

## **Feeding the People: Possible Agricultural Normalization in North Korea**

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### **INTRODUCTION**

**T**hroughout the 1950s and 60s, Kim Il-sung stressed the significance of agricultural administration and its role in socialist economic development. Rapid development, he reasoned, would satisfy the food demand as well as facilitate industrial development by providing the raw materials for light industry. It was clear that the North Korean government saw agriculture as the linchpin in overall economic development, and to that end, demanded the active participation of farmers in government policy, promising that the government would do its utmost efforts to guarantee efficient food production.

As a result of those endeavors, the North Korean government managed to produce enough food to meet the demand until the end of 1980s, despite the relatively limited amount of arable land and the 2 to 3 percent population increase.

However, the situation for North Korea's agriculture has been desperate since the mid 1990s. National disasters and economic failures have plagued the country resulting in persistent food shortages that have left countless people starving.

Before considering the cause of North Korea's food shortage or the possibility of a solution, we need to first determine just how much food North Korea could potentially produce under the best circumstances. Only then will a study of food production recovery be realistic. Additionally, an overview of the North's food support provided until the end of the 1980s would be an important factor in determining how well it can endure its current tribulations.

### GRAIN PRODUCTION AND CONSUMPTION IN NORTH KOREA

#### *The Amount of Grain Output*

With the Land Reform Act of 1946 and the collectivization of farming between 1953 and 1958, North Korea surpassed its Southern counterpart with increased agricultural output. At the same time it strove to rehabilitate the agricultural sector and the damage caused by Japanese colonialism. By 1948, North Korea had already laid the groundwork for its food supply.<sup>1)</sup> Grain production that stood at 1.998 and 2.178 million tons, respectively, in 1946 and 1947 increased to 2.809 million tons in 1948 and 2.795 million tons in 1949.<sup>2)</sup> In a word, North Korea's food production in the 1960s and 70s, as shown in Table 2, showed a steady upward trend.

North Korea published its statistics on food output in official records such as the *Chosun Central Yearbook*, and, intermittently, through such international organizations as the Food and Agriculture Organization (FAO) of the United Nations. Since reaching a set goal is

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1) Kim, Sung-bo, *The Origin and Development of North and South Korean Economic Structure* (Seoul: Yeoksa Bipyong-sa, 2000), p. 228.

2) Chosun Central Communication Company, *Chosun Central Yearbook*, Yearly Edition; Hanrim University Press, *North Korean Economic Statistics Material* (Seoul: Hanrim University Press, 1994); National Press, *The Democratic People's Republic of Korea, People Economy Development Statistical Data, 1940-1960* (Pyongyang: National Press, 1961).

**Table 1. Estimated Food Production of North Korea in 2001**

(Unit: 1,000 ha, Kg/10 are, 10 thousand ton)

	Total	Rice	Corn	Beans	Root & tuber crops	Wheat & barley	Other cereals
Cultivated Area	1,577	572	543	114	194	133	21
Yield per 10 are	-	294	293	78	226	107	56
Production in 2001	395	168	159	9	44	14	1
Production in 2000	395	142	144	12	39	18	4
FAO estimate in 2001	354	134	148				

Source: The Rural Development Administration and The UN Food and Agriculture Organization.

characteristically the driving force in a planned socialist economy, what is presented is not so much the actual numbers but rather, how much progress was made towards the final goal compared to the previous year. In that light, North Korea's statistical figures are unreliable. The North, for example, announced that it had produced 1.998 million tons in 1946 and 10 million tons in 1987. According to those figures, the grain output increased seven-fold. If one considers that South Korea's food production increased only 2.5 times in the same period, North Korea's figures do seem exaggerated.<sup>3)</sup>

Noteworthy is that North Korea, based on FAO and the U.S. Department of Agriculture (USDA) data,<sup>4)</sup> recorded its highest grain output of 7.114 million tons in 1986. Numerical discrepancies aside,

3) Kim Woon-keun, "The Food Crisis in North Korea: Background and Prospects," *East Asian Review*, Vol. 8, No. 4 (Winter 1996), p. 58.

4) FAO and USDA have been recomposing North Korea's agricultural statistics using their own data and the basic statistics submitted by North Korea in 1977 when it joined FAO, and the recomposed statistics show longitudinal consistency and accuracy.

**Table 2. North Korean Food Production, 1961-2001\***

(Unit: 10 thousand ton)

Year	North Korean Figures**	South Korean Estimate	FAO Estimate
1961	483	-	358.3
1962	500	-	372.5
1963	500	-	405.4
1964	500	-	421.2
1965	452.6	354.8	370.7
1966	440.5	-	407.3
1967	511	-	378.8
1968	567.2	-	366.2
1969	-	-	437.8
1970	-	466.4	436.5
1971	350	-	449.9
1972	390.3	-	430.9
1973	534.4	-	481.5
1974	700	-	506.8
1975	770	495.3	523.2
1976	800	503.2	535.1
1977	850	502.9	570.8
1978	780	498.8	557.8
1979	900	517.7	576.6
1980	900	398.2	504.2
1981	-	563.9	579.9
1982	950	599.6	603.3
1983	-	578.5	618.4
1984	1000	626.7	656
1985	-	-	633.2
1986	-	-	711.4
1987	1000	-	662.8

1988	-	-	637.1
1989	886	-	659.4
1990	900	481	586.6
1991	890	443	540.5
1992	880	427	497.3
1993	900	388	459.3
1994	708	413	495.1
1995	349	345	424.5
1996	250	369	448
1997	268	367	266
1998	283	393	347
1999	428	422	348
2000	-	358	292
2001	-	395	354

Source: Combined from *Chosun Central Yearbook*; FAO, *Production Yearbook*; *Monthly Bulletin of Statistics*; *FAO Special Report 1995-2001*; Korea National Statistical Office, *Comparative Socioeconomic Conditions between South and North Korea*; Rural Development Administration, *Estimated Sereal Production of North Korea*.

