S P E C I A L R E P O R T

FAO/WFP CROP AND FOOD SECURITY ASSESSMENT MISSION TO THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME

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Mission Highlights

- This FAO/WFP Crop and Food Supply Assessment Mission was the first one to be conducted since 2004; however, it benefited from recent exercises, including the August 2007 Flood Rapid Assessment, and the 2008 joint FAO/WFP Rapid Food Security Assessment.
- The findings forecast a total domestic food production for the 2008/09 marketing year of 3.342 million tonnes milled (4.21 million tonnes unmilled), including potatoes in cereal equivalent and production from kitchen gardens and sloping lands.
- This represents a decline in food production for the third consecutive year.
- The total cereal import requirement in 2008/09 is estimated at 1.786 million tonnes, based on a cereal utilization of 167 kg/capita/year and taking into account non-human utilization (seeds, feed, losses etc). Even assuming commercial imports are maintained at the substantial levels of previous years (500 000 tonnes) and that all current food aid pledges (450 000 tonnes, including unconfirmed contributions) are delivered, the country would face a remaining deficit of 836 000 tonnes.
- Analysis of household food access has revealed that most households will face major challenges in meeting their food consumption requirements during 2008/09. This is due to overall low per capita cereal availability in most provinces; low and sharp seasonal reductions in Public Distribution System rations (150 grams per person per day as reported from June to September 2008); reduced number of meals and poor dietary diversity at the household level; and limited alternative options for accessing food.
- It is estimated that some 8.741 million persons (37 percent of the total population) consisting of the elderly; pregnant and lactating women; children in nursery, kindergarten and primary schools; children in residential institutions and in paediatric wards; and other transitory categories will require food assistance to meet their basic food needs.
- Based on the nutritional requirement for each beneficiary category and corresponding period of food assistance, the total quantity of food required until the next harvest in October 2009 is estimated at 800 000 tonnes (consisting of cereals, pulses, oils, and fortified biscuits and blended foods).
- Weather-wise, 2008 was overall a very favourable year, but the agricultural sector could not fully take advantage of good conditions. Main reasons for the below-average production include:
  - A long-term decline in soil fertility, mostly due to built-up acidity in soils reducing the plant absorption of nutrients from fertilizer;
  - Perennial shortages of critical agricultural inputs, especially fuel and fertilizer;
  - Vulnerability to extreme weather events, i.e. alarming trends in the concentration of summer rains, build-up in riverbeds, making them prone to flooding, and damaged or obsolete infrastructure;
  - Structural factors, including constraints on market activities, use of natural resources, and unresolved distribution of potential benefits from higher productivity in both lowland and slope agriculture.
- Seeds were widely available in 2008, but fertilizer supplies were only 60 percent of deliveries in 2007 and fuel supplies amounted to about 70 percent of previous year's levels. Yields for the main season fell accordingly; prospects for the next winter/spring season are also very modest.

1. OVERVIEW

FAO and WFP conducted a Crop and Food Supply Assessment Mission (CFSAM) in the Democratic People's Republic of (DPRK) from 9 through 24 October 2008.[1] This was the first such exercise since 2004; in late 2005 the DPRK Government had decided to sharply curtail humanitarian assistance after a short series of good agricultural years. Until 2008, food aid operations by WFP and other actors had thus reduced considerably, and further CFSAMs were not deemed necessary by the DPRK Government. The relative improvement in the food balance, however, proved short-lived, especially since the country suffered severe flooding in 2007. As of early 2008, the terms of a new agreement between the DPRK Government and various parties included up to half a million tonnes of food aid from the United States,[2] a Rapid Food Security Assessment (RFSA) to be conducted in June 2008 and a CFSAM scheduled for October.

The RFSA and CFSAM constituted two important and relatively rare opportunities to update all parties' understanding of the food production, availability, access and utilization in the country. Most of the CFSAM team members, both from WFP and FAO sides, had already participated in the RFSA. The two exercises covered the beginning and end of the main cropping season, allowing for comparisons and combination of data collected during both instances, at the county, childcare institution, farming cooperatives, and household levels.

The June RFSA covered all ten provinces, WFP surveying eight of them, with the remaining two being surveyed by US NGOs. General agricultural and food production information was collected in eight provinces, with FAO doing much additional fieldwork in two of them, South Hamgyong and South Hwanghae. All RFSA information was made available to the CFSAM team, who built upon this knowledge by covering again six out of ten provinces: South Hamgyong, Kangwon, North Hwanghae, South Phyongan, North Phyongan, and South Hwanghae.[3] In June 2008, for example, the FAO team visited six counties and sixteen cooperative farms in South Hamgyong province, as well as four counties and 10 cooperative farms in South Hwanghae, while in October, during the CFSAM the team visited a total of ten counties and nine cooperative farms in six provinces. The WFP members of the team visited the same counties and, in each county, a number of childcare institutions and households; some of the WFP visits also included farm cooperatives. A sample of the information collected during the county and cooperative farm visits is presented in Appendices 3 and 4.

The June and October surveys, when taken together, constitute a fundamental part of the CFSAM, as complemented by review of existing documents, including government data, observations during travel time and cooperative visits, interviews with knowledgeable sources in Pyongyang, as well as earth observation sources (satellite imagery, satellite data-derived rainfall estimates, and normalized difference vegetation index, NDVI).

2. OVERALL ECONOMIC SETTING, DEMOGRAPHY AND AGRICULTURE

2.1 Macro economy, trade and market trends

The DPRK economy[4] grew moderately between 1999 and 2005, a recent high point in agricultural production, but declined in 2006 to 1.4 percent and 2.3 percent in disaster-affected 2007.

Although mining output and construction lost ground in recent years, there were some modest gains in manufacturing, utilities and services, which cover transportation, hotels and restaurants, owing to a marked increase in foreign visitors.

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[1] Mission members included Simon Dradri (WFP team leader), Paula Hidalgo Sanchis, Hongyi Xie; Henri Josserand (FAO team leader), Tom Morrison, and John O'Dea.
[2] To be delivered through WFP (up to 400 000 tonnes) and US NGOs operating in the country (up to 100 000 tonnes).
[3] The detailed schedule of CFSAM visits, by province, is presented in Appendix 2.
[4] Based on Economist Intelligence Unit (EIU) reports and Bank of Korea, Seoul.

Between 2000 and 2005, DPRK's estimated commercial trade balance on goods has consistently been negative, being near or well over USD 1 billion per year. Main trading partners have included China, Republic of Korea (ROK), Japan, Thailand, the Russian Federation and the European Union.[5] In terms of the country's current account, this deficit has been only partly offset by a small positive balance on services, including travel and tourism, and a more substantial one on current account transfers (aid and workers' remittances). The current account can only assume to be balanced if a substantial amount of exports were to have been unrecorded, or if a significant share of commercial imports took place on very favourable concessional terms. It is unclear, for example, how imports from China (about USD 1.4 billion in 2007), are paid for.

Table 1. Key economic indicators, 2003-2007

	2003	2004	2005	2006	2007
Real GDP growth (%)	1.8	2.2	3.8	-1.4	-2.3
Exports (USD million)	1 066	1 278	1 338	1 467	1 685
Imports (USD million)	2 049	2 279	2 713	2 879	3 083
Trade balance (USD million)	-983	-1 001	-1 375	-1 412	-1 398

Source: Bank of Korea, Seoul and Korea Trade-Investment Promotion Agency, Seoul (as cited in the Economist Intelligence Unit, 2008).

This unexceptional performance should not conceal the fact that changes seem to be afoot on the economic front. For one thing, DPRK exports rose sharply in 2007 –a 15 percent increase from the previous year. Trade with ROK has almost tripled since 2002, partly reflecting the expansion of the export-oriented Kaesong industrial complex, and this trend was reportedly maintained in the first part of 2008. China, still the main trading partner in value, displays a growing interest in outsourcing production to DPRK, in establishing facilities there, and in expanding joint iron ore mining. These developments, combined with increasingly widespread and developed informal domestic trade networks, are taking the country further along the path where a centrally planned system and a limited market economy coexist. As we discuss in the section on the county balance sheets, informal internal transfer mechanisms are at work, helping remove disparities in food availability between city and countryside, and between other social groups. Farmers' markets have expanded dramatically since July 2002. In addition to official transfers from farming cooperatives to the Public Distribution System (PDS), both cooperative members and households residing in the cities report that many urban families depend extensively on farm relatives for agricultural produce and livestock, either for consumption, barter, or even to use for growing-out in town. At harvest time especially, one is struck by the increasing amount of people who are also getting about the country on a growing number of bicycles transporting grain or small animals.

2.2 Demography

The last national population census of 1993 put total population at 21.213 million. Since then, the Government has been providing estimates based on the Registration System. The figure currently used by the National Food Administration for drawing up the country's balance sheet in October 2008 was of 23.9 million, while WFP estimates (*see table below*) use a low annual population growth rate of 0.7 per cent, which would bring total population by the end of calendar year 2008 up to 23.55 million. On this basis, the CFSAM assumes a 2008/2009 mid-marketing year figure of 23 600 000.

1993	1995	1997	1999	2001	2003	2007	2008
21 213.00	21 511.02	21 813.23	22 119.68	22 430.44	22 745.57	23 389.16	23 552.89

UNFPA and the Central Bureau of Statistics are currently conducting a comprehensive census; overall population estimates should be available in the spring of 2009, with results at mid-year.

[5] "North Korea's External Economic Relations", Haggard and Noland, August 2007

2.3 Agricultural sector

The contribution of agriculture, including forestry and fisheries, has fallen from 30 percent of Gross Domestic Product (GDP) in 2004 to only 21 percent. The sector's performance has been erratic, in great part due to its vulnerability to natural disasters as droughts, floods, tidal surges, hail storms, typhoons and extremely cold winters, but volatility aside, the trend has clearly been downward. The next chapter of this report deals with the current production and prospects, but more generally speaking, the sector has been struggling with four main issues:

a) Long-term decline in soil fertility
b) Shortages of inputs
c) Vulnerability to extreme weather events
d) Structural factors

Long term decline in fertility of soils – Domestic farming techniques have increased the acidity of soils, which makes some soil nutrients unavailable and reduces the effectiveness of others, so that yields for all crops are very low by relevant world and regional standards. Producers are keenly aware of this, but large-scale lime application to improve the fertility of acidic soils is severely constrained by lack of transport facilities and fuel.

By the same token, double cropping of wheat and barley on already exhausted soils has reached its limits (also because of fuel constraints at planting time). Further development of leguminous crops in the crop rotation is widely regarded as essential. Applications of regular and high-quality compost obviously help, but there are alternatives and complements to this extremely labour and transport-intensive approach.

Perennial shortages of critical inputs - fuel, fertilizer, farming and transport machinery (until the sector fully moves to a more sustainable set of farming techniques), but also spare parts, plastic sheeting, etc. The June and October surveys converged closely on estimates that the 2008 fuel allocation averaged 64 percent of previous year's levels while fertilizer allocation represented only 60 percent of what it had been in 2007.

Continued vulnerability to weather events - Concern about the vulnerability of agriculture to severe weather events was, in some form or other, expressed consistently at all levels (national, county, cooperative). Chief reasons usually given include:

- There appear to be alarming trends in the amount and concentration of summer rains. Since 2005 rains have become both heavier and more concentrated over the July-August period. Rainfall in these two months used to amount to 60 percent of annual precipitation; it was about 90 percent in the summer of 2007[6];

- A gradual build-up of sediment, gravel, stones, etc. decreasing the depth of river and streambeds. Since so much of area cultivated is in floodplains, sometimes even in the actual upper river beds, the likelihood of flooding is very high;

- Recovery and rehabilitation from the August 2007 floods remain incomplete. Considerable labour has gone into rebuilding roads, bridges, embankments, small dams, and even into dredging of major watercourses, but much is still damaged, and vulnerable to repeated pressure from cresting water levels.

Structural factors – Increased market liberalization has helped, but producers must still overcome many constraints to enjoy the fruits of their labour, even though they readily accept that the larger share of their output should be redistributed to the rest of society. In addition, over the last few years, some of potentially most profitable components of the cooperatives (orchards, silkworm raising, some of the marine fisheries) have been turned over to specialized national agencies.

[6] About 1,000-1,200 mm in July-August.

Home garden production is spared incentive and institutional issues, and is highly productive, unlike hillside or slope agriculture. The latter phenomenon is informal, but appears to be widespread and tolerated, although its extent seems to have stabilized. Slope agriculture -to a large extent carried out by older women and pensioners—provides relatively low returns and is damaging to the environment. However, shifting to a more appropriate, technically sound and sustainable type(s) of slope agriculture or hillside agro-forestry requires institutional mechanisms, including rights of usufruct, which are still being designed and tested on a small scale. The issues of who manages these activities, and how their benefits are shared among relevant stakeholders (including cooperative farm members, county and provincial authorities), is still largely to be resolved and generalized.

3. FOOD CROP PRODUCTION IN 2008/09

3.1 Climate, topography and crop growing conditions

DPRK has a continental climate with four distinct seasons, which are only partially tempered, by its maritime location. Due mainly to altitude (DPRK is 80 percent mountainous) and partly to latitude, average monthly temperatures vary from -19°C in winter in the north (Ryanggang in January) to 25°C in summer in the south (South Hwanghae in August). The frost-free period ranges from 160 to 190 days, which at lower altitudes in the south allows double cropping. About 85 percent of all precipitation occurs during the summer months, and most of that is squeezed into July, August and September. When this concentration combines with typhoons, mid-summer rainfall can be (as seen in 1995 and 2007) devastating in agricultural, economic and human terms.

