project gave SDC members a dependable buyer for their raw milk, which might have lead to strengthen SDC's management capacity.

Table 12 Number of Dairy Farms and Dairy Cattle

		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
No. of dairy farms	(Republic of Korea)	35,713	36,040	33,277	30,150	27,965	28,219	25,667	23,519	21,129	17,419
	(SDC)	6,864	6,963	6,915	6,231	5,834	5,750	5,769	5,418	4,946	4,784
(SDC/Republic of Korea) (%)		19.2%	19.3%	20.8%	20.7%	20.9%	20.4%	22.5%	23.0%	23.4%	27.5%
No. of dairy cattle (1,000 cattle)	(Republic of Korea)	480	515	504	496	508	553	552	553	551	544
	(SDC)	91	101	108	110	113	121	126	126	134	147
(SDC/republic of Korea) (%)		19.0%	19.6%	21.4%	22.2%	22.2%	21.9%	22.8%	22.8%	24.3%	27.0%

(Source: Responses from SDC.)

(2) Increased income for dairy farmers

The production volume and demand for raw milk varies seasonally¹³, and while other private sector dairy companies may suspend further reception of raw milk if a production surplus appears likely, the SDC regulations guarantee members a stable receipt and income. The income which a dairy farming household can earn in a year from raw milk production is as shown in Table 13, which indicates that their income is rising.

¹³ Raw milk surpluses are particularly common between August and December when no milk is supplied for school dinners.

Table 13 Changes of Income per Dairy Farming Household

Year	88	90	92	94	96	97
Raw milk purchase price (W/kg) (A)	322	364	383	394	455	454
Annual production volume (x million W) (B)	358	402	418	442	492	519
Income from raw milk (x hundred million W) (A × B)	1,153	1,463	1,601	1,741	2,239	2,356
Number of dairy farming households (household) (C)	6,864	6,915	5,834	5,769	4,946	4,784
Income per household (1 million W) (A × B/C)	16.8	21.2	27.4	30.2	45.3	49.3

(Source: Responses from SDC.)