\* Production amounts include rice, corn, barley, beans and other minor cereals (unhulled).

\*\* In North Korean publications, numbers before 1995 were based on unhulled grain, but after 1995, they were based on milled grain.

what is important is that North Korea's food production had been running normally. In other words, even though the statistical reliability is somewhat doubtful, North Korea's trend of food production fits in with the general picture of the actual conditions. Interestingly, with 1992 as the pivotal year, when North Korea began to suffer serious food shortages, North Korea stopped exaggerating and began to downplay its statistics on food production, a shift no doubt motivated by a desire to solicit more food supplies from the international community.

In summary, North Korea's normal grain output is somewhere between 5 to 6 million tons. The news that people were dying of

starvation surfaced when food output went down to 4 million tons after the early 1990s and again to 3 million tons after 1995. The question is how the North can regain its food production capacity, and bring it back to the 5-million-ton level of the past.

### *Grain Imports and Exports*

Understanding how North Korea was able to resolve its food shortage problem before necessitates a historical analysis on export and import of grain. Using North Korea's data and statistics on import and export of food, this paper seeks to determine whether the food shortage confronting North Korea since its establishment in 1948 is a temporary or a chronic condition.

With the goal of becoming self-sufficient, North Korea has promoted an agricultural policy focused on increasing food production, such as the Land Reform Act of 1946, cooperative farming program (1953-58), and Kim Il-sung's Thesis on Socialist Rural Policy of 1964. Yet the food shortage continues to plague the country. Basically, the instability in food supply stems from fragile grain production systems coupled with a continued steep rise in population. In response, during a meeting with farmers on February 2, 1967, Kim Il-sung commented: "We must increase the food supply this year to at least 1 million tons. If we raise the output to 1 million tons, we don't have to import 500 thousand tons of grain and instead, could export our surplus of 500 thousand tons." This comment is evidence that North Korea, with a population of 11 million people in 1967, imported some 500 thousand tons of grain.

Attributing its food shortage to a lack of arable land, North Korea launched a large-scale program to expand farmland. The "Five Policies for Rehabilitating Nature" (1976) and the "Four Projects for Rehabilitating Nature" (1981) were the core policies for North Korea's effort to expand land for food production. Essentially, North Korea's food shortage had reached the point where agricultural policies other than those for expanding arable land could no longer

solve the problem.

According to import-export statistics on North Korean grain, it had continued to export a certain amount of grain despite its own food shortage. This effort was meant to prevent its food supply from falling below the absolute minimum by exporting rice which costs three times more than the imported wheat and flour. North Korean grain exports diminished steadily, however, and stopped, completely in the 1990s. The country had been supplementing its food shortage with grain imported from China and Russia at a "friendly price between socialist states," which was one-third of the international market rate. North Korea imported 650 thousand tons of grain from China in 1992, 940 thousand tons in 1993, and 200 thousand tons in 1994. But, when China was itself hit by a food shortage in 1995 due to a bad harvest, and requested cash from North Korea, the latter stopped importing Chinese grain. In May 1997, North Korea and China agreed on a secret pact of economic and technology exchange stipulating that China would supply 500 tons of grain to North Korea every year, of which 250 tons would be paid at one-third of the international market price.

The recent economic crises, China's bad harvest in 1995, and the increase in international grain prices in the 1990s have all contributed to the hardship in North Korea. Damage due to cold weather in 1993 also reduced the food supply by more than 500 thousand tons; the hail damage in 1994 reduced the food supply by 1.20 million tons; and the flood in 1995 cut production by some 1.90 million tons. As if that were not enough, a deficiency in foreign reserves due to the economic crisis of 1995 led to a reduction in food imports. To supplement the food shortage caused by the bad harvest in 1995, North Korea asked China, the U.S., Japan, Egypt, Taiwan, Thailand, and other countries for some 3 million tons in food aid. The actual amount received, however, was 1.985 million tons in 1995 and 500 thousand tons in 1996. With food imports to North Korea insufficient and the annual food production low, the food shortage remains unresolved. North Korea's grain import-export figures for

**Table 3. North Korean Commercial Cereal Trade, 1961-2000**

(Unit: 1,000 ton)

Year	Imports			Exports			Balance
	Rice	Corn	Total	Wheat/ Wheat flour	Others	Total	
1961	22.5	2.6	25.1	398.1	75	473.1	448
1962	0.3	12.7	13	91.9	30.4	122.3	109.3
1963	0	37	37	96.1	30.1	126.2	89.2
1964	0	23.5	23.5	50.6	31	81.6	58.1
1965	43.5	0	43.5	129.7	100.5	230.2	186.7
1966	72.1	18.1	90.1	433.8	-	433.8	343.7
1967	125.4	6.3	131.7	524.2	-	524.2	392.5
1968	59.6	5.4	65	148.7	-	148.7	83.7
1969	96.2	17.4	113.6	225.7	-	225.7	112.1
1970	88.6	21.9	110.5	260.7	-	260.7	50.2
1971	103.1	9.3	112.4	276	-	276	163.6
1972	93	8	101	407.7	9.9	417	316.6
1973	111	119	230	1,448	9.3	1,498	1,268
1974	1107	70	1,177	1,370	9.7	1,380	203
1975	132	15	147	293	-	293	152
1976	173	96	269	278	-	278	9
1977	280	300	580	500	-	500	-8
1978	500	200	700	405.6	-	405.6	-294.4
1979	450	200	650	525.6	-	525.6	-124.4
1980	300	-	300	510	-	510	210
1981	300	-	300	720	-	720	420
1982	300	-	300	585	-	585	285
1983	120	-	120	350	-	350	230
1984	80	-	80	200	-	200	120
1985	200	-	200	200	-	200	0
1986	200	-	200	270	-	270	70
1987	225	-	225	610	-	610	385