Rainfall in 2008 as reported by cooperative farm managers and the Ministry of Agriculture (MoA) has been, agriculturally speaking, generally excellent, as the following table indicates:

Table 2. Rainfall 2008 (mm)

Province	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept
Pyongyang	12	11	16	54	50	75	310	158	50
South Phyongan	14	13	13	37	50	72	267	314	23
North Phyongan	9	12	15	34	84	114	332	276	28
Chagang	9	10	12	23	68	153	187	142	12
South Hwanghae	12	13	22	51	65	121	176	262	81
North Hwanghae	12	11	16	39	31	44	253	218	75
Kangwon	46	34	66	16	47	217	330	374	92
South Hamgyong	15	14	25	16	22	84	159	217	32
North Hamgyong	11	12	28	11	131	10	179	189	10
Ryanggang	6	7	13	8	45	22	127	97	13

Source: MoA

There were additional comments, as follows: a moderate June drought which some farm managers reported, e.g. in North Hamgyong, affected transplanting of rice where the damage to irrigation systems in August 2007 had still not been fully repaired; low September and October rainfall affected germination in winter crops moderately in most areas; on the other hand bright and dry autumn weather aided crop maturation and harvesting operations; and there were no extreme weather conditions or events.

3.2 Cropping patterns

Over 80 percent of arable land is used for cultivation of cereals, compared to about 60 percent in China. There is a concomitant imbalance in farm livestock and the fodder crops to support them, which has a knock-on effect on soil fertility and agronomic sustainability. The preferred crop for flat

land is irrigated rice. It is mainly mono-cropped but sometimes followed by winter wheat, spring barley or potatoes. Maize, the second main crop is grown on adjacent upland, and may be similarly double-cropped if resources, mainly farm power, allow it. In the northern provinces, higher latitude and altitude prevents double cropping, and potato therefore predominates as a main crop.

3.3 Area planted

The total area planted, which is presented in Tables 6 and 7, derives from five main categories:

a) Cooperative farms
b) State farms
c) Household gardens on cooperative farms
d) Other kitchen gardens
e) Sloping land cultivation outside cooperative farms

a) Cooperative farms

According to MoA official statistics, only about 15 percent of the country is flat arable land[7], and it is within this area that about 3 000 cooperative farms are located and almost all the rural population live. Average farm size is just over 500 ha, usually including 100 ha of forest for fuel wood, and the total cultivated land on cooperative farms now is around 1.5 million ha.[8] The main crops grown are as follows:

Paddy

Japanese rice is the temperate cousin of (more accurately a different sub-species from) tropical rice which is common in much of the rest of East Asia. It is longer growing, higher yielding[9] (providing it is properly fertilised; unlike tropical rice it has a high response to manuring), and, again by contrast to tropical rice, has only moderate tolerance (as evidenced, for example, by tillering) to unfavourable weather conditions. It should not be compared, at least in yield, agronomic, and (outside the DPRK context) international market price terms, to tropical rice. These agronomic characteristics are mentioned here because, as will be seen, they have relevance to this year's CFSAM; and the farming conditions and shortage of basic inputs that DPRK is now experiencing would not have the same impact on food security in a country growing tropical rice. DPRK now has lower yields than any other country that grows Japanese rice[10]. It is generally transplanted, but labour constraints underpin a gradual move towards direct seeding (which has a moderate penalty in terms of yield but a higher marginal return to labour). Average yields are now (at <3.0t/ha) much lower than in the late 1980s and early 1990s when high mechanisation and fertiliser rates produced a national average of more than two and a half times this level. On the other hand, production is now in some respect more efficient: major canal realignment now allows gravity fed as opposed to pumped irrigation (as well as electricity for urban and other uses); and improved field layout allows more efficient mechanisation (at least potentially). Almost the entire crop is irrigated, but there is a small amount of upland rainfed rice. There has been a very small decrease in area of paddy compared to 2004, and in spite of some increase in coastal polders, the net result is lower mainly because of roadside tree planting, as well as land surrendered to major irrigation canal realignment.

Visually, the rice crop this year appears shorter compared to 2004, apparently due to fertiliser shortage. This was confirmed by farm managers, and the MoA agronomist who accompanied the Mission. Moreover, to still see rows in the crop at harvest is very unusual, apparently due to lack of

[7] Higher figures, e.g. 18 percent, reflect expansion in the hilly land areas within cooperative farms in response to food security pressures
[8] Again, there are different figures, sometimes as low as 1.3 million, reflecting variations over time. The Mission believes the round number of 1.5 million is roughly right at this time.
[9] Potentially by a factor of about three.
[10] Japan, ROK, North China, New South Wales (historically and probably still the holder of the world's highest recorded yield for rice), Southern Europe (e.g. Italy and Spain), California, and South America below 30° latitude.

tillering and fertiliser shortage after transplanting. This in turn led to insufficient competition by the rice plants against weeds, and even the massive mobilisation of labour for weeding seems to have been insufficient to overcome this, so that some weeds were visible at harvest, again a rare sight.

The crop consumes huge amounts of labour, to the extent that major mobilisation of the urban population, including school children, civil servants and the army, is needed at transplanting, weeding and harvesting times for up to a month at each of these three stages. To compensate for lack of fuel and fertiliser, this mobilisation has been both at an unprecedented high level this year and substantially allocated to compost making. The resulting production has been impressive, but the sustainability of such mobilisation is, in the Mission's view, questionable, even with adequate levels of fertiliser, which might raise the marginal productivity of labour towards more credible levels.

Maize

Almost the whole crop is transplanted, perhaps 90 percent. No other country, in the Mission's knowledge, does this for maize, even partially. Moreover, a recent development is to grow seedlings in compressed high quality compost pots as for high value horticulture markets in some developed countries. About 10 percent is direct seeded, and all is done manually. The crop is almost entirely rainfed. There has been a very small increase in area compared to 2004, and this seems to be a small reversal of the general retreat from marginal soils which started prior to 2004. This reversal may be due to general pressure on food production. More marked than in rice, the crop appeared shorter than in years with normal amounts of fertiliser, and grain fill was frequently inadequate.

Potato

Potato is grown as a spring double crop in the southern rice bowls, preceding rice on the flat land, and preceding maize on the upland, and to a much greater extent as a single main crop at higher altitude in the northern provinces of Chagang and Ryanggang. The general constraint of adequate seed as reported in the 2004 CFSAM report has now been largely overcome. This has been assisted by IFAD financing of the national seed potato facility at Daehongdang in Ryanggang, which now distributes disease free mini-tubers to multiplication farms in each county. All members of the team had been in DPRK in June on other missions and had the opportunity to observe the potato crop. The quality of the crop appeared good. Moreover, the area under maincrop potatoes has doubled since 2004, from 89 000 ha to 181 000 ha this year. The spring crop area has also increased, from 100 000 ha in 2004 to 128 000 ha this year. Given the lack of fuel and farm power on which double cropping essentially depends, this is impressive but yields are lower this year due to lack of fertiliser.

Winter wheat and spring barley

The area under these crops has reduced substantially since 2004, from 70 000 ha for winter wheat in 2004 to 56 000 ha this year, and from 32 000 ha in spring barley to 22 000 ha. This is a logical management decision, nationally and at farm level, and is due to the switch to potato, described above. The switch breaks the graminaceous disease cycle, produces higher returns to labour, and takes advantage of the new availability of high quality seed. A counterbalancing disadvantage is that potato is less easily stored and, unless processed into noodles, cannot be used so easily as a strategic and transportable food resource.

The Mission was able to see recently planted winter wheat. It looked quite good, but the moderate autumn drought has affected germination somewhat. Normally this would be overcome by tillering, but with the lack of fertiliser this is likely to be only partial. An estimated yield decrease of 15 percent can be expected in 2009 compared to 2008 and has been factored into the tables below accordingly.

Soybean and other crops

Other crops produced are mainly soybeans, which has increased substantially since 2004, from 60 000 ha to 82 000 ha now. Moreover, a marked change in the way it is grown is that it is now mainstreamed into the rotation and is planted as dedicated fields as opposed to previously occupying small land parcels, and as one of the last jobs in the busy spring labour calendar. This is because of a general awareness of the need for sustainable farming and stable rotations to build soil fertility and to break disease cycles.

b) State farms

There are a few State farms that specialise in the production of seed and breeding livestock. They do not figure in tables 6 and 7, were not part of the itinerary and, for the purpose of this mission, are not relevant in terms of food production. They do however play a significant role in the efficient and timely delivery of high quality seed, and all farm managers reported that this was largely satisfactory. Farm managers do retain farm seed for their own use, but apparently not to a greater extent than they need to, from an agronomic viewpoint. Almost all maize seed, for example, is hybrid and has to be replaced annually, and in the few cases where this did not occur 100 percent, only a small area was planted with composite seed.

c) Private kitchen gardens on cooperative farms, and other kitchen gardens

The households of cooperative farm members are each allocated 30 *pyong* of kitchen garden, just less than $100m^2$. Nationally, this amounts to about 17 000 ha only, but this can be regarded as a minimum figure because the area cultivated by the household often somehow spills over to roadsides and stream banks. About half as much area in addition, i.e. about 8 000 ha, is estimated to constitute kitchen gardens in urban areas and attached to factories and institutions. These are Mission estimates; the MoA has no figures available. In round terms, this is assumed to be 25 000 ha, the same figure as in the 2004 CFSAM report. However, the yield assumption of that report is now considered to be conservative and has been increased from 4t cereal equivalent per ha on half the garden to 6 t/ha. This is for two reasons. First, the number of small livestock kept in the garden has risen a lot in the last few years, partly because of the increase in trade between the cooperative and the households, partly because of the increased availability of micro-credit and partly because of the new opportunity for exchanging these animals for grain in the farmers' markets that are open on the 1^{st}, 11^{th} and 21^{st} day of each month. These exchanges constitute a transfer and do not represent an increment in overall grain production. But the increased number of animals also significantly raises the soil fertility of kitchen gardens, leading to higher yields. Second, there has been increased availability of high quality seed, particularly potato seed, since 2004. This was much in evidence in June.

d) Sloping land cultivation outside cooperative farms

Following the severe food shortages of the mid- and late-1990s and the inability of the PDS to deliver full food rations, some urban dwellers were informally allowed to cultivate sloping land that had previously been restricted for cultivation. Although this is now seen as unsustainable and damaging, at least in its present form, at the time there were few practical alternatives and it was allowed as a temporary strategy to reduce food insecurity for vulnerable groups such as the urban elderly for whom pensions and PDS support were insufficient. The disastrous floods of the mid-1990s were partially the result of soil and hillside degradation, i.e. the floods would have happened anyway but, in the view of many experts in government and aid organisations, were made worse by environmental degradation and slope cultivation, which increases surface flow of rain water. Since that time, encroachment onto the hillsides does not appear to have decreased, but certain factors have become clearer.

First, the Government agency responsible for such slopes, i.e. those over 15 percent, is, and historically has been, the Ministry of Land and Environmental Protection (MoLEP). Their expertise

is natural resource protection and forestry, not agriculture. Their mandate is to monitor the situation, and to implement Government policy to rehabilitate these areas to natural forest, i.e. to reforest sloping land while crop cultivation around the new trees is allowed until the canopy closes.

Second, opinion among some Government and international agricultural experts tends towards a possible future strategy that would rationalise, stabilise, and improve the management and productivity of sloping land agriculture within catchment conservation plans. FAO and some international NGOs are assisting with this. The adapted technology is progressing, but it needs to be embedded in a formal organisational structure that has agricultural expertise.

Third, the extent of the problem (or opportunity) has become clearer since 2004. There has been controversy not only over the number of hectares affected, but over what constitutes encroachment. To a MoLEP forester, encroachment means anything more than aggressive collection of firewood; to an MoA agriculturist, encroachment means annual cropping, even if that is now tempered by eliminating crops like maize that encourage erosion, planting on the contour with ridged crops like sweet potato, and as already mentioned, rudimentary agro-forestry with crops planted under new tree planting. MoLEP's estimate dated July 2008 for their idea of encroachment is >1 million ha. But actual crop cultivation is, they estimate, between 300 000 and 350 000 ha. The Mission believes both these figures are realistic, based as they are on reports from their Forest Rangers located in every county. The 2004 CFSAM report tentatively estimated six (6) percent of formal arable land, i.e. 75 000 ha. That now seems to be too low, and has been adjusted in this report to 16 percent, i.e. 300 000 ha.

Fourth, production estimates have also been controversial and reports anecdotal. One reason to believe the anecdotal reports of higher production, say 0.5 - 1 t/ha of cereal equivalent, compared to more cautious reports, of say 0.2 t/ha, is that the higher figure fits the county balance estimates better. Another reason to believe the higher estimates is the number of maize stalks per ha – 15 to 25 per m^2 which is an indication of quite high soil fertility. The 2004 CFSAM report assumed 0.73 t/ha and the Mission's opinion is that at that time it was true. Now however, with closer supervision by MoLEP, the restriction to certain slope-friendly crops, competition from new tree planting, and perhaps somewhat depleted soil fertility because cultivation is now confined to the more stable slopes, the Mission has reduced average slope yields this year to 0.5 t/ha cereal equivalent.

3.4 Livestock

Farm managers interviewed by the Mission reiterated Government policy as follows: a) to increase grass eating animals; b) to decrease grain eating animals; c) to increase draught oxen from one per 3 ha at present to one per 2 ha (for which the use of artificial insemination to practically achieve this is now widespread); and in general shared figures to show it was indeed happening. MoA official figures for 2008 subsequently received confirm these general trends.

