Improving Access to Maize Marketing Opportunities in Remote Areas of Ghana

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Paper presented at the workshop on
"Improving Smallholder Market Access in Remote Areas of Sub-Saharan Africa"

Wye College, 8-9/7/99

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This paper examines maize production and marketing activity in Afram Plains District of Eastern Region and West Gonja District of North Region, Ghana[1]. In both districts maize is, or has been, important as both a cash and a food crop. However, both are remote from the main maize market centres in the country, so are at a competitive disadvantage in a liberalised marketing environment when compared with more accessible areas (especially the so-called "maize triangle" in Brong Ahafo). The paper assesses whether producers in the study districts can (and should) compete in national maize markets and, if so, what the most cost-effective ways are to improve their competitive position within these markets.

1 Maize Production in The Study Areas

Afram Plains District (also known as Kwahu North) lies within the flood plains of the Afram River, a tributary of River Volta. The district covers an area of about 4,500 square kilometers, lying within the forest-savanna transition agro-ecological zone. Extensive farming practices since the early 1980s have reduced many of the forest lands to savanna. However, land use intensity, estimated as the number of years a plot of land is cropped relative to the total years of a cropping and fallow, is still low (about 2:7) because of the relative availability of land in the area.

The population is estimated at about 250,000, growing at 3% p.a. The area has a large migrant population from other regions of Ghana as well as from foreign countries. In 1964 the government created special settlements at Forifori, Mem-Chemfre, Amankwaakrom and Ntonaboama for communities displaced from Volta Region as a result of the creation of the Volta dam. Other ethnic groups, especially those from northern Ghana, have been attracted to the area by its agricultural potential. Many of these may came in as farm labourers but stayed on to farm on their own.

It is estimated that about 80% of the population is employed in agriculture - engaged mainly in crop farming, supplemented by livestock rearing. The diversity of the forest-savanna transition agro-ecological zone favours the cultivation of a wide range of crops. These include yam, maize, cassava, plantain, cocoyam, rice, beans and vegetables.

The cropping system is yam-based in the sense that yam is the first crop to be planted on newly cleared land. After the yam is harvested, the mounds are spread and the land prepared for maize production. Cassava may be planted on yam mounds or later as the last crop in the rotation sequence. Groundnuts and cowpea are planted either as sole crop or in mixtures with maize. Our sample survey data suggests that production of maize as a sole crop is very common, although there are also inter-crops with groundnut, cassava and beans

The ascent of maize as the most important crop in Afram Plains began with the decline of the cocoa industry in the area. This started in the early 1970s and culminated in the death of the industry in 1982/83 because of severe drought and bushfires. Abandoned cocoa farms were turned to arable farms for yam and maize.

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[1] The paper reports on research conducted in these two districts during the period July 1998 to May 1999. The majority of this work was conducted by, or under the guidance of, Dr.Ramatu Al-Hassan of University of Ghana, Legon.

The introduction of mechanised land preparation in maize production has led to the degradation of some forest lands to savanna grasslands. The remaining forest lands, which have not been stumped are covered by the 'Acheampong weed' which is claimed to help maintain soil fertility. These lands are still cultivated by the slash and burn method, using hoe and cutlass.

Table 1: Percentage of Farmers in Afram Plains District Growing Various Crops

Crop	Percentage of Farmers Growing Crop
Maize	73
Yam	47
Cassava	35
Beans	16
Rice	6
Tomatoes	6
Groundnuts	5

source: District Directorate of Agriculture, Afram Plains

It is estimated that more than 70% of farmers in Afram Plains can be classified as maize growers (Table 1). These include both subsistence and surplus producers. It is not clear whether any farmers can be categorised as deficit producers, since people grow crops such as yam and cassava for subsistence as well. Yam, as maize, is grown as a cash crop. Yam farming tends to occur in the hinterland where virgin or long-fallowed lands can be found. Maize, it is claimed, is grown by townsfolk because it is the "easiest crop to farm and can be grown twice in a year". The crop is described as easy to grow because, apart from the grassland areas between Ekye-Amanfrom and Odumasua, most lands in the Afram Plains are still fertile and can produce a crop without fertiliser.

Farmers distinguish between two production systems: the mechanised system and the traditional system based on hoe and cutlass. Mechanised farming is practised on previously bulldozed and stumped lands and can be small scale (up to 15 acres) or large scale (above 40 acres). Apart from the mechanisation of land preparation, large scale mechanised farmers tend to apply the full complement of recommended practices for maize production. They plant seed in rows at recommended rates, apply fertiliser, and some apply weedicides. After harvest, the produce is treated well with recommended chemicals for storage. Yields of maize on mechanised farms range between 1.5 and 1.8 tons per acre (3.7 and 4.5 tons per hectare).

Small scale farmers clear land by slash and burn, use no fertiliser and do not plant in rows. These farmers depend on the inherent fertility of forest land to produce maize; a practice that has been referred to as the "extraction of forest rent", especially when combined with shifting cultivation. Yields are between 500 and 1000 kg per hectare.

Maize is grown by both men and women, although the average area of land cultivated by men is higher than for women. The average maize holding of our sample of 54 farmers was 9 acres, with 50% of the sample cultivating between 1 and 4 acres, and another 20% cultivating between 10 and 70 acres.

Although all household members contribute labour if maize is being grown for household consumption, when grown as a cash crop it is carried out as an individual activity. As such, the farm owner has the ultimate responsibility to provide labour, usually through hiring.

West Gonja District (from now on referred to as *Damongo*, as most of our work radiated out from the district capital) is located in the western part of the northern region. It has a land area of 16,700 square kilometres, of which almost one third is accounted for by Mole National Park and other forest reserves. The district lies within the Guinea Savanna agro-ecological zone and has an annual rainfall of about 1300 mm, nearly all of which falls between May/June and September/October. Both the White and Black Volta Rivers pass through the district, with tributaries including the Mole River flowing within the study area. However, irrigation potential is not yet developed.

The district was estimated to have a population of around 112,000 in 1996[2], including a large immigrant population into the district that keeps growth rates around 3% p.a. The 1996 figure gives a population density of less than 10 persons per square kilometre, even when park and reserve land is excluded. This is among the lowest in the Northern region and, indeed, in the country as a whole, (comparing with a figure of 55 persons per square kilometre in Afram Plains, for example). However, the population is not equally distributed across the district and in the area around Damongo town there are fears of declining soil fertility as population rises. Soils in this area are alluvial sandy deposits and are described as "suitable for cereals and cotton" (West Gonja District Assembly 1996). The most fertile soils in the district are found around the southern and south-eastern fringes (Mpaha, Tuluwe), south of the Tamale-Kumasi road.

As in the case of the Afram Plains, Damongo has a history of planned resettlements. During the 1960s, a programme was initiated by the government of the first republic to resettle populations of the Upper East regions because of high population densities and low agricultural productivity of lands in these area. The programme did not succeed because of the unwillingness of the people to relocate. Despite the failure of the programme, today, the district has a high migrant population from the Upper regions. These people consider themselves temporary migrants since their aim is to farm and make money and return home. There is also a new type of migrant from the Dagbong area who moved to the district after the so called "Northern Conflict" in 1994.

There are two main cropping systems, a yam based system in the remote and fertile area, and a cereal and legume based one with cassava in areas with more intensive land cropping. Fallow rotation is practised, although farmers claim that they are no longer able to leave the land long enough for the soil to rejuvenate.

Being a main staple crop, maize is grown by household heads. Other members of the household provide their labour for the household production. Where an individual grows maize for cash, they have to provide the necessary inputs, including labour[3]. The participation of women in maize production varied according to the culture of the settlers. In Dagarti

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[2] source: District Administration

[3] In Dagarti villages, it was explained that household heads are in full control of the produce produced by households. The women in the house take control of the produce after the household head has decided what is to be sold. Individuals may also have their own private farms and the household head cannot control that produce. Junior males do not usually cultivate the major staples such as maize, yam, millet and sorghum. They cultivate groundnuts, beans (cowpea) and other minor crops.

settlements, women do not own farms and do not take part in the tedious aspects of farming such as land preparation and weeding. They do, however, take part in planting and harvesting. Even in yillages where women do farm their own plots, they tend to specialise in growing vegetables. According to the women, they do not have the capital to hire labour or to buy fertilisers for maize production[4]. Instead, they help their husbands on their maize farms, especially during planting and harvesting.

Yam and sorghum are also staple crops, but more of cash crops as well. Sorghum (guinea corn) is normally sold to pito brewers. Again women do not grow these crops because of their requirements of labour and fertile lands. Yam does best on virgin or long fallowed land which is not accessible to women. Maize is always the crop to follow yam.

Mechanised and traditional production systems are practised in Damongo, as in Afram Plains. However, few farmers depend on the services of tractors and these are mainly civil servants. These are also the group that can buy fertiliser at 40,000 Cedis a bag. Most farmers, therefore, use the hand hoe for all cultivation from land clearing to harvesting.

In our sample, 50% of the farmers cultivated between 1 and 6 acres of maize, another 33% farmed 6 to 10 acres and the rest farmed 10 to 50 acres. In terms of output, 57% of the sample had less than 10 bags. According to these figures, yields achieved by smallholders (600-1000 kg per hectare if no fertiliser is used) are comparable to those in Afram Plains. It is, however, claimed by farmers that yields can be tripled either with fertiliser on old lands or by cropping on newly cleared lands in the hinterland.

1.1 Access to Land, Labour and Capital

With the influx of migrants into the *Afram Plains*, access to land is undoubtedly critical for farming in the area. Three types of land tenure systems operate in the area:

- *Sole ownership* for indigenous peoples or the descendants of the early settlers. Lands which were allocated for settlements created in 1967 are under the control of chiefs of such settlements. The allocation of these lands is controlled by the chief and the Ministry of Food and Agriculture through a land allocation committee. There is an annual property tax of 2000 cedis per acre paid to the District Assembly. Most larger farmers tend to have permanent title to their land.
- The *abusa share-cropping* system, under which the farmer pays the land owner a third of the farm output for each cropping season. (A tenure agreement usually lasts for a year). The farmer bears all the costs of production. The abusa sharecropping system is the predominant tenure system in the Afram Plains.
- *Rental* at a fixed charge paid either in cash or kind. Cash rent for land during the 1998 cropping season was 15,000 cedis per acre. Some land owners demanded one bag of maize for each acre of land. Cash rental is a new practice and farmers seem to prefer this to the sharecropping system because it does not interfere with their crop output or their cash earnings from farming.

Although there is no shortage of land in the Afram Plains, the abusa share-cropping system is a major constraint on gaining access to land. Farmers find the terms of this tenure system too

[4] In spite of our efforts to include women maize farmers in our sample, we could only find six.

severe. This is particularly critical because of the large migrant populations in the area. The access problem generally affects men and women alike. There are many women indigenous to the area who have no problem with land. The research team came across a woman trader in Tease who had just returned from Accra to the area to farm. Her plantain trading business was not going well and she was back to raise some capital through farming maize on family land. On the other hand, male farmers in the focus group discussions expressed dissatisfaction with the terms of the tenure systems. Clearly, wives of these migrant farmers, if cash-strapped, will find it difficult to acquire land.

Apart from mechanised land preparation for large scale maize production, all other farming tasks are manual. Farmers depend on hired labour supplied by seasonal migrants from northern Ghana. These come into the area from November to December to prepare yam mounds and then again in March/April for maize. Given the large farming population, there is always an excess demand for labour and labour costs tend to be high. For example, labour charges for land preparation are pegged at the rates charged for mechanised ploughing. The charge for weeding is then set at half the rate for ploughing. Labour is so expensive that large scale farmers prefer to apply weedicides than hire labour.