1988	200	-	200	630	270.3 <sup>1)</sup>	900.3	700.3
1989	90	-	90	350	480 <sup>2)</sup>	781	691
1990	43	-	43	370	534 <sup>3)</sup>	904	861
1991	11	-	11	950	332 <sup>4)</sup>	1,280	1,269
1992	-	-	-	-	-	920	-
1993	-	-	-	-	-	1,090	-
1994	-	-	-	-	-	600	-
1995	-	-	-	-	-	962	-
1996	-	-	-	-	-	1,050	-
1997	-	-	-	-	-	1,630	-
1998	-	-	-	-	-	1,354	-
1999	-	-	-	-	-	1,620	-
2000	-	-	-	-	-	960	-

Source: *UN FAO Almanac* (1960-2000); *UN Commodity Trade Statistics* (2000); *FAO/WFP Special Report* (November 1998); *FAO Special Report* (1960-2000).

1) Corn, 2) Rice 130,000 tons, Barley 54,000 tons, Corn 296,000 tons, 3) Rice 270,000 tons, 4) Rice 112,000 tons, Corn 220,000 tons.

the period between 1961 and 2000 are seen in Table 3. After the mid-1990s, plagued by insufficient foreign reserves, the actual amount of commercial import activities with foreign countries other than China and Russia has been 100 thousand tons annually. Most of its food supply comes from the international community, including South Korea, in the form of humanitarian aid.

## THE POSSIBILITY OF AGRICULTURAL RECOVERY

### *Institutional Perspective*

Including institutional reform as part of the discussion of recovery for North Korea's agriculture will only restrict that discussion. Institutional overhaul of the entire socialist agricultural

foundation is difficult to achieve without the collapse of the entire North Korean regime. Accordingly, it is appropriate to discuss only the institutional changes that are permissible under the current North Korean regime.

(A) Flexible Operation of the Collective Farm System

The most important characteristic of a socialist system is socialization of the means of production, and that agricultural socialism is represented by the collective farming system. For North Korea to increase productivity by making changes in the collective farm system would shake the very foundations of socialism. Even with the extreme food shortages between 1995 and 1998, North Korea did not give up collective farming.<sup>5)</sup>

Instead, in order to make up for deficient productivity, North Korea adopted “the work squad management system” which streamlined the production unit. The system failed, however, when the government reneged on its earlier promise to let producers dispose of surpluses at their discretion. The system had two critical fatal flaws. First, it sought to raise the number of farmers by reducing the production unit to seven or eight people based on family relations, but subdividing of production units increased the target volume of each unit. Second, the farmers wanted to decide how to deal with crop surplus, but the government, contrary to its earlier promise, did not allow it. Instead, it distributed coupons that could be used to purchase sundry goods. In fact, the coupons were nothing more than a permission slip, since the farmers still had to pay for the actual goods.

It is clear that the motivation to produce will require private farming. Citizens are not interested in joining 7-8 person farming units, once they have experienced private farming in family

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5) Nam Sung-wook, “Changes in Food Shortage and Population, 1961-1998,” *Research on Modern North Korea* (in Korean), Vol. 2, Issue 1 (Seoul: Graduate School of North Korean Studies of Kyungnam University, 1999).

gardens. Lastly, without being clear on what is responsible for the lack of progress—whether inefficient farming practices or insufficient investment, the work squad management system that aimed simply at increasing the labor force was doomed to failure. Ultimately, North Korea’s political conditions make it difficult to expect North Korea to adopt a policy similar to that of China’s agricultural reform in 1978, because that would require dismantling the basic framework of collective farming.

(B) Flexible Reform in *Juche* Farming Methods

With poor harvests exacerbating the food storage since 1995, critics have blamed *Juche* (self-reliance) farming as one of the causes of famine. South Korean specialists on North Korean agriculture, rather than trying to understand the fundamentals of *Juche* farming methods, pointed to *Juche* farming methods as the primary culprit of North Korea’s food shortage. However, with socialist industrialization in rapid progress, *Juche* stressed the need to secure a stable supply of agricultural products.<sup>6</sup> Increasing productivity for the unit area or the area under cultivation was absolutely necessary. Despite efforts to secure 200 thousand *jongbo* (1 *jongbo* is 2.451 acres) of land through the “Five Policies for Rehabilitating Nature” in October 1976, to reclaim 150 thousand *jongbos* through the second seven-year plan (1977-1986) and 300 thousand *jongbos* through the third seven-year plan (1987-1993), new arable land did not increase as had been hoped. In fact, the excessive reclamation projects caused erosion and landslides that added to the succession of natural disasters between 1995 and 1998.

When its arable land expansion efforts hit a dead end, North Korea turned its attention to science in order to boost productivity. Various cultivation methods were introduced such as suitable crops for suitable land, timely planting, high-density cultivation,

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6) Nam Sung-wook, “The Philosophy and Reality of North Korea’s *Juche* Farming Methods,” *Farmers and Society* (in Korean), (Summer 2000), pp. 12-19.

continuous cropping, and systematic fertilization. North Korea did not have the necessary fertilizer and machinery to support the methods, however, and failed efforts only highlighted the agricultural problems in North Korea.

Given the urgency of the situation, *Juche* farming methods are simply strategies to increase productivity. Once the supply of agricultural equipment is stabilized, North Korea can abandon overcultivation and maintain proper harvest techniques, adapt a rational plan for fertilization, and utilize other advantages to increase productivity. In other words, the flexible application of *Juche* farming methods, especially giving the farmers the right to choose crops for cultivation, will lead toward recovered productivity. In particular, the recent support for potato cultivation in place of corn, is a step in the right direction.