Table 3. DPRK Livestock ('000)

	2004	2008
Cattle	566	576
Pigs	3 194	2 178
Sheep	171	167
Goats	2 736	3 441
Rabbits	19 677	26 467
Chickens	18 729	14 071
Ducks	5 189	5 878
Geese	1 580	1 477

Source: MoA

3.5 Farm inputs

a) Labour and farm power

The fuel availability in 2008 was remarkable which had a substantial influence on crop yields and overall cereal production. There was reduced availability of fuel as shown in the table below:

Table 4. Farm fuel allocation 2008 ('000 t)

	Plan	Actual
Diesel	100	70
Gasoline	20	10

Source: MoA

The average of farm managers' responses to mission questions indicated that fuel availability was less than this, at 64 percent of what they called "normal" allocation, where "normal" means much less than requirement. In short, fuel supply was acutely and unusually low this year. This, together with labour requirements for compost led to substantial extra mobilisation of labour from urban areas. Most farm managers reported 30 percent more than normal and one reported 60 percent more. All farm managers agreed that the level of labour mobilisation was unprecedented. The extra labour was provided to cope with the three main peak requirements during the crop calendar: rice transplanting, weeding, and harvest. This happens in most years, but the extra amount of urban labour provided this year meant that farm labour could concentrate on the more skilled tasks.

All farm managers reported that their policy was to increase the number of draught oxen to compensate for the now perennial shortage of tractor power. Nationally, there is one ox per 3 ha; the target is one to 2 ha.

b) Seeds and planting material

All farm managers reported that seeds and planting materials were satisfactory, and are being replaced by new seed delivered by specialized producers according to recommendations. About 3 percent of the rice crop is retained for seed annually on cooperative farms; maize seed, almost all of it hybrid, is replaced every year, and so no maize seed is debited to the food balance sheet. About 10 percent of wheat and barley is retained for seed annually on cooperative farms; the equivalent figure for potato, which is replaced from outside the farm every three years, averages about 15 percent annually. There was no indication of lack of resources to pay for these seeds, and farm managers indicated that they were satisfied with these particular inputs.

An appreciable change compared to 2004 is the improved availability of disease free potato seed, and evidence of its effect was seen in June, not only on the cooperative farms but also in the private kitchen gardens of cooperative members' households. As already mentioned above, this has underpinned the substantial increase in area planted. The national potato breeding facility at Daehongdan has been supported by IFAD and the Swiss Development Cooperation (SDC), and this now delivers virus free mini-tubers to multiplication farms in each county.

The actual seed rate for wheat and barley is high at 200 kgs/ha and has been factored into the county balances. The national recommendation is reportedly 150 kgs/ha, but the higher rate is believed to be a risk-avoiding measure compensating for low soil fertility and lack of fertiliser.

c) Fertiliser, compost and soil fertility

Fertiliser, always a short commodity, has been scarcer this year than farm managers can remember, and overall is 60 percent of 2007 levels. None of the farm managers interviewed had had any P (phosphorus) or K (potassium) this year, only N (nitrogen) as urea (although the amounts expressed in the table below are as ammonium sulphate equivalent, a DPRK

convention). As already mentioned, fertiliser, or lack of it, matters a lot to Japanese rice yields, compared to tropical rice which, in other countries, often receives no fertiliser at all. Japanese rice will continue to give yield response up to 150 kgs/ha of elemental N, giving a large increase in panicle numbers with the increase in nitrogen. Normal (not recommended) rates in DPRK are 75 to 95 kg/ha; but this year the average farm visited by the Mission applied 45 to 60 kg/ha.

Table 5. Fertiliser availability, October 2007 to September 2008, (tonnes)

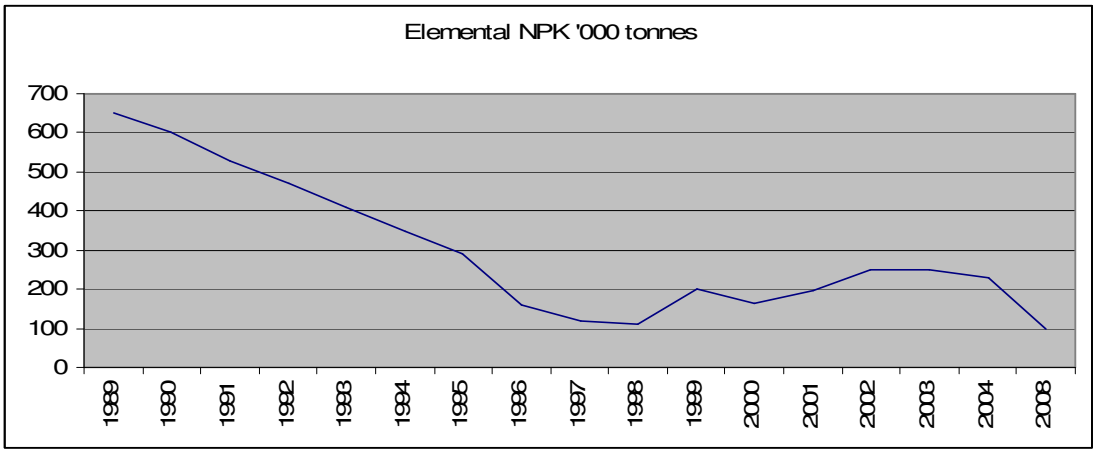
	Domestic production	Import	Assistance	Application	Stock from 2007	Actual stock
N	256 800	180 500	657	438 457	1 400	900
P	7 425			7 425		
K	10 415			10 415		

N = 21%, Nitrogen
P = 50%, Phosphorus
K = 15%, Potassium
Source: MoA

Moreover, they had not anticipated the severity of the scarcity until spring, and had applied normal amounts (here as elsewhere in this report normal does not mean recommended amounts) to the winter and some spring crops in the expectation of better supplies. It was largely the eventual realisation of severe fertiliser shortage that led to the abnormally high level of urban labour mobilisation, which was largely used for making compost and its application.

The urea that was delivered this year was a mix of domestic production and imported (from China mainly [“Import”], as well as small amounts on a project basis by aid agencies [“Assistance”]). The Republic of Korea (ROK), historically a regular supplier, did not deliver any fertiliser this year and the EC stopped delivering fertiliser in 2004. Domestic production is reportedly from three factories that are operating well below capacity. In terms of nutrient content, production is roughly the same as reported in the 2004 CFSAM.

Figure 1: Fertiliser application 1989 to 2008



Source: CFSAM 2004 report and MoA

A change compared to 2004 is the effort that seems to have gone into the application of lime, even though this is in many cases still not sufficient. As identified in the 2004 CFSAM, there has been a progressive increase in soil acidity on many farms so that the P becomes locked in the soil and largely unavailable for crop growth and grain formation. This in turn affects the effectiveness of N and K. Any tendency to increase the amount of N applications to compensate for this lack of response leads to increased soil acidity. But farm managers have limited resources to extract themselves from this vicious circle, and this year the lack of fuel to transport large amounts of lime has meant that the problem is not improving. In other words, a renewed availability of fertiliser in the future (especially P and K) may not be fully effective. The rebuilding of soil fertility is needed first.

The deep problem of depleted soil fertility is being addressed very seriously by the MoA and other government agencies, at central and local level, as well as by farm managers. Much of the remarkable labour mobilisation has been directed at compost making. In the medium and long term this will restore soil fertility, but the extent to which it compensated for lack of fertiliser this year is questionable, coming as it did late in the spring, (and even though, even more remarkably, much of this was applied by hand soil injectors to individual plants in the root zone). There are two types: ordinary compost which is made of regular crop residues and plant material cut from the hills or waste ground; and "*hukbosan*", or improved compost. The ingredients of hukbosan vary, but include any or most of the following: crop residues, animal dung and evaporated urine, human waste delivered from the towns, urea fertiliser to speed decomposition (farm managers reported using up to 10 percent of their fertiliser this way), peat (often brought by rail from up to 100 kms away), lime, and river silt. The target is 5t/ha of hukbosan and 25t/ha of ordinary compost (compared to 20t/ha last year). Few farm managers had managed to achieve this, but most had got close to the target.

d) Pest and disease control

No major outbreaks were reported to the Mission. The use of integrated pest management and the use of bio-pesticides (e.g. water infused with crushed potato leaves [solanin] to control insects in rice) seem to gain steadily in popularity and sophistication. It is generally quite effective, but it may also be seen as a coping mechanism in the absence of more effective but expensive chemical pesticides.

e) Irrigation

Since 2004 there has been a steady improvement in the general availability of irrigation water due to the major canal realignments started in 1999 and still going on. The realignments are massive and expensive operations to reduce dependence on scarce electricity for pumping and to rely more on gravity. But the floods of August 2007 damaged some irrigation infrastructure. Although again there has been impressive labour mobilisation to repair the damage, some farm managers reported that they still had some difficulties with irrigation. However, the problem is not severe and cases seem isolated, not pervasive, and farm managers reported that in most cases all repairs would be completed this year.

3.6 Crop yields and production

Overall, the Mission concludes that average yields have not fallen by as much as the severe lack of fuel and fertiliser, the low soil fertility and long term underinvestment in farm machinery would suggest. Mitigating factors, in order of importance, are: the increased mobilisation of labour for transplanting, weeding and harvest, and compost making; excellent weather; increased application of compost, particularly hukbosan and its sub-soil injection; and improved seed and planting material. Based largely on interviews with farm managers, the Mission's estimate is that overall average yields are about 75 percent of 2004 values, a relatively recent "normal" year. This figure varies by crop and by location.

a) Post harvest losses

Post Harvest Losses (PHL) in physical quantitative (as opposed to qualitative) terms seem rather low, at about 5 percent to 8 percent. The varieties of rice used do not shed grain easily. Great care is used in cutting, stooking, and transporting to the cooperative farm for threshing which is done with electrical powered threshers where the straw and grain is passed through up to three times to ensure minimal loss. Maize is dried to 17 percent moisture on any available flat surface before being delivered to the central authorities, and thereby collects many insects and moulds. Again, in quantity terms losses are low, and gleaning of grain that is dropped is efficient and not lost to consumption.

This estimated value of 5-8 percent refers only up to and including this point. When the grain then passes from the farm to the central authorities, losses are likely to be higher. The Mission saw some central stores and heard reports of others that indicate the likelihood of high losses.

In quality terms, losses are high, but it is difficult to put a figure on quality. Rice stays stooked in the field for up to a month and even without rain can develop moulds and eventual off-tastes. Maize collects insects and moulds through the way it is dried (see paragraph above) and however good the central storage facilities are, quality once lost cannot be restored. The 2004 report quoted PHLs as 15 percent. Overall, for the purposes of county balances, the Mission adheres to the same figure this year.

b) Wild food

The collection and consumption of wild food is deep within the Korean culture and happens whether or not there is food shortage. It is generally done by old people for the household. It may be done more in times of food shortage, but it seems not to be a main source of calories (at least not in comparison with the calories expended collecting them), more of condiments, luxury food, fungi, herbs, and flavouring. For example, pine bark may be used to flavour noodles, certain grasses may be used to flavour rice, (sometimes to counteract off-tastes – see PHLs above) bellflower root is considered a delicacy (it is gathered wild and also cultivated in the kitchen garden, probably also in sloping land cultivation), and bracken shoots.

Table 6. 2008 main season crop production (area in '000 ha, yield in t/ha, production in '000 t)

Province	Paddy			Maize			Potato [1]			Other (soya, etc)			Total	
	Area	Yield	Prodn	Area	Yield	Prodn	Area	Yield	Prodn	Area	Yield	Prodn	Area	Prodn
Pyongyang	26.60	2.86	76.08	13.59	3.13	42.54	2.85	2.06	5.87	2.80	1.23	3.45	45.85	127.94
South Phyongan	110.12	3.00	330.36	68.99	3.13	215.92	25.15	1.97	49.55	12.25	1.09	13.35	216.51	609.19
North Phyongan	101.05	2.94	297.09	87.15	3.13	272.77	32.22	2.06	66.37	10.29	1.16	11.93	230.70	648.16
Chagang	7.00	2.57	17.98	35.00	2.73	95.56	4.17	2.21	9.22	11.12	1.38	15.34	57.29	138.11
South Hwanghae	146.15	3.22	470.60	86.71	3.37	292.22	25.00	2.21	55.25	15.85	1.73	27.43	273.71	845.50
North Hwanghae	58.68	2.79	163.73	74.53	2.65	197.50	18.62	1.97	36.68	9.66	1.73	16.71	161.49	414.62
Kangwon	33.95	2.43	82.50	36.30	2.17	78.78	10.01	1.75	17.52	6.81	1.01	6.88	87.08	185.68
South Hamgyong	60.00	2.57	154.20	46.69	2.24	104.58	31.29	2.06	64.46	2.06	1.45	2.99	140.04	326.23
North Hamgyong	24.88	2.43	60.46	48.97	2.08	101.85	12.91	2.13	27.50	5.50	1.38	7.59	92.26	197.40
Ryanggang	1.95	1.93	3.76	5.23	1.85	9.68	18.47	2.58	47.65	5.38	1.52	8.18	31.03	69.27
Total/weighted average	**570.39**	**2.90**	**1 656.77**	**503.15**	**2.81**	**1 411.39**	**180.69**	**2.10**	**380.07**	**81.73**	**1.39**	**113.86**	**1 335.96**	**3 562.09**

Source: MoA with yield values modified by the Mission
[1] Potato production in cereal equivalent at 25 percent conversion rate.