Access to labour is, therefore, determined by ability to pay. Those most likely to be affected by the labour limitation are poorer farmers who have no family to fall on for labour. Many migrant farmers are likely to find themselves in this situation since whole families seldom migrate.

As elsewhere in the country, finance is a major problem facing farmers in the Afram Plains. The farm budgets presented in section 1.6 indicate the minimum quantity of capital required to grow a hectare of maize (as all labour is assumed to be family labour). In addition, if farmers are to avoid selling maize at low prices immediately after harvest, then they must have the storage capacity as well as some additional sources of funds for other cash expenditure. Although farmers normally grow other crops in addition to maize, farmers claim that the need for cash for such expenditures as school fees and other emergency expenses is their reason for disposing of maize early in the season[5].

Only 14% of our sample of farmers (including a quarter of the women) claimed that they had ever received a loan for production either from a bank, NGO or relations. The reasons given for not having taken a loan from a bank suggest that long procedures, stiff collateral requirements and farmers perceptions of the lending preferences of banks, as well as farmers own aversion to risk of crop failure, deny them access to institutional credit.

Focus group discussions indicated that some farmers depend on traders for production credit. The data from the structured farmer survey does not reflect this, but it does appear that some local traders lend to known farmers pre-harvest (for emergency consumption as well as production purposes) as a way of guaranteeing access to cheap maize supplies after harvest.

Communal land ownership is the main tenure system practised in *Damongo*, as in most parts of northern Ghana. Farmers claim anyone can get land to farm. In particular, there are new and fertile lands, but one has to move far into the hinterland. Land conflicts are not common but they sometimes do arise between new and old settlers when a new settler moves to someone else's fallow land.

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[5] Poor drying conditions in Afram Plains may also force farmers to sell wet season maize quickly.

Similarly, obtaining labour is not a problem, as long as one has the money to pay for it. The cost of labour for the 1998 cropping season was 4000 to 5000 Cedis a day for weeding, 30-40,000 Cedis per acre for clearing, and 70,000 Cedis per acre for ridging.

Lack of capital was cited by more than 75 percent of the sampled farmers in Damongo as the most serious problem limiting production (Table 2). As the farm budgets show (section 1.6), maize farming is profitable only with application of fertilisers. Storage costs must also be incurred for farmers to earn the more remunerative seasonal prices.

Table 2 Constraints to Maize Production in Damongo

Constraint	Count	Rank
Lack of capital	48	1
High price of fertiliser	14	2
Poor rains	11	3
Destruction of crops by pests	8	4
Cost of labour/lack of labour	7	5

source: farmer survey

Seventy percent of the sample (including 5 of the 6 women) claimed never to have taken a loan of any sort for production purposes. Of those who indicated that they had taken a loan at some time, 44% received the loan from a bank, 22% from traders, and 17% from a credit union. It is interesting to note that most of these beneficiaries had holdings between one and 6 acres. This is most likely the effect of special credit programmes targeting smallholders.

The reasons given by other respondents for not having taken a loan included:

- lack of access due to location
- fear of not being able to repay
- lack of knowledge about sources of credit.

Both focus group discussions and the traders' survey indicated that some traders give production credit to farmers, who are obliged to pay back in kind after harvest. The terms are, however, very disadvantageous to farmers. Usually if one obtains a loan equivalent to one bag of maize for land preparation or weeding, s/he is required to pay back two bags of maize at "bush weight". As one farmer commented, "at harvest, the big sack of the creditor is put at your step" and it must be filled according to his or her terms. There was a case where a farmer obtained a 60,000 Cedi loan from a trader on the condition that at harvest he should sell his maize to the trader at 18,000 Cedis a bag (bush weight). At the time the loan was contracted, 60,000 Cedis could only buy one normal bag of maize. "Farmers are only producing for the traders", lamented one of the farmers. "Traders are killing us", commented another.

None of the farmers in the focus group discussions had participated in inventory credit programmes, which IFAD have run in West Gonja district since 1997/8.

1.2 Seasonal Calendar

The *Afram Plains* has two cropping seasons. The major rains set in in April/May and last till about July/August. The minor rains begin in September and last till October. Harvesting of the first maize crop in the Afram Plains begins in August and ends in October. The second crop is usually ready for harvesting by December and may continue to about February.

In most areas of Ghana where the rainfall is bimodal (such as Brong Ahafo) the major maize cropping season coincides with the major rains[6]. In Afram Plains, by contrast, more maize is grown during the minor rainy season. The reasons for this include attack by stem borers and the problems of drying maize grown during the major rains, and the need to clear land early for the minor rainy season crop.

In *Damongo* there is just one cropping season, although there is some flexibility in planting dates (anywhere from April/May to July) according to how the rains come. Harvesting takes place at the end of the year, when the Hamattan winds make drying very easy.

1.3 Maize Production Prior to Liberalisation

Unlike in Tanzania, the state has never played a dominant role in maize marketing in Ghana. The marketing parastatal, Ghana Food Distribution Corporation (GFDC), has never accounted for more than 15% of the total marketable surplus, leaving the majority of marketing activity in the hands of numerous small-scale traders. However, in the early years of the Rawlings administration, international donors supported a silo building programme that installed modern storage facilities, equipped with dryers and cleaners, at various sites (including Afram Plains). During the 1980s GFDC bought maize from farmers at above market rates, but in doing so undermining its own financial position to the point where it was forced to cease trading operations in the mid-1990s.

At the onset of structural adjustment reforms in 1983, an overvalued exchange rate and other macro-economic distortions reduced the profitability of trading activity, whilst the supply of inputs such as inorganic fertilisers and tractor ploughing services was controlled by the Ministry of Agriculture (MoFA). Fertiliser prices were subsidised by about 45%. Macro-economic stability was gradually restored during the 1980s, although inflation remained high and volatile into the 1990s, causing nominal interest rates to remain above 40% and the nominal exchange rate to depreciate precipitously in the early 1990s[7]. Subsidies on fertiliser were phased out during 1985-90 and in 1991-2 the importation and distribution of fertiliser was transferred from MoFA to the private sector. National fertiliser consumption fell as an

[6] However, although during group interviews farmers claimed that they do more maize in the minor season than in the major season, the survey data shows maize average area per farmer in the major season to be 3 acres more than the area cropped in the minor season. The average output per farmer in the major season was 39 bags compared to 26 bags in the minor season.

[7] Real interest rates were sometimes positive, sometimes negative during these years, whilst the real exchange rate, which had depreciated in the 1980s, depreciated rapidly during 1991-4 only to return to its 1991 level in 1995.

initial result of these changes[8], although it has subsequently recovered somewhat, with a growing demand for fertiliser from maize producers in Brong Ahafo.

Given this history, it is perhaps hard to define the pre-liberalisation period (unless one goes back to the late 1970s). However, maize production in both study areas has benefited from state-sponsored interventions, which are no longer in place.

In *Afram Plains District*, a large FAO-funded mechanisation programme, which provided cheap tractors and other assistance to maize production, ran for several years starting in 1987[9]. As already mentioned, there is a GFDC silo situated on the main access road[10] within Afram Plains District, from where maize used to be purchased, but which currently only offers drying and storage services, and runs at less than 1% capacity utilisation.

Damongo is well known as one of the areas in the Northern region where maize was grown on a large scale under the Workers' Brigade programme of 1960s. A farmers' institute and an agricultural station were established in the district to support both the Workers' Brigade farm programme, which was mechanised, and individual farmers (especially the settlers). In the 1970s MoFA continued to run a service centre in Damongo, providing subsidised tractor services and distributing fertiliser. It seems likely that the impact of this declined during the 1980s, as budgets were cut, fertiliser subsidies removed and MoFA tractors eventually sold off. However, in 1987 a Sasakawa Global 2000 project started in the district, providing a full package of services to 3000 maize farmers (approximately one farmer for every 4-5 households in the district). These farmers produced a total of up to 4000 tons of maize per year from their one acre, intensive maize plots. The programme, however, ran into repayment problems with its seasonal credit programme as a result of a bad season weather-wise and closed down in the early 1990s.

1.4 Current Trends in Maize Production

Official statistics show an increasing trend in maize production in *Afram Plains* in recent years. The increasing trend is confirmed by farmers in spite of a number problems related to rainfall, labour availability and costs, costs of fertiliser, and an unfavourable land tenure system for land deficit farmers. Production is increasing because people are returning to the land. In particular, youth from other parts of the country come to the area to make money through farming. This suggests that production is increasing more through expansion in crop area than from higher land productivity or yields.

Farmers in the study sample had been in maize production in Afram Plains for an average of 13 years, with slightly over a quarter of them having been in the area for more than twenty years. Fifty percent of farmers who have produced maize in the area for more than 5 years,

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[8] Gerner et.al. (1995) calculate that the value-cost ratio (VCR) for fertiliser application to maize (in which part of the country?) fell from 3.3 in 1991 to just 1.2 in 1994 as a result of fertiliser subsidy removal and the effects of the devaluation of the cedi.

[9] The project supplied 88 Same (Italian brand) tractors to individuals and societies. A workshop for maintenance and the supply of spare parts was also set up. Each beneficiary had 50 acres of land cleared for them using bulldozers, at a cost of 250,000 Cedis. Apart from the 3000 acres of land cleared under this project, land was also cleared by individuals. Large scale farming based on mechanised ploughing and harrowing is practised on the bulldozed lands.

[10] It is not situated in any of the main producing villages, however.

claim that their maize output has increased over the period and about 54 percent also claim that maize output has increased over the past 10 years.

Table 3: Crop Production Statistics (1998)

Crop	Area (hectares)	Yield (Tons/ha)
Yam	24,200	18.0
Maize	21,000	2.5
Cassava	12,000	8.2
Rice	4,600	3.0
Cocoyam	770	-
Plantain	550	-

source: District Directorate of Agriculture, Afram Plains

In *Damongo* the perception of sample farmers (44% of whom had farmed maize in the area for 10 to 25 years), is that maize production has declined over the past 10 years as a result of a decline in yields[11]. Eighty-nine percent of sample farmers claimed that maize production had declined in the last 5 years, while 50% suggested a decline in the last 10 years. The main reasons for the decline in production in the last 5 years were given as:

- lack of capital (35%),
- poor rains (22%),
- decline in soil fertility (22%).

The same reasons were given for the decline over the past 10 years, although specific mention was made of the high cost of fertiliser by 19% of the sample. Ten years ago fertilisers were very cheap, so farmers did not have to go so far into the bush to farm. Now they have to go far into the bush to clear new land in order to get any good yield. Focus group discussions also revealed high cost of labour and tractor services as additional reasons for declining maize production.

The decline in production means that smaller quantities of maize are sold by farmers, since production is increasingly tending towards subsistence. This, in turn, makes Damongo less attractive to traders as a source of maize, as search costs to identify available surpluses become much higher. The Chairman of Tamale Traders' Association explained that the importance of Damongo as a source of maize surpluses within North Region has declined in recent years. He highlighted the Savelugu area, much closer to Tamale on a good road, as the most reliable source of surpluses nowadays. These surpluses are being produced by large-scale farmers, who have switched into mechanised maize production following the collapse of North Region's (subsidy dependent) rice industry.