#### (C) Expansion of Family Gardens

One of the institutional reform measures aimed to solve North Korea's food shortage is expanding the size of vegetable gardens permitted to each family. Expansion from some 30 *pyong* (1 *pyong* is about 3.95 square yard) for a family to 50 to 100 *pyong* would substantially address the food shortage. Vegetable gardens, although relatively small, yield high productivity. According to former researcher, Rhee Min-bok of North Korean Institute of Agricultural Science, productivity for collective farming is only 30 percent of that of private farming, and productivity of family gardens is generally three to five times that of cooperative farms.<sup>7)</sup>

The agricultural yield produced in family gardens was 810 thousand tons in 1996, 22 percent of total agricultural productce, and 1.11 million tons in 1997, 31.8 percent of the total. Consequently, if the size of family gardens were expanded to twice the current size, the output would increase by over 500 thousand tons to 1 million

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7) Daesan Agricultural Culture Foundation, *Inter-Korean Agricultural Cooperation Towards the New Millennium* (Seoul: Baek-ui, 1999), pp. 100-102.

**Table 4. North Korean Food Production vs. Household Gardens' Production**

(Unit: 10 thousand ton)

		1996	1997	1998
North Korean Data*	Total production	200.2	214.8	-
	Household production	44	68.4	-
	Household production rate	22.0%	31.8%	22.0%-31.8%
Estimation	Total production**	369.0	348.9	388.6
	Household production***	81.2	111.0	85.4-123.7

\* The FAO data submitted by North Korean Agricultural Committee, on the basis of milled grain.

\*\* The data estimated by the Rural Development Administration (RDA).

\*\*\* Re-estimated according to the RDA data.

tons. Granted, when the size of the collective farms is reduced, there would be a proportionate reduction in the production, but because the increase far exceeds the reduction, the total increase would surpass 500 thousand tons, a 30 percent increase. The main hurdle is the agricultural policy. If North Korea were permit expansion of private family gardens, it would undermine the collective farming system.

### *Investment Factors*

Arable land, fertilizer, agricultural chemicals, agricultural machinery, research and development for horticulture, and irrigation are possible areas for investment. The possibility of recovery will be evaluated by first examining whether there is a capacity for such investments.<sup>8)</sup>

(A) The Amount of Arable Land

The total area under cultivation in North Korea is 2.05 million hectares, 15 percent of the country's total area of 12.054 million hectares. Of the area under cultivation, 170 thousand hectares are arable. 300 thousand hectares of land are used for perennial crops, and 50 thousand hectares are pastureland. According to the figures from 1994, before a succession of natural disasters devastated the land, the average farmland area per farmer in North Korea was 0.085 hectares, less than that of other socialist countries such as Bulgaria (0.17 ha), Hungary (0.68 ha), and Poland (0.63 ha).<sup>9)</sup> With reduced food production in 1995, North Korea ordered expansion of 10 thousand hectares of land for corn cultivation,<sup>10)</sup> aiming to reach 7 million tons of corn output—the greatest level of 1980s. However, since North Korea's actual land under cultivation has reached the same level as the total arable land, it is impossible to acquire new land for corn cultivation. Moreover, since 90 percent of the land damaged by natural disasters has already been rehabilitated since 1995, expanding land for cultivation is not a viable option for increasing food productivity.

An interesting development related to expanding land for cultivation is North Korea's project to reallocate huge tracts of land. Two motives drive the North Korean government in the land reallocation project. The first motive is to wipe out family farmland, a remnant of feudal times in which land ownership was passed down

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8) Nam Sung-wook, "Prospects of Grain Production, Consumption and Trade in North Korea: 1961-1997," Ph.D. Dissertation, University of Missouri-Columbia, 1997.

9) The U.S. (185 ha), South Korea (1.2 ha), Israel (1 ha), the Netherlands (2.3 ha), and China (0.45 ha). The average farmland per farmer in North Korea is extremely tiny. Just looking at the figure for the average farmland per farmer, it is too small for food production. That North Korea is unable to produce enough food supply with the farming population reaching 30 percent of the total population shows that what is urgently needed is not labor but capital investment.

10) *The People's Korea*, January 15, 1997.

**Table 5. Present North Korean Farm Land Redistribution**

(Unit: jongbo)

Period	Province	Redistributed Area
October 1998-April 1999	Kangwon	30,000
October 1999-May 2000	North Pyongan	51,500
October 2000 - Present	South Hwanghae	30,000 completed from target area of 100,000

Source: The Yonhap News Agency

from generation to generation<sup>11)</sup> and second, to establish agricultural mechanization. Such a move could help to expand, though only slightly, land for cultivation. Land allocation would yield 7 to 8 *jongbos* for every 100 *jongbos*.<sup>12)</sup> It yielded some 1,700 *jongbos* of new arable land in Kangwon Province and 3,200 *jongbos* in North Pyongan Province.<sup>13)</sup> North Korea began the project in October 1998, with small rice fields and farmland in Kangwon Province as the first target. Having concluded that both chemical and organic fertilizers must be used consistently for three years in order for the reallocated lands to be arable, North Korea is focusing its efforts on getting fertilizer.

#### (B) Fertilizer

Obtaining a steady supply of fertilizer is a critical step in improving North Korean agriculture. Since the founding the North Korean regime, the government has promoted policies to increase

11) "Even though South Korea has many 'beols' (extensive and flat land) producing grain, most of them are privately owned and thus cannot be reallocated. If South Koreans came to 'Handre beol' in North Pyongan Province, they would be both surprised and envious." Comments made by Kim Jung-il, *Rodong Shinmun*, May 2002.

12) *Joongang Ilbo*, April 3, 2001.