Table 7. Forecast of winter and spring double-crop production, 2008/2009 (area in '000 ha, yield in t/ha, production in '000 t)

Province	Winter wheat & barley			Spring wheat & barley			Spring potato[1]			Total	
	Area	Yield	Prodn	Area	Yield	Prodn	Area	Yield	Prodn	Area	Prodn
Pyongyang	2.75	1.99	5.47	0.68	1.49	1.01	2.70	2.20	5.94	6.13	12.43
South Phyongan	9.78	1.84	18.00	3.30	1.53	5.05	20.85	2.87	59.84	33.93	82.88
North Phyongan	8.70	1.79	15.57	2.50	1.62	4.05	25.60	2.34	59.91	36.80	79.53
Chagang	0.55	1.46	0.80	0.40	1.59	0.64	2.10	1.74	3.66	3.05	5.09
South Hwanghae	18.80	1.67	31.40	7.50	1.38	10.35	22.35	2.26	50.51	48.65	92.26
North Hwanghae	8.85	1.55	13.72	3.16	1.43	4.52	17.00	2.27	38.59	29.01	56.82
Kangwon	2.80	1.61	4.51	1.48	1.53	2.26	9.00	2.08	18.72	13.28	25.49
South Hamgyong	3.00	1.59	4.77	1.75	1.45	2.54	21.00	2.13	44.73	25.75	52.04
North Hamgyong	1.00	1.45	1.45	1.40	1.44	2.02	7.20	1.82	13.10	9.60	16.57
Ryanggang	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total/weighted average	**56.23**	**1.70**	**95.69**	**22.17**	**1.46**	**32.43**	**127.80**	**2.31**	**294.99**	**206.20**	**423.11**

Source: MoA with yield values modified by the Mission
[1] Potato production in cereal equivalent at 25 percent conversion rate.

Table 8. Total food crop production forecast for 2008/2009 including cooperative farm household gardens and sloping land outside cooperative farms (area in '000 ha, production in '000 t)

Province	Total area (including double cropping)	Total production	
		Unmilled cereal equivalent	Milled equivalent[1]
Pyongyang	52	140	106
South Phyongan	250	692	541
North Phyongan	268	728	580
Chagang	60	143	122
South Hwanghae	322	938	723
North Hwanghae	190	471	382
Kangwon	100	211	169
South Hamgyong	166	378	308
North Hamyong	102	214	177
Ryanggang	31	69	67
Farm total	**1 542**	**3 985**	**3 174**
National household gardens on cooperative farms	25	75	56
National sloping land production outside cooperative farms	300	150	113
National total	**1 867**	**4 210**	**3 343**

[1] Paddy converted to rice with a milling rate of 65 percent; maize milling rate of 85 percent; cereal equivalent for potatoes at 25 percent

4. FOOD SUPPLY/DEMAND OUTLOOK, NOV. 2008 – OCT. 2009

4.1 County cereal balance sheets, 2008/09 marketing year

During the June and October 2008 data collection, the FAO/WFP team visited a number of counties to assess the overall food supply and demand conditions, as well as distributions at Public Distribution Centres (PDCs) and general food security and nutrition conditions. The team then split up with one group visiting child care institutions and households, and another focussing on farming cooperatives. County interviews were designed to obtain basic information, and to provide the background for more detailed interviews. However, an additional benefit is that they could be structured to generate a simple county balance sheet, as a way to check orders of magnitude, verify the consistency of information, and shed some light on the theoretical difference in food availability between farm cooperatives and other social groups in the county. Since food surplus counties are also supposed to provide food to deficit ones, it also provided an opportunity to discuss inter-county food transfers. The table below summarizes the information used to derive simple county food balance sheets. With prepared templates, the information could be generated during discussions with county officials, and prompt additional questions and discussion.

Table 9. Basic county balance sheets

Province	**South Hamgyong**	**Kangwon**	**North Hwanghae**	**South Phyongan**	**North Phyongan**	**South Hwanghae**
County	**Sinhung**	**Chonnae**	**Singye**	**Songchon**	**Pakchon**	**Haeju**
Population (total)	102 402	80 584	76 800	162 200	95 598	244 649
PDS dependents	56 715	62 630	34 000	107 225	29 228	215 644
Cooperative farmers	45 687	17 954	42 800	54 992	66 370	29 605
No. of cooperatives		15	16	20	19	7
Total milled cereal production, less PHL (15%)	14 459	8 840	15 039	13 600	29 351	14 290
Industrial use (tons)	434	245	900	1000	550	360
Transfers from (+) /to (-) outside counties	0	0	- 500	8000	-16 000	15000
Net available to county (summer crops)	14 025	8 595	13 639	20 600	12 801	28 930
Net available to county (summer + spring)	15 427.0	9 454.5	15 002.4	22 660.0	14 080.6	31 823.2
Per capita theoretical availability (kg/cap/yr)	**151**	**117**	**195**	**140**	**147**	**130**

The county cereal balance sheets[11] are similar to the national ones, but are done 'in situ' during interviews with county officials, and are less detailed. The per capita theoretical availability from a small sample cannot be used to derive a national average because the inter-county transfers only cancel out when all counties are taken into account, or when a national balance is derived. However, they are instructive in providing a general sense of the range of per capita cereal balances at the county level; in this case, the population-weighted average across this small set of counties equals 142 kilograms per person/year (milled). Another advantage of deriving county cereal balance sheets is that it highlights the difference in availability between members of cooperative farms and other social groups, falling under the PDS dependent category. In this case, if the farming population of the seven counties were to receive an average 260 kg (unmilled) of cereals per person per year, this would leave only 82 kg/person/year on the average for PDS dependents. Such a disparity is unlikely to happen, for several reasons. First, cooperatives have to provide a substantial share of their production to the PDS, both in exchange for various agricultural inputs, and as a contribution to the national food supply. Second, social support mechanisms are at work between countryside and city, so that some of the cooperative food supply is shared with relatives in urban areas. Finally, informal marketing systems absorb a share of cooperative production, which also tends to 'even out' the domestic food supply.

[11] Including the cereal equivalent contribution of potatoes.

4.2 National cereal balance sheet, 2008/09 marketing year

The 2008/09 marketing year cereal balance sheet, in Table 10 below, is based on a number of estimates and assumptions, some of which were derived by the team from its own observations and analysis, while others were drawn either from previous CFSAMs in DPRK or provided by the National Food Administration.

- Total gross cereal and cereal-equivalent production is estimated to be 4 210 thousand tonnes, including 3 562 thousand tonnes of main season and 423.1 thousand tonnes of secondary season production. Home gardens are estimated to contribute 75 thousand tonnes, and slope cultivation 150 thousand tonnes of cereal equivalent;
- Mid-marketing year population is estimated to be 23 600 000 (FAO/WFP estimate);
- Annual consumption of cereals is set at 167 kg/person (including potato in cereal equivalent), which represents about 1 600 Kcal, or roughly 75 percent of the average person's daily energy requirement of 2 130 Kcal (FAO/WFP estimate). Another estimate is derived on the basis of a lower per capita annual consumption (142), for comparison purposes;
- A seed requirement of 280 000 tonnes, based on seeding rates practiced in the country:
    - Rice: 3 percent of the rice crop being retained for seed annually on cooperative farms;
    - Maize: almost all hybrid, produced on specialized seed multiplication farms, and not debited to the balance sheet;
    - Wheat, barley and other cereals: 10 percent;
    - Potato: average of 15 percent annually.
- A paddy-to-rice milling ratio of 65 percent (FAO standard estimate), compared to the official 75 percent rate. The standard maize milling rate in DPR Korea is set at 85 percent, but maize is used as a whole grain in many products, so the actual average milling rate may be slightly higher;
- Post-harvest losses of 15 percent of gross production. The level of post-harvest crop losses in DPRK remains a contentious issue, with estimates up to 30 percent, but there is as yet no scientific basis to settle the issue. Paddy is left to dry in fields and can be damaged by moisture from undrained fields or rain. Maize cobs are left to dry first on the stalk, then on the cob, and finally as grain on roads and other flat surfaces. The 2004 CFSAM report explained in detail all factors potentially affecting post harvest losses but concluded that a rate of 15 percent was reasonable in the absence of representative and detailed sample studies. This team felt that post harvest losses from the field to storage areas are quantitatively small (5-8 percent), but the physical condition of storage facilities at the country and provincial levels is poor. Consequently, the quality of stored material (degree of moisture, infestation with various insects) is also poor. In conclusion, this team regards a 15 percent level of post harvest losses as a reasonable lower bound estimate. This compares with the official estimate of 2.2 percent provided by the National Food Administration;
- Industrial use is set at 89 300 tonnes (National Food Administration), a relatively low percentage of national availability;
- A feed-grain requirement of 223 900 (National Food Administration) – the equivalent figure in 2004 was 181 000 tonnes;
- The amount of food set aside by the National Food Administration for Public Services, including state restaurants, etc. is set at 12 500 tonnes;
- Finally, 'other uses' add up to 20 400 tonnes;
- The National Food Administration reportedly plans to import commercially 360 000 tonnes of food in 2008/09, compared to 770 000 tonnes in 2007. In our view, the commercial import capacity of the country is comparable to what it was last year. For example, considering that DPRK reportedly imported about USD 334 million of cereal and meat products in 2007 (at much higher international prices), we estimate that at current prices the country could procure up to 500 000 tonnes of a combination of rice, maize and wheat;

- An estimated 450 000 tonnes of food aid has been resourced or pledged for the marketing year at the time of CFSAM. However, this includes also not yet officially confirmed contributions, the arrival of which is not assured and could be subject to possible changes. An additional 130 000 tonnes have been included in a recent appeal, but they are not yet pledged, and do not appear in the balance sheet.

Table 10. DPRK food (in cereal equivalent) balance sheet, marketing year 2008/09

	2008/09
DOMESTIC AVAILIBILITY	**3 343 000**
Domestic production[1]/ (milled equivalent)	3 343 000
Stock change	0
TOTAL UTILIZATION	**5 129 070**
Food use[2/]	3 941 200
Non-human utilization	1 187 870
Incl. Industrial use	89 300
Feed use	223 900
Seed use	163 770
Losses	678 000
Public services (rest)	12 500
Other	20 400
IMPORT REQUIREMENT	**1 786 070**
Anticipated Commercial Imports[3/]	500 000
Uncovered Food Deficit	1 286 070
Of which, food aid on hand or pledged[4/]	450 000

[1/] Includes potatoes in cereal equivalent.
[2/] Calculated at a 167 kg/person consumption rate for a total population of 23.6 million (mid-marketing year population).
[3/]Based on previous years' levels, including concessional loans; subject to possible changes.
[4/] Includes pledged but not yet officially confirmed contributions; subject to possible changes.

Based on a traditional CFSAM net cereal utilization of 167 kg/capita/year and taking into account non-human utilization (seeds, feed, losses etc), the total cereal import requirement in 2008/09 is estimated at 1 786 070 tonnes. Assuming commercial imports is maintained at the substantial levels of previous year (500 000 tonnes) and that all food aid pledges of 450 000 tonnes are officially confirmed and delivered, the country would face a remaining deficit of 836 000 tonnes.[12] Should any of these assumptions not hold true, this will result in a higher uncovered deficit.

5. VULNERABILITY/EMERGENCY FOOD NEEDS ASSESSMENT

5.1 Food security background

The analysis in the previous sections shows that despite good weather conditions, the low availability of fertilizer and fuel has resulted in a below-normal agricultural production in 2008. This will negatively affect the food security situation in DPRK during the 2008/09 marketing year (November 2008-October 2009). Furthermore, high international prices for food and fuel commodities coupled with reduced international (bilateral) food assistance have diminished the prospects for adequate national food supply. The combination of these factors has significant food security implications which are the basis for the household food access analysis provided in this section.

At the household level, food security in 2008/09 is expected to be negatively impacted and this could affect a significant proportion of the population. WFP analysis of household food access over the past few years offers important insights into who is likely to face food insecurity and to what

[12] For comparison purposes, the government's balance sheet, based on the Ministry of Agriculture early forecast of production (4.67 million tonnes of cereal equivalent, not including slopes and home gardens), and a level of cereal consumption set at 150 kg/capita/year, would imply no deficit. Commercial imports would actually fall from 360 000 tonnes to just over 280 000 tonnes. More realistically, the FAO production estimates, combined with a level of net cereal consumption set at 150 kg/capita/year, and commercial imports of ½ a million tonnes would imply an uncovered deficit of 434 870 tonnes.

extent. In general, household food access is contingent upon the efficiency of the PDS which serves as the primary official source of food for officials and workers who represent about 65-70 percent of the population. The remaining 30-35 percent of the population (cooperative farmers and their families) receives allocations from their own production and hence their level of food security directly depends on the performance of their agricultural season. Thus, PDS-dependent households experience greater food insecurity than the cooperative farmers, as they have to depend on food sources outside their control. These households attempt to secure the rest of their food requirements through different means including: i) own production in kitchen gardens and on hill slopes; ii) market purchases; iii) wild foods; and iv) transfers from better-off families and friends.

A comprehensive review of data collected by WFP between 2003 and 2007 indicated that the DPRK Government provided full cereal rations and employment up to the early 1990s. However, during the 2003-2007 period, less than a quarter of PDS-dependent[13] households and only two thirds of cooperative farmers received cereal rations which were often partial. The Government tried to revive the PDS in October 2005 which led to some improvements but before long it reverted back to pre-revival levels. The findings of the review were broadly corroborated by the RFSA. Erratic PDS-rations were also confirmed during interviews with government officials (in Pyongyang and in the counties) and with households. The PDS-ration across the country was 150 grams per person per day between June and September 2008, about one quarter of nutritional requirement.