[11] This picture is not confirmed by official statistics, which show maize output in the district increasing from 21000 metric tons in 1992 to 33000 Mt in 1995, followed by a decline to about 26000 Mt in 1996. Much of the output expansion between 1992 and 1995 is attributed to improved yields of about 48 percent. The decline in output in 1996 was due to both a decline in area planted and yields by 9 percent and 10 percent respectively over the 1995 values. However, Poulton (1997) casts doubt on the accuracy of official production figures for North Region.

Table 4 Farmers' and Traders' Ranking of Crops at Damongo Workshop

Rank	Farmers' Ranking of Crops for Home Consumption (Group 1)	Farmers' Ranking of Crops for Home Consumption (Group 2)	Farmers' Ranking of Crops for Cash Income (Gp.1)	Farmers' Ranking of Crops for Cash Income (Gp.2)	Traders' Ranking of Crops (Volume of Business in Markets)
1	Maize	Cassava	Groundnuts	Groundnuts	Groundnuts
2	Cassava	Maize	Sorghum/ millet	Yam	Guinea corn (sorghum)
3	Yam	Yam	Beans	Guinea corn (sorghum)	Maize
4	Beans		Yam		Cassava
5	Guinea corn (sorghum)		Maize		Millet
6	Millet		Cassava		
7	Groundnuts				

Table 4 shows the rankings of different crops made by participants at the research project's Damongo workshop in May 1999. Whilst maize remains important (if not pre-eminent) as a staple food crop for home consumption - and so will continue to be grown for as long as anyone can foresee - it no longer dominates farmers' thinking with regard to cash income. Whilst some farmers would have earned more from groundnuts than from maize even prior to liberalisation, the toppling of maize by sorghum, yam and beans is relatively recent. There is strong demand for sorghum both locally and in Upper West for use in pito (local alcohol) brewing. Yams are farmed only in newly cleared lands. Beans are sold primarily in Tamale, but also further south. Cassava is sold in chip form. The theme running through Table 4 is that of soil fertility decline and the need to shift out of maize given the high cost of, and difficulties in obtaining, fertiliser.

When asked during focus group discussions about their perceptions about the future (in five years), farmers said they believe maize production will continue to go down because things appear to be getting worse and not better. "The future belongs to the traders. It depends on how traders will treat we the farmers" commented one of the leaders.

Nevertheless, it is hard to see the district economy picking up on the strength of sorghum, cassava, yam or even groundnut production (nor of donors being particularly keen to promote the first of these!). Whilst the tourist industry obviously employs some people within the district, there is no evidence of any imminent rural industrialisation. If efforts are not to be made to restore maize production, so that marketing of regular surpluses once again becomes an option, then a search will have to be made for new, higher value cash crops. So far, little effort has been made in this direction.

1.5 Decapitalisation

One aspect of the decline in maize production in Damongo that deserves a mention is the process of decapitalisation that takes place when fertiliser prices rise rapidly in relation to output prices (either as a result of subsidy removal or devaluation - or both in the case of Damongo). Poorer farmers in a unimodal rainfall system where maize was an important crop

would tend to rely on the sales from one season to buy fertiliser for the next. Where relative prices change dramatically, this ability is suddenly diminished and many farmers are unlikely to be able to compensate by accessing additional capital from elsewhere. In effect, their stock of production capital has been slashed. Thus, even if use of fertiliser remains profitable (albeit less profitable than before) after the shock, the level of both production and fertiliser use will decline considerably. This seems to be an important part of the maize story in Damongo.

Evidence that this is the case is provided by the parallel history of larger producers, both civil servants in Damongo and the farmers in Savelugu who were mentioned above. To survive decapitalisation, a farmer must be able to do one of the following:

- Transfer capital from another activity, which presumably only makes sense if that activity also suffers a similar (or worse) shock;
- Access new capital, on the assumption that use of fertiliser after the shock can generate sufficient returns to cover the cost of that capital.

It would appear that civil servants in Damongo could draw on new capital (say, allowances or job perks - not salaries!) to continue their maize production activities through the early 1990s. Many of the larger farmers in Savelugu, meanwhile, transferred resources into maize production from rice and may also have been able to access new capital from banks (or possibly from traders).

1.6 Returns to Maize Production, Fertiliser Use and Storage

Appendices A1-A5 present a selection of farmer budgets, compiled from data collected during field work, to show the profitability of maize production and storage in the years 1996/7 and 1998/9 for:

- a smallholder farmer in Afram Plains, who rents land under the abusa sharecropping system and employs hoe and cutlass technology (no fertiliser application);
- a large-scale farmer in Afram Plains, who owns his own land, employs a tractor for ploughing and applies inorganic fertiliser;
- a smallholder farmer in Damongo, who employs hoe and cutlass technology (no fertiliser application);
- a large-scale farmer in Damongo, who employs a tractor for ploughing and applies inorganic fertiliser.

The budgets in Appendices A1-A4 assume that all labour employed is household labour and so assess profitability on the basis of returns to labour (manday). As noted earlier, hired labour costs 3-4000 cedis per day in the two areas, according to the time of the season and the task in question. No charge is made for the opportunity cost of production capital in these calculations, although the opportunity cost of the stocks held in storage is included within storage costs, based on the market price of the stocks when they were placed into store.

The budget in Appendix A5 assumes that all labour employed is hired labour and so assesses profitability on the basis of returns to capital at a simple annualised rate. This is a more appropriate way of assessing the attractiveness of large-scale farming activity and confirms

that maize production (when allied to storage) remains profitable even after the adverse relative price trends for maize grain and fertiliser in the early 1990s.

The critical determinants of profitability are:

- output price
- yield.

As illustrated in Appendix A6, maize grain in Ghana experiences considerable intra-seasonal price movement[12]. In Afram Plains the price of the first major season maize (in August) is usually high, because maize supply at this time relieves the food scarcity of the lean season (April-July). As supplies increase with harvesting and farmers sell to cover expenditures for their minor season crop production, the price begins to drop in September. For example, during the first week of August 1998, the price of maize in Donkorkrom was 40,000 Cedis a bag. By the end of the month, the price had dropped to 30,000 Cedis and as low as 24,000 in Tease. Traders expect prices to stay low until November, by which time some farmers have exhausted their major season harvest and those that still have maize in stock no longer have such pressing needs for cash. Therefore, there is usually a rise in prices during November. In December, the price may fall again as farmers sell to meet Christmas expenditures. Although it is claimed that farmers continue to sell to pay off their Christmas debts until February, harvesting of the minor season crop also helps to boost supplies and therefore dampen prices during this period.

By March the lean season (period of scarce food supplies in the country as a whole) is approaching. In April/May prices generally rise steeply, peaking in June/July. In Afram Plains supplies in June/July also respond to the influx of urban-based long-distance traders, as supplies in other major markets dwindle. However, the June/July prices are the most uncertain. Prices may drop if there is a rush to release stocks in response to rising prices and/or to avoid holding stocks until the arrival of the new crop on the market. It appears that the harvesting of the major season crop in Afram Plains lags behind that in Brong Ahafo by about a month, thereby increasing the possibility of sudden price drop during July.

With regard to output price, Damongo farmers are at an advantage compared with those in Afram Plains, because their harvest becomes available once prices in national maize markets have begun to recover from the seasonal "low" of September-October.

Two years of price data are included in Appendices A1-A5, as Ghanaian maize markets have witnessed an unusual degree of dispersion in intra-seasonal price movements (around what might be considered an "average" increase) in recent years. These are further illustrated in Appendix A6, which presents price data for assembly markets in Afram Plains[13].

In 1996-7 national supplies were short and those farmers and traders fortunate enough to have stocks in storage did very well. This encouraged a considerable increase in participation in inventory credit schemes (on the part of farmers) in the following year, when again prices rose far enough for attractive profits to be reaped. However, many farmers expected prices to

[12] Moreover, monthly average figures of this nature do not capture price volatility from week to week within a month. During field work farmers in both areas complained about this, arguing that it made marketing much more risky, particularly when they had to organise transport from their home to an assembly market.

[13] This information was supplied by traders from three villages at the research project workshop in Tease in May 1999.

reach the same peaks as they had the previous season, so hung on to their stocks for too long, eventually making minimal profits or even losses. Finally, in 1998-9 prices have remained unusually depressed, especially since Christmas. This owes much to a good harvest (of all staples, not just maize - and in neighbouring countries as well as Ghana, so eliminating the possibility of export). However, the problem for producers and commercial storers has been compounded by the arrival of thousands of tonnes of imports (a result of delays in finalising earlier import contracts?), which now "hang over" national maize markets, preventing prices from rising.

The figures used for yields, at least for the smallholder budgets, are somewhat on the generous side. A figure of 10 bags per hectare, however, indicates the returns that might be achieved by an above-average smallholder - one who might hope to produce a marketed surplus in the majority of years - if fertiliser is not applied. Alternatively, in the case of Afram Plains, the figures indicates the returns that a more average performer would achieve if he owned his own land (so did not have to pay the abusa rental).

The Appendices for Afram Plains suggest that maize farming is **not** profitable if a farmer has to sell his/her output immediately after harvest. The farmers most likely to do this are the poorest or, in years of above-average harvest, possibly some larger farmers who find themselves unable to dry and store their entire harvest. This indicates that there may be benefits to be gained from savings and credit schemes for the poorest farmers, allowing them to meet pressing expenses in August-October from savings deposited earlier in the year, as well as from inventory credit schemes.

Taken together, the Appendices also illustrate the importance of raising productivity in maize production if it is to be a viable long-term alternative in these areas. Our data do not permit calculation of VCRs for fertiliser application, but comparison of the two types of farmer suggests that fertiliser use still makes sense if allied to a storage strategy after harvest. This highlights the importance of improving smallholders' access to fertiliser (including through production credit). However, experience with the Global 2000 scheme in Damongo and with more recent inventory credit schemes suggests that access to credit is not the only advantage that larger farmers have over smallholders. Other complementary advantages include:

- access to market information
- ability to cope with bad years (by drawing on additional sources of capital).

To these we might also add management capacity and resilience to embedded (within season) shocks, such that appropriate cultural practices are consistently applied in a timely way.

Finally, these budgets leave us with one unanswered question: If returns (to labour) are lower for smallholders in Afram Plains than in Damongo, why does smallholder production of maize appear to be expanding in Afram Plains whereas in Damongo previously surplus producers are retreating into subsistence? The following factors may help explain this:

- contrary to what we have assumed in the budgets, yields may not actually be as high in Damongo (particularly close to Damongo town) as in Afram Plains;
- farmers appear to store more maize for longer in Afram Plains (see following section), perhaps because, with two harvest per year and other cash crops such as yams, many have other sources of income to tide them over the immediate post-harvest period. (To

the extent that decapitalisation of farmers who used to use fertiliser has been a problem, these features of production in Afram Plains may also have helped to cushion them through the worst relative price shocks).

1.7 Survey Evidence on Timing of Sales and Storage

In *Afram Plains*, the majority of sampled farmers (both men and women) sold the greater proportion of their maize at home, with long-distance traders as the principal buyers. The preference of farmers to sell at home was explained in terms of transport limitations and the risks entailed in taking produce to an assembly market only to find a disappointingly low price. Meanwhile, long distance traders appear willing to bear transport costs and other risks in order to buy from villages when produce is scarcity and/or in expectation of lower per kilo farm gate prices.

The most common determining factors for sale of maize by farmers are good price and need for cash, which were mentioned by 52% and 43% of the sample respectively. Four farmers indicated that lack of storage space may compel them to sell. These men had total major and minor season outputs of 24, 34, 38 and 120 bags respectively.