13) "Plans are underway to complete the nationwide land allocation within three to four years, and once that is done, the next goal is a tidal land reclamation project," commented by Choi Myong-hyun, Director of North Korea's Ministry of Agriculture in an interview. *Tongil Shinbo*, March 17, 2001.

use of chemical fertilizers for agriculture. To that end, it developed the capacity to produce 3.5 million tons of fertilizer by the mid-1980s using such fertilizer plants as Hungnam Factory, built during the Japanese colonial period. However, in the 1990s, fertilizer production fell because North Korea could not import needed petroleum due to lack of foreign reserves. Nor could it restore the decrepit plants that had been built by the Japanese. It is estimated that in 1996 North Korea produced 960 thousand tons of fertilizer, indicating that the rate of operation of its facilities was a mere 27 percent.<sup>14)</sup> At that rate, it was some 500 to 600 thousand tons short of the minimum demand of 1.5 million tons.<sup>15)</sup>

Normalizing the fertilizer supply has not been the answer, however. Each year, North Korea has begged South Korea for fertilizer, blaming stagnant grain production on the lack of chemical fertilizers. However, even with fertilizer aid, productivity has not increased as planned. Because of soil acidity and insufficient irrigation water and chemicals, cooperative farms produced only half of that produced in South Korea.<sup>16)</sup>

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14) Kim, Sam-sik, "Measures for Fertilizer Support," (in Korean), *The Reunified Korea Economy* (April 1998), pp. 20-24.

15) In an interview with a reporter from the Xinhua News Agency in January 1998, Deputy-director Cha In-suk of the Ministry of Agriculture said that 700 thousand tons of urea fertilizer, 500 thousand tons of phosphoric fertilizer, and 300 thousand tons of potassic fertilizer are needed for the 1998 agricultural production.

16) In South Korea, the farm households that participated in the trial use of fertilizer totaled 72 percent in 1970s, and the figure went up to 92.5 percent in 1980s. The fertilizer (by volume and element) used in North Korea in 1999 for rice farming per hectare consisted of 96 kg of nitrogen, 19 kg of phosphorus, and 18 kg of potassium, a total of 133 kilograms. North Korea's rice output for 1999 was 2.6 tons per hectare of land (the standard of the average grain, the average grain exchange rate of 65%, 4 tons for standard of this year's grain). Supposing that the elemental content of fertilizer supplied to North Korea is 50%, then, based on the 50% standard for the trial fertilizer for South Korea in 1960s, an 1kg of grain increase can be expected for every 1kg of fertilizer. Accordingly, if South Korea were to donate 200 thousand tons of fertilizer to North Korea, a 200 thousand-ton

### (C) Agricultural Machines and Other Equipment

In the 1960s, North Korea made remarkable progress in expanding the distribution of agricultural machines through farm mechanization policies; however, due to decline in the operation of agricultural machine factories, it has been unable to promote farm mechanization. That the number of tractors, an indicator for farm mechanization, reached 9,000 in 1960 and rose further to 75,000 in 1997 shows that North Korea has a great interest in farm mechanization. However, due to insufficient supply of machine parts and petroleum, the actual rate of operation is 30%, impeding the progress of farm mechanization. Moreover, because the North lacks means of transport, farm machines are being used for transportation rather than for farm work.<sup>17)</sup>

Once the land for cultivation is expanded as a result of the government land reallocation project, the need for farm mechanization will be greater. In such a case, lack of machines may stand in the way of productivity. However, as long as most North Korean farming activities are done manually as they are currently, that is hardly linked to increased productivity. In the long run, however, North Korea needs to mechanize some areas of farming, introducing seeders, rice planting machines, and agricultural chemical sprayers, especially since its agricultural labor force is gradually aging. In addition, a stable supply of vinyl and bamboo for laying out seed beds, and farm pipe is necessary to normalize productivity.

### (D) Seeds

There is a paradoxical element to the seed variety issue. North

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increase in grain production can be expected. Given this, it shows that the grain output of 2.92 million tons, according to FAO standards in 2000, despite the donation of 300 thousand tons of fertilizer was due to several variables that undermined the expected yield from the fertilizer aid.

17) Nam Sung-wook, "Grain Production and Grain Consumption in North Korea," *Journal of Rural Development*, Vol. 21 (Winter 1998), pp. 225-235.

Korean defectors who had worked in the area of agriculture assert that North Korea's agricultural technology does not lag far behind its Southern counterpart. They argue that the stagnation in productivity is due to insufficient supply of materials. Moreover, they say that South Korean seeds and North Korean seeds are equally advantageous, given their respective natural environments. The arguments actually have some validity. North Korea's goals for seed multiplication are somewhat different from South Korea's in that North Korea aims for high yield, pest tolerance, cold hardiness, and maturation time.<sup>18)</sup> While North Korea's seed production technology is not very sophisticated, considering the regional differences between the two Koreas, the issue of lagging agricultural technology is not a high priority issue. On a more realistic note, the problem is establishing a new seed supply. The extreme famine of 1995-1998 led to a disintegration of the supply system when not enough seeds could be produced. Rebuilding that system is urgently needed.<sup>19)</sup>

#### (E) The Expansion of Irrigation Facilities

Although North Korea's water resources are greater and higher in velocity of flow than South Korea's, due to ineffective water management, the North suffers from drought annually. For better water management, obsolete facilities such as pumping stations and dams need to be replaced and waterways must be dredged. In addition, comprehensive measures are needed to prevent spring drought and summer flooding. Such a water management policy is not so much aimed at increasing output but at preventing a decline. To maintain the current year's output of 3.5 million tons, efficient water

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18) Kwon Tae-jin, *et al.*, "North Korea's Agricultural Technology and Directions for Inter-Korean Cooperation," (in Korean), *Agricultural Economics*, Vol. 22, No. 4 (Fall 1999), pp. 43-60.