5.2 Health and nutrition

There is limited official data on the health and nutrition situation in the country. The 2004 joint Government, UNICEF and WFP Nutrition Assessment is the most recent nationwide and independent assessment available. This assessment concluded that despite improvements in nutritional status, malnutrition rates remained low by World Health Organization (WHO) standards. Some 37 percent of children under 6 were stunted, 23 percent were underweight and 7 percent were wasted. One third of all mothers with small children were malnourished, anaemic, and dietary diversity (poor in protein, fats, minerals and vitamins) was lacking. The assessment recommended provision of micronutrient-fortified foods for nutritionally vulnerable groups such as women and children.

WFP has continued to gather substantial information on the health and nutrition situation of the country over the years including during the joint WFP/FAO RFSA in June 2008. The RFSA report noted that malnutrition was common in all provinces and wasting was observed in hospitals and residential child institutions. It concluded that the findings of the 2004 Nutritional Assessment were still valid. Furthermore, US NGOs undertook a three week assessment prior to establishing programmes in the DPRK, which concluded that malnourishment was prevalent in Chagang and North Phyongan Provinces. Yet the latest data provided by the Government to WFP and UNICEF suggests that malnutrition cases treated in provincial hospitals during 2005 and 2006 have declined. Also child institutions and hospitals visited by WFP between 2007 and 2008 reported reduction in malnutrition rates, although this was not the case across the board. Based on the field work which confirmed inadequate PDS-rations and poor dietary diversity at household levels as well as seasonality of food access, the Mission concluded that malnutrition rates among vulnerable groups are likely to rise—especially during the lean season. Furthermore, the Mission recommends a countrywide nutritional survey to update the national statistics as well as to provide vital information necessary for the design and implementation of national and humanitarian nutritional assistance programmes.

[13] 65 to 70 percent of the North Korean population is PDS-dependents, the large majority of them live in urban areas.

5.3 Household livelihoods and coping strategies

5.3.1 Approach/methodology

The methodology comprised of reviews of secondary information with particular focus on the June RFSA; consultations with government officials and representatives of NGOs and discussions with WFP officials in Pyongyang; field visits to six provinces and 10 counties which included discussion with provincial and county officials, interviews with households and visual observations; and a visit to a food market in Pyongyang. Household interviews were based on the RFSA questionnaire. However, interviews focused on sources of household food access, household income (number of income sources and amount), expenditure patterns (amount spent on food), and food consumption (frequency and diversity).[14]

Even though the CFSAM went according to the plan, there were nevertheless some key limitations. Firstly, the length of fieldwork was short and therefore time spent in each province was limited and resulted in only 3-5 household interviews. Secondly, the households interviewed were selected by government authorities and were not randomly picked. Thirdly, there was a sense that interpretation of questions and responses may have been misunderstood or incomplete reflecting cultural sensitivities.

5.3.2 Household food security situation

WFP assessments show that the Korean diet mainly consists of rice or maize and vegetables, often supplemented with wild foods. Oil is consumed in small quantities, while consumption of animal protein (poultry, meat, fish, eggs and dairy products) is occasional. Meals typically comprise of rice or maize, vegetable soup and a side dish of kimchi or salted radish, usually supplemented with seaweed, wild vegetables and herbs collected during the spring and autumn seasons. Households ordinarily like to have three meals a day, but this drops to two or less during the lean season or when PDS-rations are inadequate.

The Mission noted that the frequency of food consumption has improved slightly from 2 meals per day, as reported by the RFSA only 3-4 months ago, to 2.5-3 meals per day in a majority of cases. This appears to reflect improved food access due to the harvest season (September/October), relatively higher PDS-rations during October, and the start of the expanded food assistance operation. But food diversity still remained poor, where households predominantly consumed maize and vegetables. The consumption of meat or fish was only reported on important holidays such as the National Day on 10th October. Although some households reported livestock ownership, actual numbers of rabbits or chicken remain fairly low and are not reflected in the consumption pattern of those who own them. PDS-rations were consistently reported to be 150g per person per day in June to July, and raised to 300 grams in October. However, the Mission did not witness any distributions, but sighted trucks on a few occasions moving commodities. The different sources of household food access are discussed below.

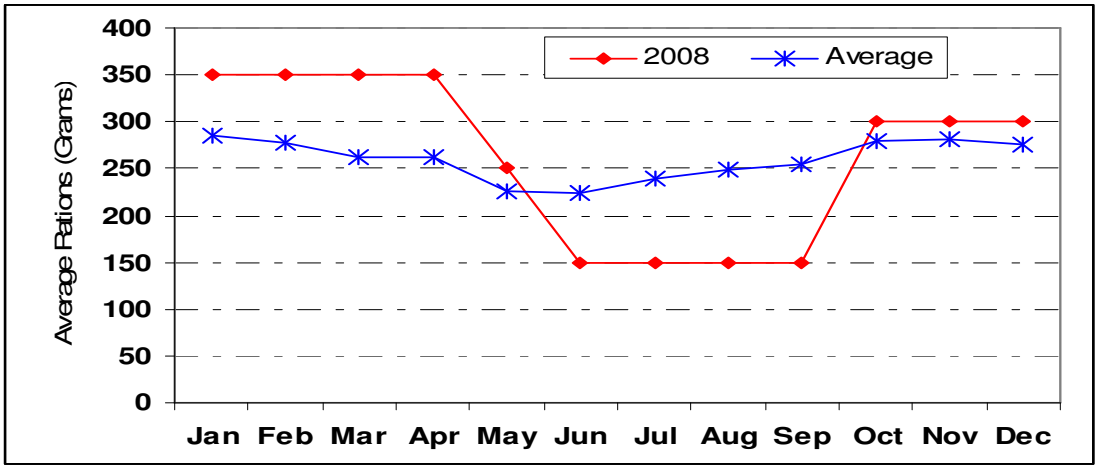
A: Public Distribution System

The Public Distribution System (PDS) is the main source through which government distributes cereals (maize and rice) and potatoes produced on cooperative and government farms to the predominantly urban population (officials and workers). In principle, the system ensures equitable redistribution of the nation's food stocks. While it has not been possible to get full details of how the

[14] The ideal situation would be to aggregate household food access from different sources to determine the extent of food insecurity and any food assistance requirement. Gaining reliable information on PDS-rations, contributions from kitchen gardens, gift from relatives and from wild foods are not easy in the DPRK context, making this approach impossible. Consequently, the approach that was adopted was to qualitatively assess the importance of the main sources of food and to get insights into household consumption patterns – frequency and food diversity – to guide a qualitative judgement on household food security from the access and consumption patterns.

system works, there are indications that its performance has been erratic. In 2004 PDS-rations were in the range of 200–250g, but were increased to 500g in October 2005. However, the PDS continued to experience serious implementation challenges in providing nutritionally adequate quantities of cereals for many counties. In 2007, PDS-rations were still at 500 grams until the floods in August, when distributions were interrupted due to losses of food stocks and damages to crops. Distributions resumed at different times in September, October and November at lower ration levels of 300-400g. At the beginning of 2008, the PDS-ration was consistently reported by officials and households to be 350 grams which was then reduced to 250g in May and further to 150g (around 500 Kcal per day/per person) between June and September. In October they were adjusted upwards to 300g.

Figure 2: Monthly Average of Public Distribution System Rations (2008 and Average)



Source: CFSAM 2008 Analysis using PDS-rations from Government obtained by WFP and interviews (in the case of 2008).

Analysis of PDS-rations suggests that they have varied over the past few years and appear to reflect the national food availability (production and imports) as well as seasonal variations in food availability. This is most evident in 2008 where the reduction from 350 grams in April to 250g in May and to 150g in June through September coincided with the onset of the lean season (between May and July) in most parts of the country. The ration was raised to 300g in October and officials confirmed this would be maintained in November, with plans to increase in December. This increase is clearly linked to main September/October harvest of maize and rice.

It is understood that some counties are perennially food deficit and rely on transfers from surplus counties. In years of poor production (e.g. 2007 due to the floods), ordinarily surplus provinces may not produce enough and this leads to a breakdown in the system of transfers. Where statutory transfers are maintained, this leaves some of the counties in deficit – requiring government to import substantial amount of cereals to support the distribution system.

Movement of food to deficit counties and PDCs can be costly and challenging. This was clearly the case following the destruction of roads and bridges by the 2007 floods. The Government has expended much effort (including mobilization of labour) to repair the damaged roads and bridges but it will take months if not years to restore the situation. The problem of moving food is compounded by recent high fuel prices that have affected all sectors of the economy. It should be expected that this will significantly affect the PDS capacity to move food to different parts of the country. In addition, some regions (e.g. North Hamgyong and Ryanggang Provinces) are mountainous and generally difficult to access.

In summary, the PDS has been negatively impacted by low food production, high fuel prices, and infrastructure damage due to floods. Given the lower than normal production this year, it is expected that populations (PDS-dependent households) living in food-deficit and remote parts of the country will have reduced access to PDS-rations. Consequently, their energy consumption between November 2008 and October 2009 will be subject to variations.

B. Kitchen gardens

Kitchen gardens, small plots of land close to family home or an institution, is a very important source of household food access. The official size of kitchen gardens attached to private households and institutions is 30 *pyong* (about 100m^2), but actual sizes vary significantly. According to analysis by WFP and other organizations, the kitchen garden sizes are negligible in apartment buildings in *dong* (urban districts) areas; small in *gu* (peri-urban areas) areas; bigger in *up* areas (smaller urban settlements); and largest in *ri* (rural areas) areas. WFP field observations since 2003 indicate that the average size of private kitchen gardens attached to households is about 15 *pyong* in *up* areas and 60 *pyong* in *ri* areas. In child institutions and other institutions, the size is almost 700-800 *pyong*.

The main crops observed were cabbage and beans, but households interviewed indicated that others, including spinach, eggplant, cucumber, pumpkin, garlic, radish, onion, chilli, tomato, radish and beans are also grown. There are two main seasons for vegetables: one during summer and the other in winter. A number of households, mainly those with larger holdings, confirmed that they also grow maize and potatoes. Kitchen gardens are used to rear poultry (chicken and ducks), dogs, rabbit, goats and pigs. These animals were reported by more than half of households interviewed, but actual numbers were small.

In the judgment of the Mission, kitchen gardens constitute a very significant source of household food access between spring and late autumn. Normally kitchen gardens would help to meet micronutrient needs. However, in periods of food insecurity larger proportions of a kitchen garden are used to produce cereals (including potatoes and maize) to meet the calorie/energy needs. Vegetables produced in late autumn are used to make kimchi for consumption during the winter season. Households with larger holdings also produce for sale or barter. From a household food access stand point, the average kitchen garden is very important (and somewhat “normal”) source of food access and should not be viewed as a coping strategy.

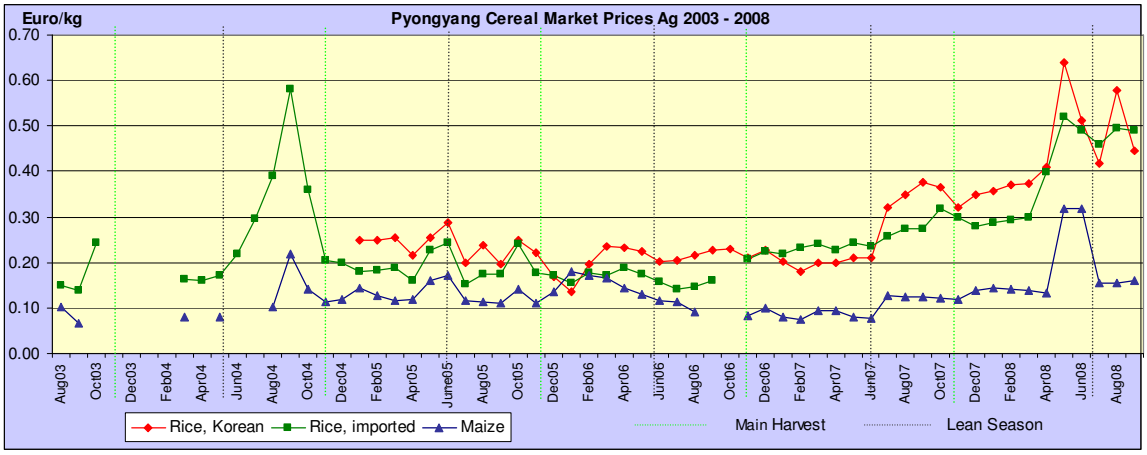
C. Markets purchase and prices

It was not possible to carry out systematic collection of market and price information to do a detailed analysis of market contribution to household food security. The analysis of prices collected by WFP in previous years as well as a field visits to one of the food markets in Pyongyang were used to provide important insights into the market contributions to household food security. WFP records of visits to PDCs in Tongsin County (Chagang) in 2005 confirm a two price systems: i) state-subsidized price of KPW 24 for maize and KPW 44 for rice; and ii) a higher price for additional purchases of cereal beyond PDS-ration of KPW 408/kg for maize and KPW 600/kg for rice.[15] PDC staff also estimated that 60 percent of PDS-dependent households purchased more cereal at the higher prices that month.

The Mission did not have access to PDCs or States Shops to confirm the pattern of official pricing, but visited one of the official food markets around Pyongyang to get firsthand impressions and market prices.[16] This indoor food market was found to be vibrant with relatively large number of seller and buyers. A wide range of food commodities from vegetables, to fruits, fish and meat were being sold in well established structures. Each commodity group had its own corner; for instance, the meat section had pork, dog meat, chicken and ducks in reasonably good quantities. The fish section had diverse types and size of fish. However, there was no visible sign of maize or rice being sold, but there were noodles of different types on display. All sellers were women in the age range of 40 years or above, confirming reports of recent measures to restrict market activities to older women. It was also observed that commodities were sold in kilograms using hand-held weighing scales.