Table 5 presents the maize sales made by our surveyed farmers in each month of 1998. It suggests that most farmers sell their maize over the period April to June, when prices are at their seasonal peaks. This also corresponds with the main inflow of long-distance traders. Before this period, the main buyers are resident traders, who buy to stockpile, so as to sell on to long-distance traders during the lean months.

Table 5 Sales of Maize in 1998, by Month, Afram Plains

Month	Number of Farmers who Sold Maize	Percent of Farmers	Average Quantity Sold per Farmer (bags)
January	6	11	6
February	8	15	5
March	17	31	20
April	21	39	14
May	14	26	25
June	10	19	26
July	4	7	23
August	2	4	54
September	2	4	73
October	1	2	12
November	4	7	4
December	3	6	3

source: survey data

There was a wide variation in the level of total output, which ranged from 5 bags to 130 bags, with a mean of 32 bags. The large average sales of 54 and 73 bags respectively in August and

September could be maize that the farmers concerned were unable to dry or could have been stocks from the previous season. About 26 percent of the sampled farmers did not sell maize at all in 1998, meaning that 42 percent of sample females and 21 percent of sampled males produced only for subsistence.

The data shows that the majority of farmers are able to hold maize for two to eight months depending on whether it is minor season or major season production. There is no difference between men and women in the timing of sales.

The need to store is demonstrated by the inability of farmers to break-even within the early months after harvest. All farmers have their own storage structure with only one farmer renting storage facilities from GFDC. Farmers seem to have some knowledge on how to store maize. Of our sample of farmers, 70% alleged that they apply chemicals to maize while in store[14]. Of these, 77% claimed to use actellic, which is the recommended storage chemical. Fifty percent of farmers not treating maize with chemical actually apply traditional methods such as smoking and use of the neem plant. Only four farmers, including 2 women did not treat the maize at all.

Most farmers in Afram Plains prefer to store maize on the cob and, at the final workshop at Tease in May 1999, there was some debate about their reasons for doing this. These included the fact that:

- shelled maize stored in bags suffers from very high weevil losses if it is not treated;
- shelled maize stored in bags needs higher cost sheds to protect it from getting wet;
- there is a shortage of shelling machines;
- traders do not like actellic to be used on shelled maize as kenke makers do not like it. (There was some discussion that this may be due to incorrect application rates and methods);
- retreatment and rebagging is required every three months that the maize is stored in bags and also for sale, which is tedious.

Sending maize to the GFDC silo for storage would solve most of these problems, as traders generally trust GFDC storage practices. However, farmers are reluctant to do this because:

- transport costs are too high, as the silo is a considerable distance from most farmers' fields/homes;
- they lack confidence in the system with regards to their ability to retrieve stored maize;
- rates charged for the services are considered high. (After harvest farmers do not expect to have to find additional cash to pay for storage; rather, they are looking to obtain income from crop sales to meet their many delayed purchases).

Unlike the Afram Plains where sales tend to be concentrated in the lean months, in *Damongo* there is no clear pattern to the monthly distribution of sales (Table6). Most farmers sell off their maize in one (60 % of sample) or two batches (25% of sample). Forty-four percent of the sampled farmers indicated they sell part of their maize in the low price months around December. However, around 40% of farmers do retain some maize to sell in May as well.

[14] However, these figures are not entirely consistent with the arguments presented on storage on the cob (below).

In terms of quantity sold, only 8% of the sample did not sell maize in 1998 and about 42% sold between 1 and 6 bags. The average quantity sold was 9 bags.

Table 6 Sales of Maize in 1998, by Month, Damongo

Month	Number of Farmers who Sold Maize	Percent of Farmers	Average Quantity Sold per Farmer (bags)
January	3	5	6
February	3	5	15
March	8	13	9
April	9	15	6
May	10	16	7
June	5	8	4
July	3	5	6
August	3	5	9
September	5	8	4
October	1	2	4
November	4	7	7
December	7	11	6

source: survey data

In Damongo the decision to sell is driven by the need for cash. Over 80% of the sampled farmers said that they sold maize when they needed cash, in particular cash to pay for land preparation for yam. However, 47% also said that, if possible, they wait for better prices.

More than 95% of the sampled farmers sell maize at home while 30% also sell in a weekly market away from home. Sixty percent of those who sell at home sell to long distance traders. More that 90% of total maize sales occur at home.

For farmers who hold maize for better prices, the main source of information on prices is fellow farmers. About 45% of the sample also indicated that they use changes in the influx of traders into the villages as an indicator of changes in price trends.

Seventy-seven percent of the Damongo sample do not treat maize with any chemicals. Out of this only 24% use smoke to control storage pests. The rest do nothing, despite problems with weevils and termites (mentioned by farmers in group discussions). Indeed, 50% of the farmers who do nothing mentioned weevil infestation as their major storage problem.

2 The Maize Marketing System

Afram Plains is a net exporter of maize to the southern part of the country. The importing areas are: Akim Oda, Mpraeso, Nkawkaw (all in Eastern Region); Aflao, Akatsi, Denu (in Volta Region), and markets in Accra. Apart from Accra, many of the other markets receiving maize from the Plains are only assembly points. For example, all the centres in Volta Region are possible assembly points for export to Togo.

Within the District, maize is assembled at a series of weekly assembly markets. Tease market is held on Tuesdays; Maamekrobo market on Wednesdays, and Donkorkrom market on Thursdays. Apparent differences between prices at Tease and prices in Donkorkrom or Maamekrobo may be due to the day or two difference in the timing of the market days.

2.1 Categorisation of Traders

The main actors in the maize trade are women. However, male traders probably buy larger volumes, even though maize trading may not be their main occupation.

In both areas, traders can be divided into resident and the non-resident:

- Resident traders include those who conduct all their trade in the villages of residence and others who move the produce to markets outside the district or region. Although both categories of traders source maize at the farmgate or buy from farmers in the markets, the former sell off all their maize in the local assembly markets, while the latter also send some maize to urban markets outside the district or region. This sub-group will be referred to as the rural based long-distance traders (RBLDTs).
- Urban-based long-distance traders (UBLDTs) come from outside the district, usually major urban markets.

In *Afram Plains*[15] the resident traders are the majority, followed by UBLDTs and then RBLDTs. The resident traders and RBLDTs are the principal buyers of maize from farmers. They either go into the farming villages to buy maize - chiefly, at the beginning of the main season (August/September) and during the lean season (May to June/July) - or wait in the markets for the farmers to bring the maize to them. UBLDTs tend to buy from resident traders and go into the villages only when maize is scarce (during the lean season). However, some UBLDTs who finance farmers get their supplies direct from farmers without the hassle of sourcing maize at the village level.

For the purposes of long distance trading, the purchase of major season crop from farmers (especially between September and October) carries a high risk of crop losses due to moulding. During this period the maize harvested is rather wet, and because it might still be raining, drying becomes a problem for farmers who may also be busy with the minor season maize production activities. However, the proximity of RBLDTs to the sources means that they are able to dry the produce and, therefore, have an advantage over UBLDTs in supplying urban markets during the early part of the season. Maize sourced by any UBLDTs during the early part of the season is likely to have been purchased from the rural based traders (both resident and long-distance). Price differences between Afram Plains and Brong Ahafo is another likely factor accounting for the lower patronage of Afram Plains by UBLDTs during the early part of the season. During the first week of September 1998 when maize sold for 30,000 Cedis per bag in some parts of Afram Plains District, the maize price in Techiman, a more accessible assembly market, was only 25,500 Cedis.

[15] A total of 50 traders were targeted for individual structured interviews in Maamekrobo, Tease, Kyemfre, Bebuso, and Ekyi-Amanfrom villages. These were largely resident traders and RBLDTs. Focus group discussions were also held with resident traders in all five villages, the average number of participants in these discussions being 10. UBLDTs were very difficult to catch for interview and were not available for the group discussions.

By contrast, UBLDTs tend to dominate the market from May to June/July, when supplies have dwindled elsewhere, the crop has properly dried and is much easier to transport. The focus group interviews revealed that each village tends to have a number of urban-based traders who visit regularly. However, during May-July, there are also non-regulars who come to buy maize because of scarcity in their regular markets.

Arguably, therefore, the main function fulfilled by resident traders within the marketing system is to buy small quantities of maize from farmers when UBLDTs are not present in the market and to assemble and store them for sale to UBLDTs in the lean season. Focus group discussions with traders in the sampled villages revealed that storage is practised by resident traders who have sufficient capital to store produce - usually for a month or two to capture the price hike in November, then long enough to receive the high prices of the lean period (May to June/July). The produce is usually stored in traders' homes and in a few cases in market stalls (e.g. at Maamekrobo). These resident traders are also most likely to benefit from the high weekly price variability that characterises prices in the two areas.

Another function fulfilled by resident traders is to provide production and pre-harvest consumption loans to farmers, in return for which the farmer agrees to sell his/her produce to the trader at a below-market rate. Resident traders use these patronage links not only to obtain this maize at low prices, however. A client farmer who brings his maize to an assembly market will feel obliged to sell to the "patron" trader, even if she is offering lower prices than UBLDTs buying in the market on the same day and even if he is not currently indebted to her. If he "spurns" her, the farmer fears that emergency loans will not be forthcoming if requested in future. For resident traders, therefore, credit linkages are an important tool for defending market share.

Farmers reported that, although they are still not happy with the prices in question, UBLDTs do sometimes "come with" higher prices than those being offered by resident traders. Farmers attribute this to the fact that UBLDTs are closer to the main national markets and only come to Afram Plains when they foresee shortages in these markets. However, our analysis (section 2.5) suggests that the larger volume of operations of UBLDTs may also permit them to offer a higher price to farmers.

Farmers are sceptical about the degree of competition between traders in both areas. In Afram Plains, allegations of collusion between groups of traders are quite plausible. Resident traders based in any given village are normally organised into an association, which, amongst other things, helps new members (often quite young looking girls) to get established in business. Agreeing rough prices, particularly when each trader maintains her own network of client suppliers, obviously reduces much of the uncertainty and risk for inexperienced members. As regards UBLDTs, these enter the district together in minibuses from Mpraeso or Nkawkaw, having already spent three or more hours together on the bumpy road and on the pontoon crossing an arm of Lake Volta. Smaller traders cooperate to hire trucks to transport their produce back out of the district. It is hard to imagine that they don't discuss pricing! These issues are explored further in section 2.5.

In *Damongo* resident traders can be divided into village- and Damongo town-based. Roughly a third of the village-based traders in our sample and all Damongo town-based traders sell maize outside the district.

Forty-four percent of the sampled long distance traders and traders based in the district capital had no other economic activity apart from trading. Another 39% farmed in addition. The remainder engaged in other petty trading. Only 3 of the eleven village-based traders were into crop trading only; the rest farmed or engaged in other petty trading. None of the traders specialised exclusively in maize trading. All the traders traded in a variety of agricultural produce, but 50 percent of the traders claimed that maize was the most important commodity in their trading business. The next important commodity traded in was sorghum (guinea corn).

Table 7 Number of Traders Buying Maize in Damongo in Each Month of an Average Year

Month	Long distance traders (n=11)	Traders based in District capital (n=13)
January	10	7
February	6	5
March	2	5
April	2	1
May	0	0
June	0	0
July	1	1
August	0	2
September	2	5
October	6	8
November	7	13
December	9	10

source: trader survey

Both long distance traders and traders based in the district capital claimed to buy most of their maize in the district between October and January/February (Table 7). So, unlike in Afram Plains, where traders move into the area during the lean months, trader activity in Damongo is concentrated in the period soon after harvest. By March, according to traders, most of the maize stocks in Damongo have run out[16].