19) Lee Doo-soon, "Measures for Agricultural Material Aid" (in Korean), *The Reunified Korea Economy* (August 1998).

management is imperative. Since the budget for water management policy is substantial, the current economic crisis has hindered regime's efforts to solve the problem.<sup>20)</sup> Facing severe drought, rather than supplying equipment such as water gauges, could only mobilize manpower to dig wells manually.

### FUTURE TASKS FOR NORMALIZING AGRICULTURAL PRODUCTION

Normalization of agricultural productivity will require various systematic reforms within the North Korean regime, and increasing productivity per unit area through increased input of agricultural equipment. Opening and restoring fertilizer plants, importing petroleum, and increasing agricultural equipment are all directly connected to general economic recovery.<sup>21)</sup> Since North Korea's economy will take time to recover, outside help will be needed. In order to receive international aid as from FAO or International Bank for Reconstruction and Development (IBRD), however, North Korea would have to cooperate by providing information and submitting to inspections requested by relevant international organizations.

#### *Agricultural Tasks*

The primary task is to reform North Korea's agricultural structure on a policy level. In other words, to increase productivity necessitates restructuring the production sector. As discussed earlier,

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20) That the construction for a 160-kilometer waterway between Gaechon of South Pyongan Province and Taesung Lake, a comprehensive water management project begun in November 1999, is being financed by members of the Organization of the Petroleum Exporting Countries (OPEC) shows that the project is a costly one.

21) Nam Sung-wook, "North Korean Economy in Crisis: Is Recovery or Development Possible?" *Korean Journal of Unification Affairs*, Vol. 12, No. 1 (June 2002).

systematic changes, such as dismantling the collective farm system or expanding private farms, are out of the question. Accordingly, let us now concentrate on the tasks that are realistically viable for North Korea.

(A) Stabilizing the Supply and Demand for Agricultural Materials

Refurbishment and expansion of the industry for such basic agricultural materials as fertilizer and chemicals must be undertaken as soon as possible. It is estimated that some 600 thousand tons of chemical fertilizer are needed to cultivate North Korea's crops.<sup>22)</sup> In 1999, the estimated amount of fertilizer supplied (based on total ingredients) was 199 thousand tons. Of that, 64 thousand tons were North Korea-produced, 20 thousand tons were imported, and 115 thousand tons were given in the form of aid. To normalize its fertilizer supply in a short period of time, North Korea needs to repair the Hungnam fertilizer plant built in 1955 and the Namhung Youth Chemical facility built in 1976, and it must secure a steady flow of spare parts from China.

Estimating the actual cost for repair without directly inspecting the facilities poses some difficulty, but, based on the fact that it costs more than 200 billion won to build a fertilizer plant, the estimated minimum cost for repair is around 500 million dollars. Estimating that it would take at least five years to make repairs, South Korean aid during the period will be inevitable. Of course, considering that it costs 36 billion won for every 100 thousand tons of fertilizer, North Korea would need to reciprocate through inter-Korean family reunions and other such concessions. As for South Korea, it can supply monthly some 50 thousand tons during the peak demand period for fertilizer (March to June) and somewhere between 70 to 100 thousand tons after the peak period (July), but the key point

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22) A total 450 thousand tons are for grains and 150 thousand tons are for fruits and vegetables. The figures are based on South Korea's standard quantity of fertilizer used to cultivate an area of 1,996,000 hectares.

**Table 6. The Raw Materials Required for North Korean Major Chemical Fertilizer Factories**

(Unit: 10 thousand ton, thousand kwh)

	Fertilizer	Factory	Capability	Required Raw Materials	Required Electricity
Nitride	Urea	Hungnam Fertilizer	18	Ammonia 10.8, carbonic acid gas 14.4	63,000
		Namhung Youth Chemical	40	Ammonia 22.8, carbonic acid gas 30.2	50,000
	Nitric acid ammonium lime	Hungnam Fertilizer	35	Nitric acid ammonium 21, limestone 16.6	22,750
	Ammonium sulfate	Hungnam Fertilizer	40	Ammonia 10.4, sulfuric acid 30.2	3,600
	Nitrolime	Sunchon Nitrolime	10	Carbide 8.3	-
	Chloridation ammonium	February-8 Vinalon	10	Salt 12.5, NH 3.7	35,000
Phosphoric Acid	Super phosphate	Hungnam Fertilizer	40	Apatite 21.3, sulfuric acid 15.7	1,840
		Nampo Refinery	20	Apatite 10.7, sulfuric acid 7.8	-
		Ssangyong Phosphore Fertilizer	15	Apatite 8, sulfuric acid 5.9	690
	Fused Phosphate	Nampo Refinery	10	Apatite 7.3, ophiolite 5.4	-
		Munpyong Refinery	30	Apatite 7.3, ophiolite 16.2	-

Source: The Korea Development Bank, *North Korean Industry and Structural Reform Plan* (Seoul: KDB, 2000), p. 232.

would be raising the money necessary.

### (B) Fostering Skills for Agricultural Production

Technology for cultivating rice, corn, and potato seeds as well as

for controlling crop damaging diseases and insects needs to be developed. In addition, skills for double-cropping and potato and corn cultivation need to be supplemented. Of the aid needed for seed cultivation, introducing artificial seed potatoes is most urgent. Because potatoes contain more calories and the climate and soil in the North are suitable, potato cultivation is more advantageous than corn. North Korea has recently promoted increased production of potatoes; however, efforts have stalled due to an insufficient supply of superior seed potatoes. For virus-free seed potatoes, North Korea currently relies on aid from the international community. In the long term, technology transfer or production plants for artificial seed potatoes, or establishing a joint venture to build such plants in North Korea should be reviewed. The required cost for seeds per hectare is 3.6 million won. Based on the 1999 figure of 170 thousand hectares of land under cultivation, 87,500 tons of seed potatoes are needed. Just in seeds alone, it would cost 61.2 billion won.<sup>23)</sup> A detailed analysis is necessary to come up with the exact figures.