[15] Euro1=KPW 4,600 at informal exchange rate.
[16] It should be noted that the Tong-il market in Pyongyang is open to foreigners, and may not be representative of the markets from which ordinary households in the DPRK purchase their food.

Figure 3. Pyongyang cereal prices



Source: Food prices collected by WFP since 2003.

Figure 3 presents the price trend for the main staples (maize and rice). The price data were obtained from markets in Pyongyang. The findings are in line with the findings of the RFSA and lead to the following conclusions:

- Nominal prices (in KPW) for maize and rice were stable between 2005 and 2007, but rose sharply in 2008 averaging 213 percent higher for maize and 127 percent for rice. These high prices are expected to have had an adverse effect on household food access in Pyongyang and also other provinces.
- Maize and rice are officially not sold, but distributed through the PDS. However, the price data indicates that households are buying or possibly bartering additional amounts of these commodities in markets to meet their requirements. The prices of other commodities (e.g. meat, fish and vegetables) are believed to be significantly lower in state shops than in markets, with indications of amounting to only 10-20 percent of market prices.
- In principle, a household's income should determine how changes in food prices will affect food quantities purchased through markets. Unfortunately, there is hardly any information on incomes – both on level and changes in recent years. But generally, incomes in DPRK (based on information from government for 2003-2005 incomes) are low and there are no indications that these have changed very much.

D. Wild food and other coping strategies

Households collect wild foods during the spring and autumn seasons to supplement their food requirements. The items collected include edible grasses, bracken, seaweeds, bellflower roots, anise, mushrooms, acorn nuts, parsley, fern, garlic and groundsel. Other items collected include fruits, pickpurse, tree sprouts, pine nuts, arrowroot, chestnuts and mushrooms. Some of these items are in fact delicacies and served in the top restaurants, but most are consumed by households as an accompaniment to meals, increasingly so during food shortages. All households interviewed during the CFSAM confirmed collecting wild foods, which demonstrates their significance in household food security. It was not possible to quantify the amount of wild foods households collect on average. However, the items collected would suggest that their overall contribution to household energy requirements would be low, but contribution to micronutrient requirements would be high.

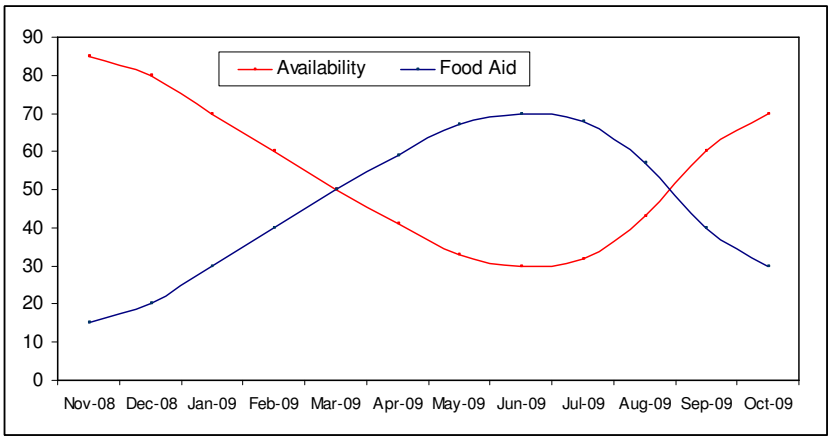
WFP has gathered information on other strategies that households traditionally use to cope during periods of food shortages. Some common ones include stockpiling food to ensure minimal availability during difficult times of the year. Hillside farming, kitchen gardens, raising livestock, fishing, assistance from better-off relatives, and petty trade (e.g. selling small items) are all routine coping strategies. In extreme situations households may sell assets, borrow food or money, eat less desirable wild foods in larger quantities, swap rice for maize, etc. Consumption coping

mechanisms during food shortages include increasing the intake of vegetables vis-à-vis cereals, adding water to food to increase volume (mainly making porridge); reduce the amount of food eaten; reducing the number of meals eaten per day; and prioritizing feeding children over adults.

5.4 Seasonality of food access

Household access to food exhibits seasonal variation. This variation depends on production cycle, resulting in a higher level of access around the harvest period and lower access during the lean (or hungry) season. The county-level consultations and households interviews unanimously indicated that food access is most difficult during the months of May to July. This is consistent with the seasonal calendar for food production which shows that the main harvest of maize and rice take place between September and October. Vegetable production for the winter kimchi also takes place around this period resulting in relative improvement in amount (vs. overall abundance) of food during the winter period. The second harvest (mainly of potatoes) occurs during spring and it contributes to a modest improvement in food access during this period. The outcome is a seasonal pattern of food access, with a gradual decline from peak availability in November to a trough between May and July. A gradual recovery is experienced from then onwards till the spring harvest season for potatoes, wheat, and barley.

Figure 4: Seasonality of food access in DPR Korea



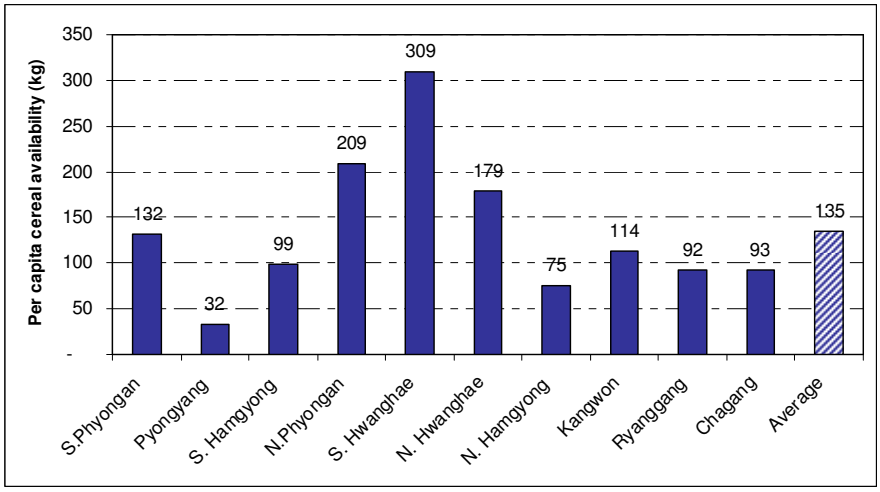
Source: CFSAM Mission
Food aid is indicated as an ideal scenario.

Seasonality of food access in turn determines the household food access gap and it has implications for magnitude and timing of food assistance. In principle, food assistance should fill the gap between the theoretical 'food requirement' and actual 'food access'. The intent is that food assistance should peak during the lean season and trough during the harvest period. It should be noted that in certain areas of DPRK (e.g. the north), food availability is further challenged by colder climates which reduces the number of crops that can be planted and harvested each year.

5.5 Regional pattern of food insecurity

The RFSA found significant differences in regional vulnerability. However, the highest levels of vulnerability were found in the north-eastern region, in particular North Hamgyong Province where a majority of households interviewed had poorer dietary diversity and lower coping strategies compared to other provinces. The region is historically disadvantaged due to remoteness, lack of arable land and gradual decline in industries. Ryanggang Province is also vulnerable due to the absence of a second harvest (in June), low availability of arable land and short growing seasons.

Figure 5: Per Capita Cereal Production by Province (2008/09)



Source: Mission Analysis based on CFSAM estimates of production and population.

The Mission's analysis of per capita cereal production by province (Figure 5) corroborates the conclusions of the RFSA. It is estimated that average per capita production (excluding kitchen garden and hill slope cultivation) for the marketing year will be nearly 142 kg per person per annum or about 390 grams per person per day. This value in principle sets the upper bound for any equitable PDS-ration, though it is only 57 percent of the daily energy requirement. An estimated 51 percent of the total population lives in the five provinces where per capita production is below the requirement--North Hamgyon, Ryanggang, South Hamgyong, South Phyongan and Kangwon.

The RFSA concluded that the rural population across the country was less vulnerable compared with urban households. Cooperative farm households were also less likely to have reduced food intake, less likely to eat only two meals per day, and less likely to have an extremely poor diet. On the other hand, urban households were judged to be affected by high food prices, reductions in food rations and increased restrictions on informal economic activities. Urban households' access to kitchen gardens, animal husbandry and wild food collection were also limited. Key exceptions to the vulnerability of urban households were in larger better-off cities (e.g. Sariwon, Chongjin and Kaesong) or cities with functioning industries such as Chongjin that provide better economic and thus, food access, opportunities.

The RFSA noted that even officials appeared to be affected by the current food shortages and in some cases appeared to face greater food security challenges than those whose members have full-time informal jobs. Households with elderly members also tend to be relatively vulnerable to food insecurity due to low purchasing power as a result of the erosion of the value of state pensions. WFP monitoring indicates that while cereal prices have almost tripled, pensions have remained almost unchanged, and would today buy less than one kilo of rice at market prices. The RFSA also noted that the elderly were working extremely hard but that their efforts had meagre returns. This is demonstrated in their predominant involvement in slope cultivation widely documented and discussed earlier in the production section of this report.

Children living in residential institutions were deemed to be particularly vulnerable, and were previously found to have higher malnutrition rates than other children. It was observed during the RFSA that these institutions had insufficient food support. The RFSA also concluded that children of weaning age are particularly affected by the current food shortages, as there is a lack of appropriate weaning food. Other children, particularly those under 5 continue to be particularly vulnerable to malnutrition. Pregnant and lactating women are also at risk due to their higher than normal dietary requirements.

5.6 Food insecure categories of households

From preceding sections, the main context for household vulnerability to food insecurity is the reliability of the official distribution. The wide disparity in rations between PDS-dependents (109 kg per persons per year) and cooperative farmers (260 kg per person per annum unmilled) makes PDS-dependent families the main category of households that would be food insecure. A higher dependency ratio (i.e. families with elderly members or many children) is an additional vulnerability factor across both PDS and cooperative farmer households. Other contexts include the availability and size of kitchen gardens, where households without access (or with small garden size) are not able to produce additional food. Coping strategies such as assistance from better-off relatives, collection of wild foods and petty trade are important, but judged to be unreliable or insignificant to factor into the categorisation of vulnerability.

The worst-cases of food insecurity were found among PDS-dependent households that had no kitchen gardens and depended primarily on PDS-rations that were supplemented by remittances from relatives on cooperative farms and seasonal collection of wild foods. The latter category of households was proportionately more represented in CFSAM interviews. While this is anecdotal, it nevertheless highlights a very important point about how low household food access can drop, and the potential implications of any inefficiency in the public distribution system.

A review of WFP assistance in the DPRK over the past decade and current beneficiary profiles of ongoing WFP and US NGO programmes are in line with the above generalisation. Beneficiary categories currently used by WFP and US NGOs stem from findings of detailed assessments and are agreed to by the Government. CFSAM discussions with county officials and interviews with beneficiaries provided opportunities for validations, resulting in the following broad food assistance beneficiary categories:

1. Women (pregnant and lactating); the elderly (over 60 years); children (in orphanages, nurseries, kindergartens and primary schools); and patients in paediatric wards/ hospitals. These categories are universally recognized to be among the most vulnerable, and are core beneficiaries of WFP and US NGOs in DPRK. The Mission recommends continuation of assistance for these categories.

2. A second category of beneficiaries identified during consultations were PDS-dependent households who are unable to meet their food requirements from PDS-rations due to a high dependency ratio (for example, because there is one income source), have very small or no kitchen gardens, and have limited or no coping strategy options. The CFSAM field interviews evidenced these vulnerabilities. In particular, it was established that PDS-dependent households without access to kitchen gardens and with more adults employed in formal government jobs were more likely to face food insecurity. The Mission recommends that households falling within these categories should be supported with food assistance.

3. Based on review of secondary information on employment, discussion with county officials and observations, there is evidence of unemployment or under-employment where industries have closed. Thus PDS-dependent households that fall in this category have difficulties in supplementing their PDS-rations with purchases. The Mission recommends provision of food assistance in exchange for work on suitably identified community projects.

4. A number of county officials expressed views that teachers (kindergarten and primary school), nurses and doctors should be provided food assistance. The Mission was not able to establish very firm basis for this assistance claim beyond noticing that they usually did not have meals when pupils or patients were provided food. It is suggested that the situation of these professionals be further assessed to determine whether or not to support them.

5.7 Humanitarian food assistance in DPR Korea

5.7.1 World Food Programme

WFP operations in the DPRK date back to 1995 with a cumulative cost of about USD 1.7 billion. Since 2001, around 6 to 6.5 million people (nearly a third of the population) have been supported (except for 2006 and 2007). Between 1997 and 2005 a total of around 4.5 million tonnes of assistance was provided through successive emergency operations. The main focus of WFP operations has been on improving the nutrition status of mothers and children. This has included support to 19 Local Food Production (LFP) factories to produce micro-nutrient fortified foods to provide balanced nutrition to children under 5 and to pregnant and lactating women. WFP operations have covered over 160 counties/ districts in 10 provinces.

At the request of the Government, WFP moved from humanitarian assistance towards development assistance starting in 2006. Between June 2006 and August 2008 WFP implemented a reduced Protracted Relief and Recovery Operation (PRRO 10488.0) providing transitional assistance to vulnerable groups. The PRRO aimed to distribute around 150 000 tonnes of food valued at USD 102 million to some 1.9 million beneficiaries in 50 counties in five provinces over two years, although the actual numbers were eventually lower. A four-month emergency operation (EMOP 10689.0) was also launched in September 2007 in response to the August floods, distributing some 10 200 tonnes of food assistance to 212 000 flood-affected people.