The general picture in Damongo is of traders who scout around from place to place throughout the year in search of maize supplies, and whose appearance in Damongo is somewhat unpredictable[17]. Thus, not only is the inter-seasonal variation in price movements attributable to variation in national production; much of the intra-seasonal variation in Damongo may be due to the flow of traders, which in turn is (at least partly) determined by maize supplies elsewhere.

Nevertheless, traders operating in Damongo claim they trade in the district every year. They learn about maize availability in the district through other traders (42%) or from their

[16] However, this information is not entirely consistent with that supplied by farmers regarding their sales (Table 6).

[17] Farmers acknowledged that market access is a problem because there are farmers who would like to sell maize but cannot get anybody to buy it.

residence in the area. Seventy five percent of the long distance traders sampled had been buying maize from the district for 5 to 10 years.

According to our survey data, the average quantity of maize purchased per trip by the village-based traders is about 14 bags, with 50% buying less than 10 bags. Traders based in the district capital or other towns outside the district purchase an average of 24 bags per trip, with 20% of traders buying less than 10 bags. These quantities reflect both low supplies of maize and inadequate trading capital. All the traders claim they rely on equity funds for trading.

Whilst the traders themselves do not get access to loan finance, they do finance farmers' production activities. Virtually all local and long-distance traders claimed they lent money to an average of 4 to 5 farmers in the 1998/9 season[18]. As in Afram Plains, traders' reasons for financing farmers are a combination of assuring supplies and being able to obtain maize at better prices. Perhaps surprisingly, two thirds of the sub-sample of local traders indicated assured supplies as the main reason, while a similar proportion of the long-distance traders mentioned better prices as their reason for lending to farmers.

As in Afram Plains many (70%) of village-based traders store maize to speculate on prices. All the 24 long-distance and district based traders keep stocks, although these may be more for assembly purposes than speculation as such. All the village-based traders and 65% of the long distance traders store produce at home. The remaining 35% of long distance traders store in market stalls.

2.2 Search Costs

In four out of the five sampled villages in *Afram Plains*, resident and RBLDTs go into other surrounding communities to purchase maize. The distances travelled range from 5 to 30 kilometres. Traders in Maamekrobe and Tease, the bigger marketing centres, tend to travel the longest distances. The time spent ranges from 3 days to 1 week, depending on the distance and availability of maize. However, another contributory factor to prolonged search time is that maize is stored on the husk in barns at the village, and farmers will normally shell maize only after they are sure of a sale and of the exact quantity required by the trader.

To reduce time spent in searching for maize, traders either pay an agent to source the maize on their behalf on a commission basis (1000 cedis per bag in early September 1997) or offer a slightly higher price to attract more supplies. It is reported that the price difference can be up to 20 percent of the purchase price. In both of these cases, only traders with significant capital can afford the costs of reducing search time. In addition, agents are only used where the trader has long experience in trading in the communities concerned and, therefore, knows the agent well enough to trust her money to him/her.

One interesting local institution that increases the length of trip for some traders is the rule in Maamekrobo market that only allows movement of trucks out of the market on Wednesdays. The revenue collector in the market explained that traders can make their purchases any time during the week, but that trucks are not allowed to leave the market until Wednesday (the weekly market day), so that a sufficient concentration of trading activities is achieved to

[18] Loan sizes ranged from 20,000 to 40,000 Cedis to between 120,000 and 150,000 Cedis. As the farmer budgets in Appendices A1-A5 indicate, the smaller loans would only constitute a fraction of the production requirements of even an average smallholder.

maximise revenue collected (and market prices for sellers?). In response, however, many traders simply load their produce and take off for the goods to follow later.

In *Damongo* district-based and long distance traders spend an average of 6 days to complete one trading trip. More than 80% of purchases are directly from farmers. Sixty percent of long distance traders use agents to look for maize. Perhaps surprisingly, 36% of village based-traders use the services of others to look for maize.

2.3 Risks of Trading in Poor Access Areas

Having acquired it, traders often accompany their produce on tractors to main roads or assembly markets where it can be loaded onto a truck. In Afram Plains at certain times of year, both traders and produce stand the risk of being beaten by rain. Since there are no facilities for drying and storage, there is a high chance of the produce getting rotten or mouldy.

Since traders do not have their own transportation, the practice is for the trader to organise for a tractor only after s/he is sure of supplies. During the wet season the conveying tractors may get stuck on the bad roads. Both of these factors can cause further delays in traders returning to the assembly market. The result is usually that they lose regular customers to other traders; to win the customers back, a trader may have to offer the produce at a lower price.

The rapid changes in prices during the early part of the major season also increase the risk of price declines, especially when the time for bringing the produce back to base is significantly delayed.

Another risk is that of default on loans granted. Some farmers who have loan contracts to sell maize to their creditors may choose to sell the produce to other traders when they are hard-pressed for cash.

2.4 Farmer Perceptions About Trading Services

As one might expect, in both areas there is a great deal of suspicion between traders and farmers. In the case of local traders this is somewhat mitigated by the fact that they live in the same communities as farmers, including, in Afram Plains, often being members of the same church. If the final workshops of the project were an accurate reflection, there is a lot more hostility between traders and farmers in Damongo, perhaps because maize there is in some decline.

According to farmers in *Damongo*, the main marketing problems that they face include[19]:

- The use of oversized bags by traders to buy maize, especially when buying at the farm/home. Traders insist that "the maize in the sacks should be pounded" as the sacks are filled. Arguably, bag size is just another dimension of the selling bargain, like price. However, lack of consistency on bag size prevents the dissemination of reliable price information and creates additional room for "opportunism" on the part of traders.

[19] The list of woes in Afram Plains is similar.

The farmers who lose out are the most vulnerable (poorest) and possibly also the least forceful / sharp. The lack of standardisation is seen by farmers as a very important problem. In the past, the Ghana Food Distribution Corporation (GFDC) used to buy the maize with standardised measures (sacks), but they have now stopped. According to the farmers, they would prefer to have the GFDC back.

- The price of maize compared to the price of inputs is too low. "Farmers are producing for traders" said one of the farmers, noting that traders dictate the prices. As with bargaining over bag size, farmers complain that they can do nothing, because it is often almost impossible for them to carry the produce to a far away market. There is also a fear that the farmer could in fact end up with a lower price in a distant market such as Damongo. Moreover, as most maize sales in Damongo are only undertaken when there is an immediate cash need, if the farmer does not sell, he may not know how else he can survive.
- The cost of transporting maize from the farm by tractors is rising every year. It can cost up to 50,000 Cedis to transport a tractor load of 8-12 maxi bags of maize from a farm to the village.
- Farmers get information on prices through traders and through other farmers. They agree that it is not good to depend on traders for information on prices because the traders normally collude. However, they have no choice. Farmers have observed that when traders come to the villages before scheduled market days, that is a sign that there are shortages.
- Competition between traders is low. In remote villages within Damongo, in addition to the problems of low surpluses, the number of traders is reduced because of the very bad roads. Farmers either headload or depend on tractors to get their produce to more accessible locations.

2.5 Trader Budgets

Appendices A7-A13 grapple with the question of trader costs and returns. Providing definitive figures for these would, unfortunately, require a much larger sample than was collected during the current work, as costs and returns can vary according to:

- purchase price;
- sale price (both of these depend critically on timing, which is obviously a large part skill, but may also be partly luck);
- location of village and state of the road leading to it;
- destination market;
- volume of bags traded;
- bag size;
- length of trip (which depends, amongst other things, on strength of local contacts and information on available surpluses, but again may also be partly luck, especially in avoiding delays);
- activities of other traders in the purchase area at the same time (which may affect both the purchase price and the time taken to assemble a full load).

Figures collected during the current research encompass considerable variety in many of these indicators, so the budgets are at best suggestive. However, every effort has been made to keep

the resulting returns within "plausible" limits, including factoring in some "costs" not captured in the original questionnaire but included in other budgets estimated for maize trading in Ghana!

These efforts notwithstanding, the returns figures shown in the Appendices are quite high. Whilst it is conceivable that some costs have still been omitted from these budgets, it is also possible that traders are achieving a significant level of super-normal returns to maize trading activity in Ghana[20]. This is plausible given:

- the strong market associations in all major terminal markets, which make it very difficult for non-members to sell produce (unless they develop entirely new marketing channels, as some of the recent, medium-sized entrants into maize marketing are doing);
- the high level of protection provided to domestic maize production and marketing, making domestic maize considerably more expensive than maize on world markets;
- the relatively high (by the standard of African staples) value added in maize processing in Ghana, which makes it less imperative that the basic grain should be as cheap as possible.

However, if there are super-normal returns to maize trading activity, it is a Ghana-wide phenomenon, not one unique to the areas under consideration. Indeed, there is a strong sense that maize supplies from different production zones within the country have to compete with each other - and this applies to traders and their margins, as well as producers.

With regard to Afram Plains, monthly data collected by MoFA indicate that prices in Ekye-Amanfrom (the trading town at the Afram Plains side of the pontoon crossing) are generally higher than Techiman prices during most months of the year. Traders, however, have to weigh up the relative costs and benefits of different purchase prices, transport costs and bag sizes (which at up to 170kg for a maxibag in Afram Plains are the largest in the country).

Neither is the hypothesis of lower competition in Afram Plains borne out by the survey data assembled in Appendices A7-A13. These show higher trader returns in the comparator, more accessible areas outside of Afram Plains. A similar finding is reported for Damongo.

Although trader returns are a sensitive subject - and one that perhaps still needs more thorough investigation - the real usefulness of Appendices A7-A13 for the purpose of the present study lies in the insights they provide into the main determinants of profitability and into the potential (relative) benefits that may be derived from different interventions designed to improve the functioning of the marketing system.

With regard to the former, it is clear that volume of business exerts a key influence on trader returns. This highlights the importance of access to capital and to contacts / information.

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[20] This tentative conclusion is supported by two other recent, unpublished estimates of trader budgets for Ghanaian maize: The first estimates the marketing costs and returns for maize assembled in Brong Ahafo, then sent to Accra via Techiman. Combined trader "profits" account for 14% of the final consumer price, equal to both transport and associated costs, and all other marketing costs. In the second, the researcher accompanied the trader and produce throughout the journey from Techiman to Cape Coast, noting all costs incurred. Of the per kilo price in the destination market, the producer received 50%, total marketing costs accounted for 13% and the trader's net margin accounted for the remainder (E.Asante, pers.comm.).

Potential interventions to improve the functioning of the marketing system, and thereby farmer access to maize markets, are addressed in the next section.

3 Potential Interventions to Improve Farmer Access to Maize Markets

This penultimate section considers the relative benefits (and to a lesser extent costs) of the following possible interventions to improve the functioning of the maize marketing system in the two study areas, and thereby to improve farmer access to maize markets:

- upgrading the main access road into the study areas;
- improving the efficiency with which transport services are provided, so as to reduce transport costs, independent of the state of the road(s);
- improving coordination between farmer groups and traders, so as either to reduce the time taken for traders to obtain a given volume of maize or to assist traders to acquire more in a given trip (capital permitting);
- provision of inventory credit to allow farmers to store maize for longer before selling.

The approach taken is to compare the static benefits that could accrue to farmers, in terms of higher producer price, from the different interventions, assuming that all benefits were passed onto them. Other dynamic (and non-maize) benefits are discussed in qualitative terms and little attempt has yet been made to compare the costs of the different interventions, some of which are in any case hard to determine.

