Korea

Meat Processing Plant Construction Project

Report Date: September 2001
Field Survey: July 2001

1. Project Profile and Japan's ODA Loan

Project Site Map：Kimje City, Korea

Project site: Kimje Pork Processing Plant

1.1 Background

Since 1980s, meat consumption in Korea increased substantially. Particularly demands for processed meat was remarkable in comparison to unprocessed meat, , which was more hygienic and easier to prepare for the table. As for pork and pork-processed products, the production capacity of the private sector was far below the domestic demands.

On the other hand, the volatility of the pork prices was high and the needs for the price stabilization operation through controlling the demand and supply were imminent to cope with expected further increases in the pork production. To cope with the situation, the government of Korea requested Japan to cooperate for this project.

1.2 Objectives

The Project is to construct a meat processing plant for meeting the rapidly increasing demands for meat processed products, for building up further capacities to control demands and supplies of pork and for providing the small and medium size pig raising farmers with a reliable sales channel.

Table 1: Actual demands (1984-88) and demand estimates (1990-2001) for pork and pork processed Products (secondary products)

(Unit: ton in thousand)

Year	1984	1985	1986	1987	1988	1990	1991	1996	2001
Pork Consumption	340	346	320	373	425	505	531	679	925
Of which processed secondary products	8[1)]	14[1)]	15[1)]	19[1)]	33[1)]	48	58	144	360

source：JBIC documents
1): Actual production

1.3 Project Scope

The Project is to construct a meat processing plant in Kimje city, Jeollabuk-do. The plant constructed by the Project (the Project Plant) is capable of producing 50 tons/day (processed product of first order, 24 ton/day, secondly, 26 ton/day) of pork processed products and is equipped with pig

slaughtering facilities, which has a daily capacity of 2000 heads.

The ODAloan covered all the costs of meat processing equipment that were to be procured with foreign currencies, and all the costs of machines and materials, which were to be procured with local currency, that were to be used for the pig slaughtering facilities and the effluent treatment facilities.

1.4 Borrower/Executing Agency

The Government of the Republic of Korea / National Agricultural Co-operatives Federation (NACF) (Formerly National Livestock Cooperatives Federation)

1.5 Outline of Loan Agreement

Loan Amount/ Loan Disbursed Amount	1,728million yen/1,386million yen
Exchange of Notes/ Loan Agreement	September 1990/ October 1990
Teams and Conditions Interest Rate Repayment Period (Grace Period) Procurement	 4.0 % p.a. 25 years (7 years) General untied
Final Disbursement Date	January 1996

2. Results and Evaluation

2.1 Relevance

The Project was planned to meet rapidly increasing demands for meat-processed products by constructing a meat processing plant. In 1988, per capita daily pork consumption was 10.1kg. The rate of consumption increased year by year thereafter, and it came up to 15.3kg in 1996. The actual consumption in 2000 was 16.5kg. The annual demands for pork processed secondary products reached 120,000 ton in 1996, close to the demand estimate, and annual demand figures continued to remain at that level thereafter. Judging from the demand and supply situations at the time of project appraisal and thereafter, the Project is justifiable from a point of view of reducing gaps existing between the demands and supplies.

On the other hand, the price stabilization function through demand supply control operations was limited to the indirect role through the storage for plant operation. The Project was to provide a reliable sales channel for small and medium size pig raising farmers. But the present state of purchase of pigs by the Project Plant is way off the original vision of the Project to purchase pigs extensively from small and medium side pig raising farmers. According to the Executing Agency, due to foot and mouth disease or so, it became necessary to select the farmers based on the quality, contracted farmers became less than 400 and most of them were not small and medium size farmers. Therefore, relevance of the project decreased in terms of providing the stable sales cannel. Notably, the Government disowned the “Fostering and Development Plan for Processing Industry in Agriculture, Forestry and livestock” policy which was adopted in 1988 to assist producers' organizations

2.2 Efficiency

There was a delay in the start-up of civil work construction from January 1991of the original plan to October 1992 since it took longer time for selecting consultants, etc. The installment of equipment was to be completed by the time of completion of civil work construction but it also delayed. In addition, there arose a four-month gap between the completion of the equipment installment and the start of test run. As a result, the Project came to completion in July 1995, a 32-month delay from the original target of November 1992. The implementation itself took 33 months as against the planned duration of 22 months. The details of the plant and equipment underwent some changes reflecting the results of in-depth investigations and surveys. Among the major changes were a reduction by half of cold storage capacity, a

50% increase in effluent treatment capacity, an expansion of plant area by 50% and increases in processing capacities for various products.