The destruction caused by the floods and the poor prospects for the 2007/08 main crop harvest prompted the Government to take measures to mitigate the food crisis. In May 2008, the DPRK and the United States governments concluded a protocol allowing for the distribution of up to 500 000 tonnes of food assistance under improved operating conditions and expanded humanitarian access. The bulk of the food contribution is to be channelled through WFP (up to 400 000 tonnes), while the remainder will be distributed by a consortium of five US NGOs (up to 100 000 tonnes). These developments provided the context for a joint Rapid Food Security Assessment in June/July 2008 and the basis for WFP's Emergency Operation launched in September 2008. The EMOP provides for food assistance to an estimated 6.2 million beneficiaries in 131 counties/districts in 8 provinces (Ryanggang, North Hamgyong, South Hamgyong, Kangwon, North Hwanghae, South Hwanghae, South Phyongan and Pyongyang).[17]

Through this Emergency Operation, WFP plans to provide assistance to the following categories: i) Mother and Child Health: support to all pregnant and lactating women, orphans and children under 5; ii) school feeding for all primary school children in all targeted counties (250 days per year); iii) food to children (6-16 years of age) in all paediatric hospitals and all paediatric wards of county hospitals, and accompanying mothers; and iv) support to the elderly through PDCs. WFP will provide support to Local Food Production (LFP), which builds on the success of previous operations, to provide fortified foods to pregnant/nursing women, and children. Other beneficiaries will include industrial workers who are unemployed or under-employed through Food for Community Development (FFCD) focusing on rehabilitation of flood-damaged infrastructure and construction of disaster mitigation structures, among others.

5.7.2 United States Non-Governmental Organisations (US NGOs)

Alongside WFP, the only other humanitarian group providing larger-scale food assistance in the DPRK is a consortium of five United States Non-Governmental Organisations (US NGOs), consisting of Global Resource Services, Mercy Corps, World Vision, Christian Friends of Korea and Samaritan's Purse. US NGOs started operations in August 2008 funded by the United States Agency for International Development's (USAID) office of Food for Peace. Its mandate is to distribute 100 000 tonnes of food aid to needy persons in the two provinces of North Phyongan and Chagang. US NGOs currently provide assistance to about 358 000 beneficiaries comprising

[17] The remaining two provinces (North Phyongan and Chagang) are covered by US NGOs.

pregnant and lactating women, children and elderly persons in 7 counties in Chagang Province and in 18 counties in North Phyongan Province.

5.8 Emergency assistance requirements for 2008/09

5.8.1 Number of food insecure persons

The estimation of food insecure persons who will require assistance is based on categories identified by WFP assessments; most of these categories are being used for WFP and USNGO interventions. The approach used here recognizes that the duration of need and ration levels differ for different categories of food insecure populations reflecting the nature of vulnerability and seasonality of food insecurity discussed in previous sections. For example, assistance to the elderly, pregnant and lactating women and children will continue throughout the year to reflect their special requirements and continuous lack of access. For other beneficiary categories, assistance will be planned to meet their needs at critical times in line with seasonal variations in food access. Meanwhile the type of commodities and amounts given will also reflect the differences in nutritional requirements for beneficiary categories. Calculation of persons requiring food assistance is based on projected national population of 23.6 million persons in all 10 provinces. It is recognised that some counties in several provinces are not accessible, and this is reflected in the Mission's analysis. Further, of the 10 provinces, 8 are operationally covered by WFP and the remainder by US NGOs. Total beneficiaries for each category were derived using demographic profile for DPRK.[18]

The Mission critically reviewed the methodology and assumptions used in the RFSA to estimate the number of persons who are food insecure and the quantity of food required. These assumptions were adjusted as necessary based on field information and triangulation of analysis undertaken in the past. Crucially, this took into account the difficulty in getting official data and the limitation imposed by the lack of critical data and of independent verification. Broadly, the beneficiary categories used in the RFSA were adopted. But demographic ratio for some beneficiary categories of the food insecure were adjusted (e.g. for the elderly from 14 percent to 13.7 percent) based on demographic profiles from various sources[19] judged to be more credible. It should be pointed out that CFSAM estimates are intended to reflect the national picture, therefore the estimate differs from that of the RFSA, which focused on WFP and US NGO operational areas.

Table 11: Estimated Number of Food Insecure Persons in DPRK by Province (2008/09)

Province	*Accessible Counties*	All Counties
S.Phyongan	*1 7109 000*	1 910 000
Pyongyang	*213 000*	243 000
S. Hamgyong	*1 212 000*	1 391 000
N.Phyongan	*1 064 000*	1 165 000
S. Hwanghae	*963 000*	1 062 000
N. Hwanghae	*891 000*	960 000
N. Hamgyong	*894 000*	983 000
Kangwon	*440 000*	500 000
Ryanggang	*276 000*	314 000
Chagang	*182 000*	206 000
Total	***7 854 000***	**8 741 000**

Source: CFSAM Mission analysis.

The analysis presented in Table 11 (last column) indicates that about 8 741 000 persons, representing 37 percent of the population, will require food assistance during the marketing year. These consist of the elderly (983 370); pregnant and lactating women (729 040); children in nursery, kindergarten, and primary schools (3 610 749); children in other child institutions and in

[18] Demographic profile for comparable countries used in some cases where data for DPRK not available.
[19] UNFPA and US Department of Agriculture (USDA) sources.

paediatric hospitals and wards. Needs for these categories are expected to remain unchanged throughout the year. The rest will consist of FFCD participants and dependents (2 730 000), and other categories whose numbers and regional distribution will depend on seasonality of food access and special regional vulnerabilities. The estimates are about 36 percent higher than established by the 2004 CFSAM, and the increase appears to be consistent with observed changes in PDS-rations, and recent economic and vulnerability trends in the country.

The analysis was also carried out using population data provided by the government for accessible parts of the country where WFP and US NGOs provide humanitarian assistance. The outcome is also presented in the same table (middle column) and shows that the number of food insecure in these areas is 7 854 000 persons. The estimate of the food insecure represents about 43 percent of the population in accessible areas and 33 percent of the total population used by the CFSAM. A breakdown of these numbers shows that over 6.6 million (or 84 percent) of the food insecure (in accessible areas) come from WFP operational areas (8 out of the 10 provinces and 131 counties), while 1.2 million (16 percent) are from counties and provinces supported by US NGOs.

The analysis also shows that about 60 percent of food insecure persons will be in the category of beneficiaries whose needs will remain unchanged during the year (comprising of pregnant and lactating women, children of all categories, and the elderly). The needs of the remaining 40 percent will be expected to vary to reflect seasonal patterns of food access as discussed earlier. Although spatial distribution of the food insecure in the first category will be approximately proportionate to population size (and therefore reflect population distribution), the second category will reflect regional, provincial and/or county-level vulnerabilities and challenges to household food access in those locations. It is expected that the number of food insecure persons in North Hamgyong, South Hamgyong, Ryanggang and Chagang will be proportionately higher.

5.8.2 Quantity of food required

The estimation of quantity of food required is based on the requirements in terms of appropriate food type and rations for each category. The Mission considers the rations currently used by WFP and US NGOs to be appropriate for the different beneficiary categories. There was, therefore, no compelling reason to recommend any changes at this stage (see Appendix 1 for commodity rations). The findings of the analysis is presented in Table 12 which shows that over 800 000 tonnes of assorted food commodities will be required to meet the needs of those identified to be food insecure for the whole country. This comprised some 606 000 tonnes of cereals, 66 200 tonnes of pulses, 34 000 tonnes of oil, 89 000 tonnes of Cereal Milk Blend (CMB), 15 000 tonnes of biscuits and 670 tonnes of Rice Milk Blend (RMB). The distribution by area of operation is estimated to be 673 000 tonnes for WFP operational areas and just over 128 000 tonnes in USNGO areas. Similar estimate based on population figures for accessible parts of the country revealed that the total of food will be 693 000 tonnes. The same types of food commodities (cereals, pulses, oils, CMB, biscuits and RMB) were used, and it is estimated that 84 percent of this amount would be required in WFP operational areas and 16 percent in US NGO areas.

Table 12: Quantity of Food Required by Province (tonnes)

Province	Accessible Counties	All Counties
S.Phyongan	111 380	135 480
Pyongyang	14 340	17 950
S. Hamgyong	79 430	100 430
N.Phyongan	70 890	83 840
S. Hwanghae	61 340	73 730
N. Hwanghae	57 600	66 860
N. Hamgyong	58 040	69 180
Kangwon	28 290	35 350
Ryanggang	18 260	22 790
Chagang	11 660	14 470
Other*	181 430	181 430
TOTAL	**692 680**	**801 500**

Source: CFSAM 2008 Analysis.
* For transitory cases to be determined (maintained constant here).

The calculated food access gap of 801 500 tonnes is based on the nutritional needs of the categories determined to be food insecure and the duration of need. It is important to note that the ration used is that required to fill the gap between the nutritional requirement and what they are able to access from other sources (i.e. notably through the PDS). This aggregate food gap is very close to the national supply-side gap of 836 070 tonnes estimated in the cereal balance sheet presented earlier in this report. In principle, these two 'food gaps' do not necessarily equate; in most cases, the access gap tends to be larger than the supply-side gap, due to lack of purchasing power, for instance.

5.9 Logistics of food distribution

WFP has a complex logistical set up comprising Pipeline, Shipping, Supply Chain, Field Logistics, and COMPAS Units. Given the long history of WFP presence in the country, and the overall high level of logistics capacity in the organization, WFP can scale-up any necessary surge in operations. The current emergency operation anticipates that the logistical capacity should be capable of handling up to 630 000 tonnes of food. An estimated 90 percent of all food assistance in the country is anticipated to arrive through the three seaports of Chongjin, Hungnam and Nampo that are strategically located on the east and west coasts. WFP's Shipping Unit manages all its shipping operations in terms of fast offloading at ports, accurate tallying of commodities, and fast-despatch to counties from the port. The Pipeline Unit and Supply Chain Unit, with many years of experience and knowledge of the country will play crucial roles in the movement and distribution of food inland.

5.10 Summary findings and recommendations

There is a convergence of evidence from the various analyses which indicate that the average household in the DPRK will continue to face major challenges in accessing sufficient food to meet their requirements between November 2008 and October 2009. Contributing factors include:

- Lower aggregate production, with per capita national average cereal availability of nearly 142 kg with most provinces producing less than the 167 kg/capita/year (milled) requirement.
- Low PDS-rations in recent years that have been insufficient to meet the nutritional requirements of PDS-dependent households. This is often compounded by seasonal trends showing drastic reductions in ration (e.g. to 150g per persons per day as reported by authorities and beneficiaries in June to September 2008).

- Persistently poor household food consumption patterns showing a reduced number of meals per day and inadequate dietary diversity, especially during the lean season.
- Limited alternative options for accessing food. The main alternative, kitchen garden, is limited to availability of physical space and therefore not accessible to most households in urban settings where the large majority of PDS-dependent households live. Other sources of food, such as transfers from relatives on cooperative farms, market purchases, and gathering of wild food, tend to be irregular, and in the Mission's judgement not reliable enough to make a very significant and sustained contribution.
- The lack of a comprehensive nutritional assessment has made it difficult to draw a firm conclusion about the nutritional status of the population. However, observations made in recent years suggest that the situation has not improved and that it is not any better than it was during the 2004 CFSAM.

Based on the above synthesis of analysis, the Mission concludes that it will be necessary to provide humanitarian assistance to meet continuing household food access gap until the next harvest in October 2009. The Mission therefore recommends food assistance of 692 680 tonnes consisting of assorted commodities to meet the needs of approximately 7.9 million persons in accessible counties and beneficiary categories. It is further indicated that the requirements could rise to 801 500 tonnes to meet the needs of a projected 8.7 million persons throughout the country. However, the latter projections would require verification even if full access were granted.

Taking into account the economic system of the DPRK, food assistance is judged to be the most appropriate response option during this period. But the Mission also recommends measures to address the longer-tem food security situation – discussed elsewhere in this report. Some aspects of the longer-term measures can begin to be addressed within the framework of food assistance by selectively adopting 'Food for Community Development' (FFCD) approach in delivering humanitarian assistance. This has been implemented by WFP in the DPRK in the past and is supported by government officials.

Analysis of the number of food insecure persons reveals that some remain out of reach either due to remoteness and terrain or because of current restrictions on access. It is therefore recommended that efforts be made to reach these counties/locations. An easing of access restrictions to these locations would be a very significant step towards assessing and verifying the food security and nutritional status of households and individuals in these locations, and ultimately to responding to any needs so established.

Food assistance to the DPRK has been erratic over the past few years, a result of fluctuating harvests and corresponding PDS distribution levels as well as the official stance on humanitarian assistance. But crucially, it also reflected in the fluctuating policy of donors to provide humanitarian assistance. In the light of the assessed needs, the Mission in particular would like to draw attention to this point and recommends that donors consider contributing to the assessed needs.

The Mission also recommends conducting a countrywide nutritional assessment to update the national picture, ensure better focus and targeting of humanitarian assistance, and importantly, to help guide government programmes in this area.