In order to compare the static benefits, the question is asked: what farmgate price could farmers receive after the selected intervention if traders were still to obtain the same ("target") income per day from their trading activities? This is based on the assumption that, for capital constrained traders, who have to feed their families and meet all their other needs through turning over their stock of trading capital, income per day is the crucial indicator of performance.

The precise interventions investigated are -

for *Afram Plains*:

- reducing the cost of transporting maize from Afram Plains to Accra from 8,500 to 6,000 cedis per bag through upgrading the main access road from Nkawkaw. (6,000 cedis per bag represents a plausible figure for the journey, given per bag costs on other journeys within Ghana, e.g. from the "maize triangle" in Brong Ahafo).
- reducing all transport costs by 20% through improving the efficiency with which transport services are provided. (Hine and others have estimated that freight transport costs per ton-km are two to five times in Africa what they are in Asia, due to higher initial import costs, lower operational efficiency etc. In Ghana, increasing operational efficiency is hampered by the control over freight and passenger services exercised by the Ghana Private Road Transport Union, whilst reducing the extent of empty running in a remote area such as Afram Plains is made more difficult by the fact that it is a

dead end[21]. The suggested 20% cost savings might, therefore, have to come through more competitive vehicle importation and other, smaller savings);

- reducing the length of time taken for a trader to acquire a "full load" of crops in the villages through improving coordination between farmer groups and traders (precise saving depends on trader type).

for *Damongo*:

- reducing the cost of transporting maize from Damongo to Tamale from 4000 to 3000 cedis per bag through upgrading the main access road to Damongo.
- reducing all transport costs by 20% through improving the efficiency with which transport services are provided (as above);
- reducing the length of time taken for a trader to acquire a "full load" of crops in the villages through improving coordination between farmer groups and traders (as above, precise saving depends on trader type).

Table 8a Basic Increase in Farmgate Price as a Result of Interventions, by Intervention and Trader Type, Afram Plains

Intervention	UBLDT buying in villages	UBLDT buying at weekly market	UBLDT buying in accessible area outside Afram Plains (comparator)
In-District Turnaround Reduced	(7 nights – 3) **2700 - 3600**	(2 nights – 0) **2900 - 3400**	(1 night – 0) **4100-4400**
(as % of current price)	6-9%	7-8%	13-14%
Cost of Transport to Accra Reduced	(8500 – 6000) **2500**	(8500 – 6000) **2500**	(7000 – 6000) **1000**
(as % of current price)	6%	6%	3%
Transport Efficiency Improved by 20%	**3150 - 3600**	**1700 - 1900**	**1430 - 1680**
(as % of current price)	8-9%	4-5%	5%

The basic result (Table 8a and 8b) is that all three interventions in Afram Plains permit an increase in the farmgate price of 1700 - 3600 cedis per bag and in Damongo an increase in the farmgate price of 1000 - 2000 cedis per bag, depending on the volume of trade that the trader is engaged in. These increases are modest, especially when compared with prices prevailing in the lean season.

Perhaps the critical test of their value to farmers is the extent to which they make it more profitable to sell maize soon after harvest. If this is assessed according to the returns to labour achieved from maize production and storage (factoring the farmgate price increases into the original farmer budgets), again the benefits are fairly marginal. Using 1998/9 prices, the returns to labour achieved by smallholders still does not reach 3000 cedis per manday (the

[21] In addition, the seasonal nature of agricultural production means that there is always likely to be an asymmetry between the volume of goods going in and those going out, although this will reverse at different times of the year.

lower limit opportunity cost of labour) at any time during the season after any one of the interventions. Using 1996/7 prices, however, the returns rise above 3000 cedis per manday if maize is stored until November, whereas previously it would have had to be stored until December.

Table 8b Basic Increase in Farmgate Price as a Result of Interventions, by Intervention and Trader Type, Damongo

Intervention	District Trader Buying in Villages	District Trader Buying at Market Centre	Village Trader Buying in Villages	Comparator Trader in More Accessible Area
In-District Turnaround Reduced	(4 nights – 2) **900 - 1200**	(2 nights – 0) **2200 - 2500**	(4 nights – 2) **1700 - 1900**	(1 night – 0) **3300 - 3900**
(as % of current price)	3-4%	7-8%	6%	11-13%
Cost of Transport to Tamale Reduced	(4000 – 3000) **1000**	(4000 – 3000) **1000**	(4000 – 3000) **1000**	(7500 – 6000; Accra) **1500**
(as % of current price)	3%	3%	3%	5%
Transport Efficiency Improved by 20%	**1400 - 1600**	**800 - 900**	**1400 - 1500**	**1500 - 1900**
(as % of current price)	5%	3%	5%	5-6%

The benefits of inventory credit provision to allow farmers to store maize for longer before selling can be assessed by simply looking at the returns to labour for maize sold at different months in the original farmer budgets. These budgets could also be used to assess the benefits of interventions designed to raise production yields.

Dynamic and Non-Maize Benefits

Of course, various of these interventions have dynamic and non-maize benefits that may far outweigh the static benefits to maize production just outlined. For example:

- Improving the road may encourage additional traders and transporters to come into the study areas, thus increasing levels of competition. Neither static nor dynamic benefits would be limited to maize, of course; all marketed crops should benefit, as should input provision. In addition, new institutional economics stresses that the benefits of roads and transportation extend to improved information flows, the development of trading contacts etc. Recent thinking on roads and transportation likewise stresses the importance of mobility to poverty reduction in general, through the means noted above, plus better access to social welfare networks etc.

- Some of the benefits just outlined would also apply to an improvement in transportation efficiency. This would depend on how many new traders and transporters were encouraged to enter the areas concerned as a result of lower transport costs when the basic state of the road remained unchanged.
- Better coordination between farmers and traders should allow farmers to access improved information, not just on maize markets, but on market opportunities in other, higher value crops, which they could then produce and sell to the same traders. This could be a major step forward in the agricultural development of the case study areas. Of similar importance, the development of strong, viable farmer groups could begin to redress some of the imbalance within the trader-farmer bargaining relationship, leading eventually to control over bag sizes and a greater share of the super-normal profits within maize marketing systems accruing to producers.

Costs

The benchmark cost for transforming an existing road into a 5-6m wide tarred surface is a staggering US$250-300,000 per km. Acceptable murram surfaces can be laid for US$10,000 upwards, depending on subsequent life-span. All have regular maintenance requirements. The road into Afram Plains is not amenable to a murram surface, so would be a high cost option (US$10 million plus for 40 or so km to the pontoon). Indeed, DANIDA have allegedly concluded that it would be cheaper to route an improved access route through Volta Region, rather than upgrade the currently preferred Nkawkaw-Mpraeso route.

Improvements in transportation efficiency may be as much a matter of better policy - and, critically, political will to take on vested interests - as of costly intervention at ground level.

Attempts to establish farmer groups have been started by World Vision in Afram Plains[22]. The benefits outlined above suggest that, long-term, this is an essential option for smallholder development in the area. However, how long it will take to establish strong, independent groups - and what level of external investment in facilitation and training will be needed to achieve this is anyone's guess!

4 A Final Note on the Role of the State

The previous section has suggested some areas in which the state may have a contribution to make, including targeting road building investment and in making changes to permit improvements in transport efficiency to take place. In addition, this work has highlighted once again the importance of a strong financial sector able to provide increased flows of capital to both traders (to increase volumes of business) and farmers (to permit adoption of yield-enhancing technology). The latter might also benefit from increased extension contact.

Farmers in both case study areas argued for a return to direct buying activity by GFDC in remote areas. At the time of writing, the future of GFDC remains unclear. It is the impression

[22] A related activity is to develop the processing of maize and cassava products for both the domestic market and export markets (e.g. selling to West Africans in London). This enterprise has already established a market in Kumasi and Accra supermarkets, worth several million cedis per month, with the first export shipments due to be sent soon. Farmers receive a price in excess of prevailing market prices for their produce and in addition are being invited to buy shares in the new venture.

of the authors that the government is reluctant to wind the organisation down, but is similarly reluctant to make the changes that could transform it into an efficient vehicle for providing services to farmers in competition with private traders.

A limited buying intervention that would benefit farmers in both areas would be the purchase of grain for a strictly limited period (say two-three months) after harvest at a price fractionally above average market levels for that period[23]. As noted earlier, the benefits of this intervention, if successful, would accrue disproportionately to the poorest producers. However, GFDC would need considerably more management autonomy than it appears to have had in the past if such a policy is not to lead to eventually-fatal losses.

In the immediate future, a government intervention that would benefit both traders and producers (though not particularly the poorest) would be to buy up some of the current "overhang" in the maize system and put it into strategic (long-term) storage, allowing the price mechanism once again to operate freely, to provide incentives to farmers to produce and storers to store.

8/7/99

References

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Poulton C (1997) *The Cotton Sector in Ghana: The Dynamics of Competition in a System of Interlocking Transactions*, Report produced under ODA Project R6439CA, Wye College.

West Gonja District Assembly (1996) *Medium Term Development Plan 1996-2000*, Office of the Chief Executive, Damongo (with assistance from GTZ).

[23] This assumes that market prices are "artificially" low in this period due to the proportion of "distress" sales by farmers desperate for cash and the problem of drying wet maize in Afram Plains, with private traders unable to generate enough capital (or overcome the drying problem) to absorb the initial glut.

Revised Farm budgets: Afram Plains (traditional technology, abusa rental)

Activity	Rate per hectare	Cash Costs	Labour Days
Land preparation (Manual)	123500		30
Seed rate (marg. tins)	74		
Seed cost (cedis)	35000 Cedis per 50 Kg.	25900	
Planting	2.47 person day @ 3000 per day		2
Weeding	62000 per task + food (twice)	4000	40
Harvesting	10 mandays @ 3000 + food	500	5
Transport from farm to house	30000 per tractor load of 10 bags	20000	
Total variable cost		50400	77
Yield (bags)	10		
Net output after abusa rental	7		

Returns at 1998/99 maize prices in Tease

	Price Cedis per 150 Kg bag	Gross Revenue	Months in Store	Storage cost/bag	Net Revenue/bag	Net Ben.of storage	Returns to Labour
August	25000	166667	0	0	17440		1501
September	30000	200000	1	1454	20986	3546	1806
October	30000	200000	2	2908	19532	2092	1681
November	30000	200000	3	4363	18078	637	1556
December	30000	200000	4	5817	16623	-817	1431
January	45000	300000	5	8771	28669	11229	2467
February	36000	240000	6	9445	18995	1555	1635
May	48000	320000	9	16328	24113	6673	2075

Revenue at 1996/97 maize prices in Tease

	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage cost/bag	Net Revenue/bag	Net Ben.of storage	Returns to Labour
August	20000	133333	0	0	12440		1071
September	20000	133333	1	1083	11357	-1083	977
October	30000	200000	2	2567	19873	7433	1710
November	45000	300000	3	4750	32690	20250	2813
December	54000	360000	4	7053	39387	26947	3389
January	54000	360000	5	8817	37623	25183	3238
February	54000	360000	6	10580	35860	23420	3086
May	95000	633333	9	23250	64190	51750	5524