As for the project costs, the actual total expenditure amounted to 4,853million yen (Foreign currency costs: 908million yen, Local currency costs: 3,945 million yen) whereas the estimated total project costs in the original plan was 5,488 million yen (Foreign currency costs: 1,250million yen, Local currency costs: 4,238million yen). The total cost of civil work construction increased to 250% of the original estimate but there were no cost over-runs in terms of the total project costsdue to the depreciations of Won against Yen, substantial reduction in procurement prices of imported equipment and land acquisition in comparison to the original estimates.

2.3 Effectiveness

(2.3.1) Production Records

The Project envisaged to increase gradually the operation rates after the commissioning of the Project Plant and to achieve the target performance (115%) in the forth year (1996) after the commencement. Table 2 shows the operation rate hit 97% in the forth year (1998) after the commencement, thus more or less achieving the planned target of 2000 heads per day. On the other hand, secondary processed products increased more slowly and kept increasing up to as late as year 2000.

Table 2：Production Records

Item	Plan	Installed Capacity	Actual Production					
			Commencement (1995)	2nd year (1996)	3rd year (1997)	4th year (1998)	5th year (1999)	6th year (2000)
Meat Processing Plant								
-Processed Products of first order								
a) Cut meat	10MT/day	100MT/day	} 8	} 21	} 37	} 83	} 75	} 59
b) Packed meat	14MT/day	18MT/day						
-Secondary Processed Products								
a) Ham	9MT/day	18MT/day						
b) Sausage	9MT/day	11MT/day	} 0.5	} 2.7	} 6.6	} 12	} 18	} 28
c) Bacon	4MT/day	0.6MT/day						
d) Canned meat	4MT/day	6.5MT/day						
Slaughter Facility								
Record	2000heads /day	2000heads /day	444	960	1437	1943	1875	1812
Operation	8 hours /day		8	8	8	8	8	8
	300days /year		150	300	300	300	299	298
Operation Rate[1)]	115%(1996)		19	48	80	97	94	91

Source: Meat Processing Division, National Agricultural Cooperatives Federation (NACF)

1): Operation rate is the percentage ratio of actual heads slaughtered to those that are planned.

(2.3.2) Demand and Supply of Pork and Pork Processed Products (Secondary Products)

In the original plan, the slaughtering facilities were to process 2000 heads per day, and 600 out of those 2000 were to be taken directly to the market in the shape of halved body with bones. The half of the remaining 1400 were to be for the first order processing, i.e. cut meat and packed meat, and the other half were to be for the secondary processing such as hams and sausages. According to Table 3, demands for pork and pork processed secondary products increased by year 1996 to the level comparable to the targets set in the original plan, but the demands stagnated thereafter. The supplies of pork processed secondary products well met the increasing demands. The private sector increased its production capacities of secondary products to an unexpected extent in a rather short period of time; even if the capacities of the plants at the planning stages were included, the supply capacity of the private sector was assessed in year 1989 to be around 59,000 ton[1] per year.

[1] Excluding the capacity of the Project. The capacity of the Project is about 11,000 ton as is built.

Table 3：Demand and Supply of Pork and Pork Processed Products (Secondary Products)

(Unit：,000ton/year)

		Commencement (1995)	2nd year (1996)	3rd year (1997)	4th year (1998)	5th year (1999)	6th year (2000)	7th year (2001)
Demands for Pork	Plan		679					925
	Actual	662	697	698	701	755	780	
Demands for Pork Processed Secondary Products	Plan		144					360
	Actual	115	120	121	109	113	128	
Supplies for Pork Processed Secondary Products	Actual	116	119	121	107	115	130	
Pigs slaughtered by the Project (,000heads)	Plan	300	420	540	600	690	690	690
	Actual	60	288	431	583	561	540	
Processed First order Products by the Project	Plan	3.6	5.0	6.5	7.2	8.3	8.3	8.3
	Actual	-	10.1	17.7	24.8	22.5	17.7	
Processed Secondary Products by the Project	Plan	4.0	5.5	7.1	7.9	9.1	9.1	9.1
	Actual	-	1.0	3.0	3.6	5.5	8.3	
	%[1)]		0.8	2.5	3.4	4.8	6.4	

1) A percentage ratio of Processed Secondary Products by the Project to supplies for Pork Processed Secondary Products both in actual figures.