Appendix 1: Food commodities and rations currently used by WFP

Beneficiary groups	Days	Commodity Ration (grams per day)						
		RMB	Cereal	Pulses	Oil	CMB	Biscuit	Kcal/day
Orphanages								
Children in baby homes (below 5 yrs)	365	100	150	50	25	50	-	1 527
Children in children centres (5-6 years)	365	100	250	50	25	50	-	1 877
Children in boarding schools (7-16 years)	365	-	450	50	25	-	60	2 215
Pregnant/Lactating Women		-		-	-	-	-	
Farm Households	365	-		100	25	130	-	1 120
PDS dependants	365	-	250	100	25	130	-	1 940
Nursery Children (6 months - 4 years)	300	-	150	50	25	100	-	1 372
Kindergarten Children (5 - 6 years)	250	-	250	50	25	50	60	1 705
Primary School Children (7-10 yrs)								
Farm households + PDS dependants	250	-		-	-	-	60	244
PDS dependants	365	-	250	-	-	-	-	825
Inpatients (6mos to 16 years) in Paediatric Hospitals	365	100	250	50	25	50	-	1 120
Accompanying mothers	365	-	250	-	-	-	-	825
Paediatric wards (70% of total beds in all paediatric hospitals)	365	100	200	50	25	50	-	1 096
Elderly	365	-	250	25	-	-	-	1 096
FFCD participants	45		800	-	-	-	-	350*
FFCD dependants	45	-	600	-	-	-	-	330*
Other vulnerable groups	120	-	1 000	-	-	-	-	1 100*
Contingency/relief activity	48	-	350	50	25	-	-	1 621

WFP distributes two types of blended food products: Rice Milk Blend (RMB) and Cereal Milk Blend (CMB)
Source: WFP Country Office Report

Appendix 2: Schedule of CFSAM field surveys, 9-19 October 2008

Crop and Food Security Assessment Mission 9 - 19 OCTOBER 2008

Week day	DATE	DESTINATION (City/County/District)	PROVINCE
Thu	9-Oct-08	Hamhung	S Hamgyong
Fri	10-Oct-08	*National Holiday*	
Sat	11-Oct-08	Hongwon	S Hamgyong
Sat	11-Oct-08	Hamhung	S Hamgyong
Sun	12-Oct-08	Sinhung/Yonggwang	S Hamgyong
Mon	13-Oct-08	Chonnae	Kangwon
Tue	14-Oct-08	Kosan	Kangwon
Wed	15-Oct-08	Singye	N Hwanghae
Thu	16-Oct-08	Yangdok/Songchon	S Phyongan
Fri	17-Oct-08	Pakchon	N Phyongan
Sat	18-Oct-08	Pyoksong/Haeju City	S Hwanghae
Sun	19-Oct-08	Pyongyang	Pyongyang

Appendix 3: Summarized survey data from cooperative farms – South Hamgyong
June 2008

County	Toksong	Toksong	Yonggwang	Yonggwang	Riwon	Riwon
Cooperative Farm	**Oop Farm**	**Sou So**	**Ki-Sang**	**Tong Zhung**	**Yong Song**	**Moo Nang**
Total Population	**1 800**	**1 750**	**2 250**	**2 350**		**1 852**
No. of Farmers	970	1 430	1 400	1 550	785	987
No. of Households	320	250	620	650	368	476
Popl per household	3.0	5.7	2.3	2.4	2.1	2.1
Area per household (ha)	0.625	0.5	0.5	0.5	0.7	0.6
Total area cultivated (ha)	**219**	**115**	**343**	**337.3**	**239.5**	**305**
Rice	65	60	180	178.6	102.5	90.6
Maize	74	22	80	69.5	77.1	141.6
Soybeans	20	11	2	2.9	1	2.4
Potatoes	60	8	66	82	53	68
Winter wheat/Barley		14	4	4.7	2.3	2.3
Vegetables			11			
Other					4	
Normal fuel alloc. (tonnes)			13	9.6		
2007/2008 fuel alloc.			9	7		
% of last year			69.2	72.9		
Normal fertilizer alloc. (tonnes)	64	17.7	120	102	71.9	97.6
2007/2008 fertilizer alloc.	34	11.5	45	45	35.9	36.6
% of last year	50	45	37.5	44.1	50.0	37.5
Average Yields (tonnes/ha)						
Rice				3.5	3.5	3.2
Maize				3.6	3.2	3.1
Potato (cereal equivalent)	12			3.25	2.75	2.8
2006 Production				1 141.8		
2007 Rice yield						
2007 Maize yield						
2007 Potato yield						
2007 Production						
2007 Loss (%)			25.0	10.2		25
Cattle	125	98	110	107	80	95
Pigs	290	80	130	130	60	100
Sheep	0	0	0	0	0	0
Goats	400	50	600	160	80	200
Rabbits	400	500	2 500	950	180	500
Chickens		150	1 000	800	380	250
Ducks		100	300	850		360
Geese			200	170	100	250

County	Riwon	Tanch'on	Pukchong	Pukchong	Yonggwang	Sinhung	Sinhung
Cooperative Farm	Koo Oop	Tap Tong	Yang Ka	Chong Hung	Sam Hung	Chang So	Wong Dong
Total Population		**2 711**	**3202**	**3 944**	**2 924**	**2 985**	**2 703**
No. of Farmers	933	1 122	2 434	1 575	1 649	1 100	1 662
No. of Households	471	717	972	805	734	607	580
Popl per household	2.0	1.6	2.5	2.0	2.2	1.8	2.9
Area per household (ha)	1.5	0.5	0.3	0.4	0.5	0.6	0.7
Total area cultivated (ha)	**680.5**	**329**	**284**	**321**	**399.07**	**362**	**401**
Rice	237	102	149	165	214	114	65
Maize	358	150	100	53	87.7	110	172
Soybeans	1.2	2	7	2	3.1	2	50
Potatoes	79	66	26	61	92.5	82	96
Winter wheat/Barley	5.3	9	2		1.77	0	2
Vegetables				40		2	
Other	5			29		52	16
Normal fuel alloc. (tonnes)		11	17	25	5.5	10	20
2007/2008 fuel alloc.		6	4	16	2	3.5	8
% of last year	45	54.5	23.5	64.0	36.4	35.0	40.0
Normal fertilizer alloc. (tonnes)	119.9	115.5	98.04	89.76	42.8	110	172
2007/2008 fertilizer alloc.		66	38.7	70.4	17.1	55	68.8
% of last year	45	57.1	39.5	78.4	40	50.0	40
Average Yields (tonnes/ha)							
Rice	4	4.7	5	4.1	4.8	7	5
Maize	5.5	3.8	5.75	4.3	4.2	7.5	8
Potato (cereal equivalent)	3.25	2.2	5	5	2.2	2.5	2.5
2006 Production	3 173.75		1450			1 828	1941
2007 Rice yield	3.4		2.55	3.69		4.6	4
2007 Maize yield	3.5		3.05	3.87		4.1	6.4
2007 Potato yield	2.8		4	4.5		2	2
2007 Production	2280		684.95			1 139.4	1 552.8
2007 Loss (%)	28.2	42.6	52.8	12.6	28.8	37.7	20.0
Cattle	133	89	104	145	127	147	102
Pigs	410	88	70	80	400	259	120
Sheep	0	85	0	100	5	0	0
Goats	2 022	92	500	1 000	636	837	270
Rabbits	4 735	250	2 000	1 000	3 400	1 500	510
Chickens	4 265	150		300	300	1 000	530
Ducks		120	500	400	600	376	100
Geese			250	600	500	105	40

County	Sinhung	Tonghsunghan	Tonghsunghan		Per
Cooperative Farm	**Jung Pyong**	**Ryu Johng**	**Koo Foong**	**Average**	**household**
Total Population	**2 643**	**1 666**	**1 678**		
No. of Farmers	1 529	920	933		
No. of Households	561	360	440		
Popl per household	2.7	2.6	2.1	2.5	
Area per household (ha)	0.5	1.3	0.6	0.6	
Total area cultivated (ha)	**282**	**470**	**326.1**		
Rice	75	172.5	181.4		0.2
Maize	140	21.7	13.7		0.2
Soybeans	5	0.3	11		
Potatoes	56	45.8	41		0.1
Winter wheat/Barley	3	4.9	0		
Vegetables	3	225	79		
Other	15				
Normal fuel alloc. (tonnes)	6	9	9		
2007/2008 fuel alloc.	3	6	5		
% of last year	50	66.6	55.6	69.8	
Normal fertilizer alloc. (tonnes)	100	150	108		
2007/2008 fertilizer alloc.	50	90	72		
% of last year	50	60	66.7	47.1	
Average Yields (tonnes/ha)					
Rice	3.2	5	4.6	4.4	
Maize	3.2	5	4	4.7	
Potato (cereal equivalent)	3	3.2	3.5	3.2	
2006 Production	856	990			
2007 Rice yield	2.8		3.6		
2007 Maize yield	2.9		3.9		
2007 Potato yield	2.375		2.2		
2007 Production	749	820			
2007 Loss (%)	12.5	17.2	22.7	27.3	
Cattle	126	187	95		0.2
Pigs	250	80	85		0.3
Sheep	0	0	0		
Goats	330	300	400		0.9
Rabbits	560	3 500	2 200		
Chickens	730	500	1 000		
Ducks	60	500	0		
Geese	0	800	406		

Appendix 4: Summarized survey data from cooperative farms – South Hwanghae June 2008

County	Tae Tan	Tae Tan	Tae Tan	Onjin	Onjin	Onjin	Jaeryon
Cooperative Farm	**Ok Am**	**Unsan**	**Ryu Jong**	**Up farm**	**Jian He**	**Samsan**	**Sinhwan Po**
Total Population	**2 982**	**3 331**	**2 990**	**1984**	**4 374**	**3 880**	**4 033**
No. of Farmers	1 335	1 800	1 541	1145	1 419	1 400	1 581
No. of Households	720	778	720	385	787	675	768
Popl per household	1.9	2.3	2.1	3.0	1.8	2.1	2.1
Area per household (ha)	1.1	1.1	1.1	1.5	1.1	1.0	0.8
Total area cultivated (ha)	**815**	**930**	**811**	**723**	**1 030**	**708**	**620**
Rice	503	309	357	462	436	416	483
Maize	126	379	243	95	372	156	32
Soybeans	59	68	75	15	66	23	9
Potatoes	37	89	74	66	65	59	31
Winter wheat/Barley	50	83	58	55	85	48	58
Vegetables	40	2	4	30	6	6	7
Normal fuel alloc. (tonnes)	25	28	21	13	32.5	25	18
2007/2008 fuel alloc.	15	14	11.3	11.2	18.5	15	12
% of last year	60.0	50.0	53.8	86.2	56.9	60	66.6
Normal fertilizer alloc. (tonnes)	240	400	233.0	244	350	240	342
2007/2008 fertilizer alloc.	140	187	150.0	120	185	120	219
% of last year	58.3	46.8	64.0	49.2	53	50	64.0
Average Yields (tonnes/ha)							
Rice	4	4	3.7	4.25	4.9	4.8	4.9
Maize	4.2	4	4.0	4.25	3.8	4.2	4.6
Potato (cereal equivalent)	4.8	2	2.0	3.25	3.5	3.1	3.3
2006 Production	2786	3 220		2600	3 966	3 200	3 110
2007 Rice yield	2.3	2.77	2.3	2.6	2.59	1.5	4.6
2007 Maize yield	2.4	1.44	2.5	3.3	1.8	4.2	4.7
2007 Potato yield	4.16	3	3.5	3	2	3.1	3
2007 Production	1 875	2 119	1 837.0	1981	2 746	1 420	3 001
2007 Loss (%)	32.7	34.2		23.8	30.8	55.6	3.5
Cattle	68	210	82.0	87	105	125	95
Pigs	145	210	190.0	130	140	127	77
Sheep		117	40.0		83	5	
Goats	276	861	800.0	40	153	272	87
Rabbits	1 240	5 700	1 000.0	2000	3 350	3 300	4 000
Chickens	300	950	510.0	500	150	520	249
Ducks	480	1 000	2 000.0		350	120	500
Geese	70	600			200	87	500

County	Jaeryon	Kwail	Kwail	Average	Per household
Cooperative Farm	**Putko**	**Song Gok**	**Saki**		
Total Population	**4 728**	**700**	**1 879**		
No. of Farmers	3 222	313	1 281		
No. of Households	950	175	685		
Popl per household	3.4	1.8	1.9	2.2	
Area per household (ha)	1.2	0.6	0.6	1.0	
Total area cultivated (ha)	**1 113**	**110**	**422**		**1.02**
Rice	592	0	60		0.5
Maize	239	46	310		0.3
Soybeans	29	16	15		
Potatoes	63	23	24		0.3
Winter wheat/Barley	128	25	13		
Vegetables					
Other	62		12		
Normal fuel alloc. (tonnes)	44.8	3	30		
2007/2008 fuel alloc.	35	1.5	14		
% of last year	78.1	50.0	47.0	60.1	
Normal fertilizer alloc. (tonnes)	360	14.9	200		
2007/2008 fertilizer alloc.	185	7	100		
% of last year	51.4	47.0	50.0	53.4	
Average Yields (tonnes/ha)					
Rice	3.5		4		
Maize	4	4.1	4.2		
Potato (cereal equivalent)	2	2	2.2	2.8	
2006 Production	3 540	465	1 880		
2007 Rice yield	2.5		2.6		
2007 Maize yield	2.19	2.9	2.4		
2007 Potato yield	2	2	2.5	2.8	
2007 Production	2 708	279	1 080		
2007 Loss (%)	22.7	21.6	43.0		
Cattle	171	97	74		0.2
Pigs	42	121	145		0.2
Sheep					
Goats	614	1 217	250		0.7
Rabbits	8 000	450	1 000		
Chickens	30	1 500	150		
Ducks	5 000	600	240		
Geese	60	120	150		