APPENDIX A2

	Farm budget for Mechanised system in Afram Plains (Assumption: farmer owns land)							
	Activity	Rate (per hectare)		Cash Costs	Labour Days			
	Land preparation (Ploughing)	123500		123500				
	Seed rate (planted in rows)	50 margarine tins						
	Seed cost	65000 Cedis per 50 Kg.		32500				
	Planting	15000 plus food		500	5			
	Weeding	62000 per ha + food (twice)		4000	40			
	Fertilizer cost							
	1. Compound (15-15)	30000		74100				
	2. Ammonia	40000		98800				
	Fertilizer application	10000			5			
	Harvesting	10 mandays @ 5000			15			
	Transport from farm to house	30000 per tractor load of 10 bags		90000				
	Total cost			423400	65			
	Yield (bags of 150kg)	30						
	Revenue at 1998/99 prices in Tease							
	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage Cost / bag	Net Revenue/bag	Net Ben.of Storage	Returns to Labour	
August	25000	750000	0	0	10887		5029	
September	30000	900000	1	4004	11883	996	5489	
October	30000	900000	2	5158	10728	-158	4956	
November	30000	900000	3	6313	9574	-1313	4423	
December	30000	900000	4	7467	8420	-2467	3890	
January	45000	1350000	5	9371	21516	10629	9940	
February	36000	1080000	6	10135	11752	865	5429	
May	42000	1260000	9	14318	13569	2683	6268	
	Revenue at 1996/97 prices in Tease							
	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage Cost / bag	Net Revenue/bag	Net Ben.of Storage	Returns to Labour	
August	20000	600000	0	0	5887		2719	
September	20000	600000	1	3733	2153	-3733	995	
October	30000	900000	2	4817	11070	5183	5114	
November	45000	1350000	3	6250	24637	18750	11381	
December	54000	1620000	4	7743	32143	26257	14849	
January	54000	1620000	5	8967	30920	25033	14284	
February	54000	1620000	6	10190	29697	23810	13719	
May	95000	2850000	9	17550	63337	57450	29259	

APPENDIX A3

	Farm Budget per Hectare (Traditional technology)						
	Activity		**Rate per acre Cedis**		**Cash Costs**	**Labour Days**	
	Land preparation (Manual)		40000/acre			25	
	Seed rate (bowls, planted at random sparsely)		3				
	Seed cost (cedis per bowl)		800		5928		
	Planting		1 manday @ 3000			2	
	Weeding		2 times @ 35000			49	
	Harvesting		4 mandays @4000			5	
	Transport from farm to house		40000 per tract load of up to 12 bags		32933		
	Total variable cost				38861	82	
	Yield	10	4	bags			
	Returns at 1998/99 maize prices in Damongo						
	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage cost/bag	Net Revenue/bag	Net Ben.of storage	Returns to Labour
November	28000	276640	0	0	24067		2917
December	32000	316160	1	1597	26470	2403	3208
January	40000	395200	2	3513	32553	8487	3946
February**	40000	395200	3	5270	30797	6730	3733
March**	40000	395200	4	7027	29040	4973	3520
April**	40000	395200	5	8783	27283	3217	3307
May**	36000	355680	6	10060	22007	-2060	2667
	Returns at 1996/97 maize prices in Damongo						
	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage cost/bag	Net Revenue/bag	Net Ben.of storage	Returns to Labour
November	30000	296400	0	0	26067		3160
December	36000	355680	1	1677	30390	4323	3684
January	45000	444600	2	3713	37353	11287	4528
February	46000	454480	3	5630	36437	10370	4417
March	48000	474240	4	7667	36400	10333	4412
April	58000	573040	5	10583	43483	17417	5271
May	61000	602680	6	13060	44007	17940	5334

APPENDIX A4

	Revised farm Budgets: Damongo						
	Costs per acre (Mechanized farming):						
	Activity		**Rate per acre Cedis**		**Cash Costs**	**Labour Days**	
	Land preparation (tractor ploughing)		35000		86450		
	Seed rate (bowls, planted in rows dense)		7				
	Seed cost (cedis per bowl)		1000		17290		
	Planting		2 manday @ 3000			5	
	Weeding		40000			49	
	Fertilizer cost						
	1. Compound (15-15)		40000		98800		
	2. Ammonia		30000		74100		
	Fertilizer application		3 mandays @4000			7	
	Harvesting					12	
	Transport from farm to house		40000 per 12 bags		82333		
	Total cost				358973	74	
	Yield (bags)	25	10	bags			
	Returns at 1996/99 maize prices in Damongo						
	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage cost/bag	Net Revenue/bag	Net Ben.of storage	Returns to Labour
November	28000	691600	0	0	13467		4489
December	32000	790400	1	4127	13340	-127	4447
January	40000	988000	2	5563	19903	6437	6634
February**	40000	988000	3	6920	18547	5080	6182
March**	40000	988000	4	8277	17190	3723	5730
April**	40000	988000	5	9633	15833	2367	5278
May**	36000	889200	6	10750	10717	-2750	3572
	Returns at 1996/97 maize prices in Damongo						
	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage cost/bag	Net Revenue/bag	Net Ben.of storage	Returns to Labour
November	30000	741000	0	0	15467		5156
December	36000	889200	1	4235	17232	1765	5744
January	45000	1111500	2	5800	24667	9200	8222
February	46000	1136200	3	7305	24162	8695	8054
March	48000	1185600	4	8870	24597	9130	8199
April	58000	1432600	5	10875	32592	17125	10864
May	61000	1506700	6	12660	33807	18340	11269

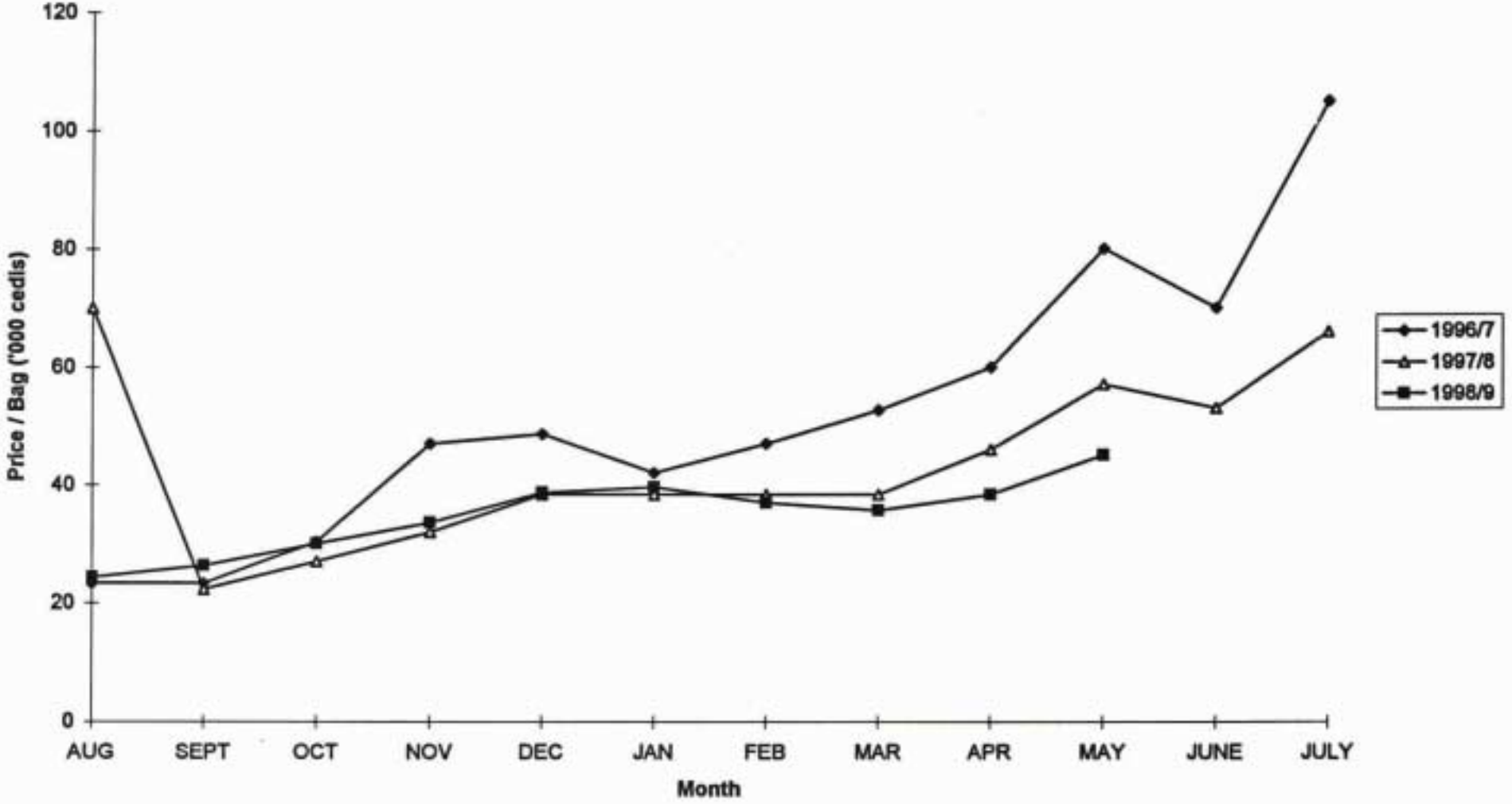
APPENDIX A5

	Budget for Mechanized farming in Damongo					
	Activity		**Rate per acre Cedis**		**Capital Costs**	
	Land preparation (tractor ploughing)		35000		86450	
	Seed rate (bowls, planted in rows dense)		7			
	Seed cost (cedis per bowl)		1000		17290	
	Planting		2 manday @ 3000		14820	
	Weeding		40000		98800	
	Fertilizer cost					
	1. Compound (15-15)		40000		98800	
	2. Ammonia		30000		74100	
	Fertilizer application		2 mandays @4000 (twice)		39520	
	Harvesting				49400	
	Transport from farm to house		40000 per 12 bags		82333	
	Total cost				561513	
	Normal Return to Management		5 days @ 10000/day		50000	
	Yield (bags)	25	10	bags		
	Returns at 1998/99 maize prices in Damongo					
	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage Cost (excl.cap)	Returns to Cap. (% p.a.)	
November	28000	691600	0	0	34	
December	32000	790400	1	78299	48	
January	40000	988000	2	90155	109	
February	40000	988000	3	100035	87	
March	40000	988000	4	109915	72	
April	40000	988000	5	119795	61	
May	36000	889200	6	123747	32	
	Returns at 1996/97 maize prices in Damongo					
	Price Cedis per 150 Kg	Gross Revenue	Months in Store	Storage Cost (excl.cap)	Returns to Cap. (% p.a.)	
November	30000	741000	0	0	55	
December	36000	889200	1	79287	94	
January	45000	1111500	2	92625	155	
February	46000	1136200	3	104481	133	
March	48000	1185600	4	117819	124	
April	58000	1432600	5	142025	161	
May	61000	1506700	6	160797	155	