Source: Figures in Plan are from JBIC documents. Commencement year planned for 1992 was adjusted for 1995. Figures in actual are from Meat Processing Division, NACF

The number of pigs slaughtered in the Project Plant increased rapidly up to year 1998. In line with this performance, outputs in the first order processed pork products, i.e. cut meat and packed meat, increased far exceeding the targets set for each year up to 1998. Behind those data, there existed a statistical categorization adopted by the Project Plant, in which all the exported products, (export started in 1996), including those in the shape of un-processed halved bodies, was categorized as the first order processed pork products. About 50% of the pigs processed annually in the slaughtering facilities were exported in one form or another when the export reached its yearly peak. The export, however, is now suspended because of the incidence in year 2000 of foot and mouth disease among the pigs. Outputs in pork processed secondary products by the Project Plant reveal steady increasing trends notwithstanding stagnating overall demands in the latter half of 1990's for the secondary products of pork. The increasing trends understandably reflect increasing demands particular to the secondary products by the Project Plant due to the consolidating consumers' confidence in the quality of the products and the prevailing brand image of the Project Plant.The original plan envisaged 6% plus[2] for the share of the Project Plant in the pork processed secondary products market in year 1996 when the Project Plant would start running with full capacity. The actual share in year 2000, i.e. 6.4%, is safely said to be within the limit.

(2.3.3) Internal Rate of return

The financial rate of return (**FIRR**) was recalculated to be 1.3% while the original rate confirmed at appraisal was 7.0%. Probable contributing factors to this decline in **FIRR** are poor operational performance in the years following the commencement of commercial operations, i.e. the balance of the revenues such as sales net of the expenses such as manufacturing costs became negative, and the about 50% increase in the investment costs in terms of Won compared with those in the original plan. Conditions for the recalculation are shown below.

2 Planned production by the Project Plant of secondary product: 9100 ton. Estimated overall demands for secondary product: 144,000ton. The computed market share: 6.3%=9.1/144

(Recalculation Conditions)

- Project Life: 8 years
- Benefits: Sales revenues of products
- Costs: Plant construction costs, replacement costs of machineries and equipment, and costs of sales and general administration.

2.4 Impact

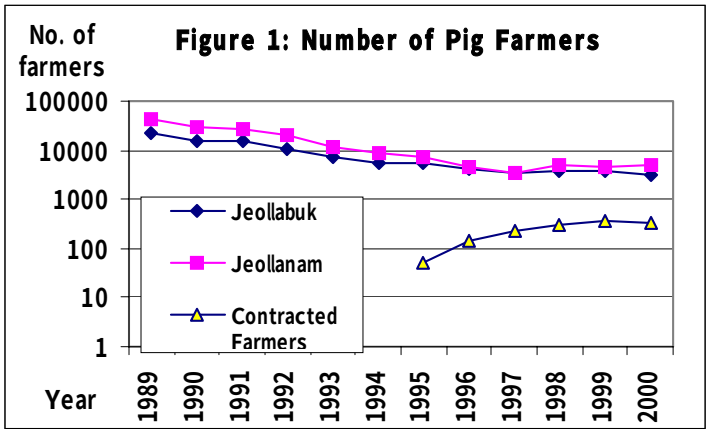
(2. 4.1) Impact on price stabilization of pork

The Project Plant is managed based on the mission to provide the consumers with quality pork and pork products while enabling the pig raising farmers to earn stable incomes. The Project Plant provides in a package all the materials, goods, and services such as pigs for insemination, exclusively prepared feed, chemicals, or programmed extension services on how to raise pigs, to the so called "keiretsu," or federated farmers on a contract basis (contracted farmers) and at the same time purchase all the pigs the contracted farmers raise on the prices set by the purchase price formula. The purchase price formula is worked out so as to set the purchasing prices depending on the quality of the pigs based on the prices of the graded halved body of pigs, on which transactions are made in the wholesale markets in Seoul. This formula is adhered to even in winter when pig-raising farmers bring more pigs to the markets. This consistency in the price setting method, together with the policy to purchase all the pigs from the contracted farms contributes to the stabilization and mitigation of seasonal variance of pig prices. Just for reference, in year 2000, 26% of the pigs shipped in Jeollabuk-do are slaughtered in the Project Plant; for Jeollanam-do 25%, and chungcheon-do 5%. The Project Plant equipped with cold storage facilities is part of line of works and facilities for pig slaughtering and pork processing and it is not for the purpose of reserve storage. Therefore, the impacts of the Project on the price stabilization are limited to those that are brought about through the operation and the pig purchasing of the Project Plant.