#### (C) Improving the Agricultural Irrigation System

If the irrigation system in grain-producing regions were improved, it could minimize the damage caused by both drought and floods, and increase agricultural productivity by supplying water when needed. Of the 1.46 million hectares of land with water irrigation systems, 1.16 million hectares depend on the energy consuming water pump system, and most water pump systems are obsolete. It is reported that of the 29,643 water-pumping systems, 32,200 water pumps and 950 kilometers of water pumping pipes need to be replaced. For highland corn cultivation, North Korea needs portable water pumps and has made requests to international

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23) For every hectare, 75,000 MNT (200 won for each) and 1,800 kilograms of seed (2000 won for every kilogram) are required. Since every increment of increase can increase the production by ten-fold, for a small cost the economic effect would be huge.

organizations for some 5,000 3.5 horsepower portable water pumps.

Unless the North restores its capacity to control flood damage through reforestation, expanded irrigation facilities would be only 50-percent effective. Therefore North Korea should immediately promote restoration of forests and expansion of the irrigation system. It is estimated that 1.63 million hectares out of the total of 9.16 hectares of North Korea's mountain areas are subject to immediate afforestation. Of the 1.63 million hectares, 1.53 million hectares are targeted for afforestation, and the estimated requirement for erosion control is 100 thousand hectares. A minimum cost of 100 million dollars is estimated.

#### *Non-agricultural Tasks*

##### (A) Financial Support of International Organizations

David Morton, the U.N. humanitarian coordinator in Pyongyang, reported in May 2002 that North Korea has asked for 250 million dollars in aid to meet the basic food supply demand, and announced that the money will be used to build the infrastructure for agricultural production and forest restoration. The aforementioned agricultural policies require a substantial amount of time and money. The estimated cost to bring North Korea's economy up to the 1980s level is between 5 to 10 billion dollars, and the agricultural sector, including various industries for agricultural materials, will need over 2 billion dollars of that cost. Judging by South Korea's experience and North Korea's record on promoting economic development plans, the time required to realize the production levels of the 1980s (5 million tons) is estimated to be at least 10 to 15 years. Considering South Korea's own experience, it takes a ten-year plan to rehabilitate a collapsed agricultural system.

##### (B) Limits in North Korea's Economic Recovery

Considering North Korea's current economic conditions, raising the required funds is impossible. Let us look at records of the Fourth

**Table 7. North Korean Budget Expenditure by Items**

	(Unit: billion won)			
	Citizen's economy	Aid expenditure for citizens	Military	General management
Expenditure	8.40297 (\$3.84 billion)	8.0482 (\$3.65 billion)	2.99657 (\$1.37 billion)	1.55067 (\$0.71 billion)
Rate (%)	40.1	38.2	14.3	7.4

Plenary Session of the Tenth Supreme People's Assembly held on April 5, 2001 in order to understand North Korea's recent economic scale. The Assembly reported that the economic budget for the entire economy is a mere 1.84 billion dollars. The annual settlement for the budget for 2000 showed that gross national earnings were 20,903.43 million won (9.55 billion dollars) and spending, 20,955.03 million won (9.57 billion dollars), resulting in a 51.6 million won (20 million dollars) deficit. The budget expenditures by item show that citizen's economic expenditures constituted 40.1% (8,402.97 million won, 3.84 billion dollars), aid expenditure for citizens 38.2% (8,004.82 million won, 3.65 billion dollars), military spending at 14.3% (2,996.57 million won, 1.37 billion dollars), and general management expenses, 7.4% (1,550.67 million won, 701 million dollars). Both the earnings and the expenditures for the budget 2001 were 21,570.8 million won (9.76 billion dollars).<sup>24)</sup> At 1.42 billion dollars, the military spending constituted 14.5% of the total budget.

The size of North Korea's budget, a mere half of its 1994 budget, has led to a severe belt-tightening policy. In addition, since earning and spending have not increased significantly from that of 1999, in which the earnings were 19,801.03 million won (9.12 billion dollars) and spending was 20,018.21 million won (9.22 billion dollars), it seems that no major economic progress occurred from 1999 to 2000. North

24) The exchange rate was 2.19 North Korean won per dollar in 2000 and 2.21 North Korean won for 2001. South Korea's budget for 2001 was 74.1 billion dollars, 7.6 times that of North Korea.

Korea's economic level, in other words, is stuck at the mid 1990s level.

Specifically the budget for agriculture increased by only 5 percent. Under those circumstances, it would be almost impossible for North Korea to recover on its own and aid from international organizations seems inevitable. The forecast for North Korea's economic growth rate for 2001 is at 1 to 3 percent.

(C) Outcomes and Limitations of International Organizations' Aid to North Korea

The Agricultural Recovery and Environmental Protection (AREP), led by UNDP, and agricultural developmental aid by International Fund for Agricultural Development (IFAD) are the two aid programs for North Korea's agricultural sector sponsored by international organizations. However, the amount of aid supplied by these programs is too meager to really assist in North Korea's agriculture recovery. Rather than full-scale recovery programs, they are more like pilot projects which are not designed to make long-term agricultural reforms; rather, they concentrate on reaping short-term results in such areas as livestock production. While the aid cannot build a foundation for productivity, the IFAD-led agricultural development project is expected to bring gradual changes and reforms in the implementation process.<sup>25)</sup>

For structural reform for agriculture, large-scale aid, such as from FAO and IBRD, is required. Granted, this issue is connected to the complex issue of improving North Korea-US relations, but for North Korea's agriculture to recover, it ultimately needs some 2 billion dollars in aid from international organizations. Paying the 2 billion dollars in installments at 200 million dollars per year over a 10-year period can lessen the burden. Part of the total amount could be given in the form of aid, on which North Korea could pay interest. Aid from the Asian Development Bank (ADB) is also a possibility. The United States, a key

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25) Kim Young-hoon, "Potentials for Reform and Opening of North Korea's Agriculture," *Agricultural Economy*, Vol. 22, No. 4 (Winter 1999), p. 142.