(2.4.2) Impact on pig raising farmers

Figure 1 shows that the numbers of farmers that raised pigs had decreasing trends in both Jeollabuk and Jeollanam-does while the number of contracted farmers had steady upward trends up to1999 from the start of operation in 1995. The Project Plant concluded contracts with 50 farmers in the first year of operation and through the efforts made to recruit farmers for contract, the Project Pant came to conclude contracts with 364 farms in 1999. The number, however, decreased in year 2000 as a result of contracted farmers attrition by applying performance criteria of attaining quality standards with respect to their raised pigs. The attrition was due because the incidence of foot and mouth disease led to suspension of export and resulted in the decrease in the number of pigs to be slaughtered in the Project Plant. There was a positive outcome of the attrition of the contracted farmers. The Project Plant was then in a position to purchase only quality pigs and thus became capable of producing processed goods of international quality standards. The attrition thus plays a good part in establishing and upholding the good brand image of the products of the Project Plant. As a result, the contracted farmers are not by any means small and medium size pig raising farmers in the locality. The choice made as to the pig procurement is deemed inevitable for securing stable supply of quality main input material, but there is no denying such a choice is a deviation from the business model drawn up in the original plan to purchase pigs from small and micro sized pig raising farmers.

Contracting with the Project Plant certainly bring benefits to contracted farmers through securing a reliable off-taker of the raised pigs and realizing more stable sales prices of the



Source: Meat processing division, NACF

pigs. In addition, contracted farmers further gain through reducing risks and costs involved in shipping their pigs to the Seoul markets rather than the Project Plant; they are losses in pig weight, death, incremental transportation costs, etc.

(2.4.3) Impact on the environment

The Project Plant taps all the quantity of water used in the plant from the groundwater aquifers. Shortly after the commencement of commercial operations, complaints were raised by the neighboring communities about the drying-ups of wells for drinking water and shortage in agricultural water. As for drinking water, the Project Plant dug a well for communal use and provided alternative pipelines to supply water. The problems with agricultural water were resolved by Kimje city at the request made to the city. On the other hand, all the effluent from the Project Plant is fully treated by the treatment facilities that have the capacity 50% greater than the original plan. Only the treated water is discharged and consequently, the targets of quality indicators are safely cleared as shown in Table 4 by the measured values taken on the discharged water

Table 4：Quality of discharged Water

Tracers	Unit	Targets	1995	1996	1997	1998	1999	2000	2001
PH		6-8	7.0	7.0	7.1	7.1	7.2	7.2	7.2
BOD5	mg/l	30	20	18	11	11	12	13	14
COD	mg/l	40	30	18	19	19	20	22	22
SS	mg/l	60	10	10	1	1	2	2	3
N-H	mg/l	25	0.7	0.2	0.2	0.3	0.3	0.4	0.4

Source: Meat processing division, NACF

2.5 Sustainability

(2.5.1) Operation and Maintenance

National Livestock Cooperatives Federation (NLCF) merged with National Agricultural Co-operatives Federation (NACF) on the first day of July 2000. The businesses formerly managed by NLCF comprise after the merger of the livestock economic business department of NACF. The meat processing division of the said department manages the Project Plant as part of the livestock economic businesses. The organization of the Project Plant has four divisions and one room and is staffed by 419[3] persons including the general manager. For the maintenance of the machineries and equipment, the Project Plant employs 29 qualified engineers in total having national certificates of engineering and practical work experiences of 5years or more in such professional fields as electricity, boilers, machineries and equipment, cold storages, etc. In addition, a couple of engineers are sent every year to outside specialized institutions to take training for upgrading their skills for maintenance. The machineries and equipment routinely falls into disorder, but there are no problems with the operations in the Project Plan because those disorders are amended and/or adjusted by the in-house engineers. As the Project Plant runs smoothly at the operation rate of nearly 100%, it seems there is no particular problem for sustainability .

(2.5.1) About the future of the Project

Table 5 shows figures of the income statements from the year 1995 when the Project Plant started operation to the year 2000. The ordinary income of each year, except for year 1998[4], is in loss. The currency crisis of 1998 and resultant deterioration of the economy caused adverse impacts on the profit and loss situation just when the Project appeared to get on the profit track. To crown it all, the incidence of

3 Out of 419, 308 work in production division. As the Project Plant is run 6 day a week, there are 650 persons all together working in the Plant

4 The ordinary incomes are before subtracting the share of overhead costs of NLCF. If the allocated share of the overhead costs were subtracted, the ordinary income of 1998 would also turn into red.

foot and mouth disease in 2000 led to suspension of export and aggravated the income profiles. The income of NACF as a whole is in surplus, but that fact does not necessarily justify losses incurred by the operations of the Project Plant. The loss making state of operation should be addressed. The export was expected at the time of field survey to resume in latter half of 2002 and subsequently the income may pick up, as the export may be restarted one year after the vaccination[5] against foot and mouth disease and if the situations as to the incidence then are found to be safe. Another good omen is the increasing trends in demands for the products of the Project Plant. They are due to expanding high recognition of the quality of the products of the Project Plant and to the accumulating consumers' confidence in the production policies of no addition of preservatives, no usage of starch flour and exclusive use of domestic pigs.

Table5：Figures of Income statements of the Project Plant

Unit: in million Won

		'95	'96	'97	'98	'99	'00
①Sales revenue and other income		10,206	62,133	118,933	177,188	173,664	156,659
	• Product sales	9,832	59,516	115,321	171,555	168,051	151,282
	• Commision	374	2,617	3,612	5,633	5,613	5,378
②Sales costs		12,407	60,874	110,159	154,693	153,407	137,524
③Sales income(①-②)		△2,201	1,259	8,774	22,495	20,257	19,136
④General sales and administrative expenses		3,971	8,473	9,857	14,606	17,857	22,979
	• Personnel		2,844	4,367	6,342	8,375	11,557
	- permanent		2,810	3,301	4,763	6,341	7,737
	- part time		33	1,065	1,579	2,035	3,820
	• Public relations		2,548	2,366	1,573	2,523	2,351
	• Market development		557	252	333	306	212
	• Transportation		1,123	1,549	5,041	3,509	3,600
	• Others		1,402	1,324	1,317	3,144	5,159
⑤Operational Income(③-④)		△6,171	△7,215	△1,084	7,889	2,401	△3,744
⑥Non-operational revenue and expenses		688	△3,486	△5,851	△5,490	△4,430	△2,986
	• Non operational revenue	769	2,406	901	1,608	2,179	3,607
	• Non operational expenses	81	5,892	6,753	7,098	6,609	6,593
Ordinary income (⑤+⑥)		△5,484	△10,700	△6,935	2,400	△2,030	△6,730

Source: Meat processing division, NACF

5 The vaccination was completed by September 2000.

3. Lessons Learned

At the time of project appraisal, the Project included objectives such as support for small and medium size pig raising farmers and facilitating pig and pork price stabilization operations. But due to the surrounding environment changes, achievement of those objectives were weakened. In order to achieve a policy goal, it is necessary to monitor the effect from the project implementation stage so that problem can be found. Notwithstanding such a notion, utmost cares should be taken so as to incorporate visions and best estimates on the subject industries and economy of the recipient country with respect to major project components, and to formulate a project plan that has a prime priority in terms of policy implementation.

Comparison of Original Plan and Actual Scope

Item	Plan	Actual
① Project Scope		
1. Construction Meat Processing Plant	2,030 pyeong	2,951 pyeong
(1) Primary processing		
a) Cut meat	10 MT/day	100 MT/say
b) Packed meat	14 MT/day	18 MT/say
(2) Secondary processing		
a) Ham	9 MT/say	18 MT/say
b) Sausage	9 MT/day	11 MT/say
c) Bacon	4 MT/day	0.6 MT/say
d) Canned meat	4 MT/day	6.5 MT/say
(3) Other related facilities		
a) Cold storage room	500 Pyeong－ 1,000 ton	506 Pyeong－ 475 ton
b) Laboratory	1 unit	Same as left
2. Slaughter facility	2,080 pyeong	2,659 pyeong
(1) Slaughter facility	2,000 pigs/day	Same as left
(2) Other related facilities		
a) Mooring	1 unit	Same as left
b) Action hall	1 unit	Same as left
c) Freezer	1 unit	Same as left
d) Cold storage room	500 Pyeong－ 1,000 ton	506 Pyeong－ 475 ton
e) Wastewater treatment facilities	1,400 ton/day	2,000 ton/day
3. Others	230 pyeong	Same as left
a) Dormitory	1 unit	Same as left
b) Cold storage car	1 unit	Same as left
4. Consulting services (M/M)		
- Detailed Design	1 set	Same as left
- Construction supervision	1 set	Same as left
- Test run/Training	1 set	Same as left
②Implementation Schedule		
Land Acquisition	January 1989～March 1990	April 1989～August 1990
Consulting Service	May 1990～November 1992	June 1991～July 1995
Construction/installation	January 1991～October 1992	October 1992～January 1995
③Project Cost		
Foreign currency	¥1,250million	¥908 million
Local currency	¥4,238million	¥3,945 million
（Local currency in Won）	Won19,804million	Won31,130 million
Total	¥5,488 million	¥4,853 million
Out of which, JBIC Yen loan	¥1,728 million	¥1,386 million
Exchange Rate	Won 1.0＝¥0.214 (February 1990)	Won 789＝¥100 (Year1995 average)