**Table 8. IFAD Agricultural Project for North Korea**

Project Name	Total Project Cost (\$ million)	Loan Amount (SDR* million)	Approval Date	Project Duration	Term of Loan
Sericulture Development Project	24.15	10.45	December 1995	1998-2003	Repayment in 20 years, 5-year grace period (interest: 3.4%)
Crop and Livestock Rehabilitation Project	32.10	20.90	December 1997	1998-2003	30 years, 10-year grace period
Uplands Food Security Project	41.77	19.15	December 2000	2001-	40 years, 10-year grace period (interest: 0.75%)

Source: IFAD, [<http://www.ifad.org>].

\*SDR: Special Drawing Rights

member in many international organizations, would be the decisive factor in whether North Korea would receive the aid it needs.

## CONCLUSION

In the final analysis, it is still possible for North Korea's agricultural system to recover. If it could rebuild the productive bases of the 1970s and 1980s when, under the socialist agricultural system, it produced some 5 to 6 million tons in agricultural output, then its agricultural sector could be revived. In reality, as long as the North Korean regime remains in power, the collective farm system will continue to operate, and any institutional reform the regime undertakes will be nothing more than temporary measures. The short-term goal for recovery is to reach the 1980s level, and the mid-to long-term goals are to raise the current rice and corn production of 210 kilograms and 289 kilograms per hectare, respectively, to the

level of South Korea's 445 kilograms of rice and 425 kilograms of corn production per hectare. With effective management to deal with natural disasters, North Korea can raise its agricultural productivity to the 250-kilogram level, and with a stable supply of agricultural materials, the figure could even go up to the 300-kilogram level. If North Korea were to undertake various structural reforms of the agricultural sector for the next ten years, the output could rise to 350 kilograms.

The realistic short-term goal feasible for North Korea now is to continue to receive aid from South Korea in fertilizer and other farming materials, while expanding the use of these products. To accomplish this, it must refurbish fertilizer plants as far as is economically possible, and improve its irrigation system. In the long run, however, it needs aid from international organizations.<sup>26)</sup> Structural reforms for agriculture will not only require an enormous amount of money but also take over 10 to 20 years to carry out. Accordingly, South Korea and the international community need to provide humanitarian aid to cope with food shortages until the recovery. As shown in Table 7, the 5% increase in the agricultural budget from the previous year is not enough to make structural reforms, not to mention the urgently needed improvements in the seed supply and irrigation system. The possibility for agricultural recovery, ultimately, depends on internal economic recovery, institutional reform, and aid from international organizations.

On the other hand, considering that the ever-increasing rice surplus in South Korea has discouraged farmers from producing, it would be worthwhile for South Korea to review the possibility of regularly sending North Korea 100 to 200 thousand tons of rice every year during the next five to ten years. Considering the long-term costs that South Korea would have to shoulder in carrying out

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26) Nam Sung-wook, "The Latest Direction of North Korea's Agricultural Policies and Inter-Korean Agricultural Cooperation," *Journal of North Korean Agriculture*, Vol. 7, Institute of North Korean Agricultural Affairs (November 2000).

agricultural administration for the unified Korean peninsula,<sup>27)</sup> starting the process now by donating South Korea's surplus rice to its Northern neighbor would be an efficient move.<sup>28)</sup> Given such factors as South Korea's obligation, under the 1995 Uruguay Round agreement on agricultural products, to import a certain amount of goods every year until 2004, it is no wonder that the supply of rice exceeds the demand. Unless South Korea takes surplus rice out of the domestic market, the price will inevitably drop. Giving financial aid to North Korea through international organizations would only increase the South Korean government's financial burden, whereas rice donations can easily be transferred to North Korea through the

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27) Nam Sung-wook, "Direction and Tasks for Establishing Agricultural Policy for Unification in the Twenty-First Century," presented at the Seventh Agricultural Policy Forum (June 1999).

28) The surplus of rice continues to rise due to increased rice production since 1980s with the government's policy of multiplying agricultural products and to reduction in rice consumption. The rice production increased drastically from 980 thousand tons in 2000 to 1.42 million tons in 2001. The annual rice consumption per person decreased from 132 kilograms in 1980 to 93.6 kilograms in 2000. Rice is consumed for two meals out of three a day. For the supply and demand for rice in 2001, the net supply of rice is 6.48 million tons (the year's rice harvest of 5.28 million tons, surplus stock of 980 thousand tons, and 220 thousand tons of imported rice), and with the consumption of over 5.06 million tons of rice, it is estimated that there would be 142 thousand tons of rice in surplus. The surplus amount exceeds the surplus quantity of 800 thousand tons recommended by FAO, and the annual cost for storing the surplus rice ranges from 90 to 100 billion won.

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	(Unit: thousand ton)		
	1999	2000	2001 (estimated)
Supply	6,000	6,090	6,480
(Domestic Production)	(5,090)	(5,290)	(5,280)
Consumption	5,280	5,110	5,060
Stockpile	720	980	1,420

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inter-Korean cooperative fund. Contributing to normalization of North Korean cereal production is inevitable, in whatever form. With China's membership in the WTO, its cheap, high-quality rice from the three northeast provinces may pour into North Korea. Should the influx of cheap Chinese rice occur before a foundation for North Korea's rice production is established, it could complicate efforts toward recovery of cereal production. Then, South Korea would need multilateral countermeasures. In the worst case, North Korea could become the primary consumer of the rice from the three Chinese northeast provinces. In sum, the China question is a major reason for South Korea to focus its attention on North Korea's recovery of agricultural productivity.