APPENDIX A6

Chart1

Monthly Maize Prices in Afram Plains Village Markets 1996/7 - 1998/9



APPENDIX A7

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INDICATIVE BUDGET FOR LONG-DISTANCE TRADER BUYING IN AFRAM PLAINS

Purchase in Remote Village

				Bag size (kg)	Price (c)	Price per kg (c)		
Buying Price (Remote)				160	42000	263		
Selling Price (Accra)				125	60000	480		
			Bags Bought:		**10**	**20**	**50**	**100**
Costs (Cedis per Bag)			Total					
Return Fare Nkawkaw to Donkorkrom				10000	1000	500	200	100
Board + Lodge in District	3000	7		21000	2100	1050	420	210
Payments to Local Agents (/bag)				1000	1000	1000	1000	1000
Own Transport to/from Buying Area				11000	1100	550	220	110
Loading / Unloading (/bag)				3000	3000	3000	3000	3000
Transport of Maize to Donkorkrom (/bag)				7000	7000	7000	7000	7000
Transport of Maize to Accra (/bag)				8500	8500	8500	8500	8500
Council Fees (x2)				1700	1700	1700	1700	1700
Rebagging				1750	1750	1750	1750	1750
Return Fare Nkawkaw to Accra				4000	400	200	80	40
Other costs/bag				2500	2500	2500	2500	2500
Expenses in Accra		3		10000	1000	500	200	100
Total per Bag					31050	28250	26570	26010
Cost per kg					194	177	166	163
PROFIT PER BAG BOUGHT					3750	6550	8230	8790
Profit as % of Accra Price					4.9	8.5	10.7	11.4
Return on Capital (% p.a.)					187	340	438	472
Financing cost/bag @		100%	p.a.		1400	1347	1315	1304
Income per Day					2350	10406	34577	74861
Income per Day before financing costs					3750	13100	41150	87900
Possible intervention effects								
improved coordination and quicker turn around								
"Target" Buying Price	7	nights			42000	42000	42000	42000
"Target" Buying Price	3	nights			44700	45220	45532	45636
% increase in buying price					6%	8%	8%	9%
improved main road and reduced transport costs								
"Target" Buying Price	6000	transport/bag to Accra			44500	44500	44500	44500
	29%	cost redn			6%	6%	6%	6%
improved transport efficiency								
"Target" Buying Price	20%	cut all transport costs			45600	45350	45200	45150
					9%	8%	8%	8%
Base' Trader Income per Day:					3750	13100	41150	87900

APPENDIX A8

INDICATIVE BUDGET FOR LONG-DISTANCE TRADER BUYING IN AFRAM PLAINS

Purchase in roadside (e.g. Donkokrum) market

			Bag size (kg)	Price (c)	Price per kg (c)		
Buying Price (Donkorkrom)			140	42000	300		
Selling Price (Accra)			125	60000	480		
		Bags Bought:		**10**	**20**	**50**	**100**
Costs (Cedis per Bag)		Total					
Return Fare Nkawkaw to Donkorkrom			10000	1000	500	200	100
Board + Lodge in District	3000	2	6000	600	300	120	60
Loading / Unloading (per bag)			2000	2000	2000	2000	2000
Transport of Maize to Accra (/bag)			8500	8500	8500	8500	8500
Taxes and fees (/bag)			1700	1700	1700	1700	1700
Rebagging (/bag)			1750	1750	1750	1750	1750
Return Fare Nkawkaw to Accra			4000	400	200	80	40
Other costs/bag			2500	2500	2500	2500	2500
Expenses in Accra		3	10000	1000	500	200	100
Total per Bag				19450	17950	17050	16750
Cost per kg				138.929	128.214	121.786	119.643
PROFIT PER BAG BOUGHT				5750	7250	8150	8450
Profit as % of Accra Price				8.6	10.8	12.1	12.6
Return on Capital (% p.a.)				683	883	1008	1050
Financing cost/bag @	100%	p.a.		586	572	563	560
Net income per Day				10327	26712	75866	157790
Net income per day before financing				11500	29000	81500	169000
Possible intervention effects							
improved coordination and quicker turn around							
"Target" Buying Price	2	nights		42000	42000	42000	42000
"Target" Buying Price	0	nights		44900	45200	45380	45440
% increase in buying price				7%	8%	8%	8%
improved main road and reduced transport costs							
"Target" Buying Price	6000	transport/bag to Accra		44500	44500	44500	44500
	29%	cost redn		6%	6%	6%	6%
improved transport efficiency							
"Target" Buying Price	20%	cut all transport costs		43980	43840	43756	43728
				5%	4%	4%	4%
Base' Trader Income per Day:				11500	29000	81500	169000

APPENDIX A9

INDICATIVE BUDGET FOR LONG-DISTANCE TRADER BUYING OUTSIDE AFRAM PLAINS							
Purchase in market							
			Bag size (kg)	Price (c)	Price per kg (c)		
Buying Price			140	31000	221.429		
Selling Price (Accra)			125	55000	440		
		Bags Bought:		**10**	**20**	**50**	**100**
Costs (Cedis per Bag)		Total					
Return Fare			10000	1000	500	200	100
Board + Lodge in District	2800	1	2800	280	140	56	28
Loading / Unloading (per bag)			1600	1600	1600	1600	1600
Transport of Maize to Accra (/bag)			7000	7000	7000	7000	7000
Taxes and fees (/bag)			750	750	750	750	750
Rebagging (/bag)			2000	2000	2000	2000	2000
Return Fare to Accra			4000	400	200	80	40
Other costs/bag			1250	1250	1250	1250	1250
Expenses in Accra		3.	10000	1000	500	200	100
Total per Bag				15280	13940	13136	12868
Cost per kg				109.143	99.5714	93.8286	91.9143
PROFIT PER BAG BOUGHT				15320	16660	17464	17732
Profit as % of Accra Price				24.9	27.0	28.4	28.8
Return on Capital (% p.a.)				3021	3383	3611	3688
Financing cost/bag @		100% p.a.		353	343	337	334
Net income per Day				37418	81587	214093	434938
Net income per day before financing				38300	83300	218300	443300
Possible intervention effects							
improved coordination and quicker turn around							
"Target" Buying Price	1 nights			31000	31000	31000	31000
"Target" Buying Price	0 nights			35110	35305	35422	35461
% increase in buying price				13%	14%	14%	14%
improved main road and reduced transport costs							
"Target" Buying Price	6000	transport/bag to Accra		32000	32000	32000	32000
	14%	cost redn		3%	3%	3%	3%
improved transport efficiency							
"Target" Buying Price	20%	cut all transport costs		32680	32540	32456	32428
				5%	5%	5%	5%
Base' Trader Income per Day:				38300	83300	218300	443300

INDICATIVE BUDGET FOR LONG-DISTANCE TRADER BUYING IN DAMONGO								
Purchase in Remote Village								
			Bag size (kg)	Price (c)	Price per kg (c)			
Buying Price (Remote)			150	30000	200			
Selling Price (Accra)			125	40000	320			
			Bags Bought:		**10**	**20**	**50**	**100**
Costs (Cedis per Bag)			Total					
Return Fare			4000		400	200	80	40
Board + Lodge in District	2500	4	10000		1000	500	200	100
Payments to Local Agents (/bag)			1000		1000	1000	1000	1000
Own Transport to/from Buying Area			3000		300	150	60	30
Loading / Unloading (/bag)			2000		2000	2000	2000	2000
Transport of Maize to Damongo (/bag)			3000		3000	3000	3000	3000
Transport of Maize to destn (/bag)			4000		4000	4000	4000	4000
Council Fees (x2)			1000		1000	1000	1000	1000
Rebagging			2500		2500	2500	2500	2500
Return Fare destn			3000		300	150	60	30
Other costs/bag			0		0	0	0	0
Expenses in destn		3	8000		800	400	160	80
Total per Bag					16300	14900	14060	13780
Cost per kg					109	99	94	92
PROFIT PER BAG BOUGHT					1700	3100	3940	4220
Profit as % of destn Price					3.8	6.9	8.8	9.4
Return on Capital (% p.a.)					191	360	466	503
Financing cost/bag @		100%	p.a.		620	601	590	586
Income per Day					1543	7140	23931	51916
Income per Day before financing costs					2429	8857	28143	60286
Possible intervention effects								
improved coordination and quicker turn around								
"Target" Buying Price	4	nights			30000	30000	30000	30000
"Target" Buying Price	2	nights			30986	31136	31226	31256
% increase in buying price					3%	4%	4%	4%
improved main road and reduced transport costs								
"Target" Buying Price	3000	transport/bag to destn			31000	31000	31000	31000
	25%	cost redn			3%	3%	3%	3%
improved transport efficiency								
"Target" Buying Price	20%	cut all transport costs			31600	31500	31440	31420
					5%	5%	5%	5%
Base' Trader Income per Day:					2429	8857	28143	60286

APPENDIX A11

INDICATIVE BUDGET FOR LONG-DISTANCE TRADER BUYING IN DAMONGO

Purchase in Damongo market

			Bag size (kg)	Price (c)	Price per kg (c)		
Buying Price (Damongo)			140	30000	214.286		
Selling Price (Tamale, Wa)			125	40000	320		
			Bags Bought:	**10**	**20**	**50**	**100**
Costs (Cedis per Bag)			Total				
Return Fare			4000	400	200	80	40
Board + Lodge in District	2500	2	5000	500	250	100	50
Loading / Unloading (per bag)			1000	1000	1000	1000	1000
Transport of Maize to destn (/bag)			4000	4000	4000	4000	4000
Taxes and fees (/bag)			1000	1000	1000	1000	1000
Rebagging (/bag)			2500	2500	2500	2500	2500
Return Fare			3000	300	150	60	30
Other costs/bag				0	0	0	0
Expenses in destn		3	8000	800	400	160	80
Total per Bag				10500	9500	8900	8700
Cost per kg				75	67.8571	63.5714	62.1429
PROFIT PER BAG BOUGHT				4300	5300	5900	6100
Profit as % of destn Price				9.6	11.8	13.2	13.6
Return on Capital (% p.a.)				775	979	1107	1151
Financing cost/bag @		100%	p.a.	386	377	371	369
Net income per Day				7827	19693	55289	114616
Net income per day before financing				8600	21200	59000	122000
Possible intervention effects							
improved coordination and quicker turn around							
"Target" Buying Price	2	nights		30000	30000	30000	30000
"Target" Buying Price	0	nights		32220	32370	32460	32490
% increase in buying price				7%	8%	8%	8%
improved main road and reduced transport costs							
"Target" Buying Price	3000	transport/bag to destn		31000	31000	31000	31000
	25%	cost redn		3%	3%	3%	3%
improved transport efficiency							
"Target" Buying Price	20%	cut all transport costs		30940	30870	30828	30814
				3%	3%	3%	3%
Base' Trader Income per Day:				8600	21200	59000	122000

APPENDIX A.2

INDICATIVE BUDGET FOR LOCAL TRADER BUYING IN DAMONGO								
Purchase in Remote Village								
			Bag size (kg)		Price (c)	Price per kg (c)		
Buying Price (Remote)				150	30000	200		
Selling Price (Accra)				125	40000	320		
			Bags Bought:		**10**	**20**	**50**	**100**
Costs (Cedis per Bag)			Total					
Return Fare				3000	300	150	60	30
Board + Lodge in District	2500	4		10000	1000	500	200	100
Payments to Local Agents (/bag)				0	0	0	0	0
Own Transport to/from Buying Area				0	0	0	0	0
Loading / Unloading (/bag)				1000	1000	1000	1000	1000
Transport of Maize to Damongo (/bag)				4000	4000	4000	4000	4000
Transport of Maize to destn (/bag)				3000	3000	3000	3000	3000
Council Fees (x2)				1000	1000	1000	1000	1000
Rebagging				2250	2250	2250	2250	2250
Return Fare destn				3000	300	150	60	30
Expenses in destn		3		8000	800	400	160	80
Total per Bag					13650	12450	11730	11490
Cost per kg					91	83	78	77
PROFIT PER BAG BOUGHT					4350	5550	6270	6510
Profit as % of destn Price					9.1	11.6	13.1	13.6
Return on Capital (% p.a.)					404	530	609	636
Financing cost/bag @		100%	p.a.		584	568	558	555
Income per Day					4184	11071	31731	66164
Income per Day before financing costs					6214	15857	44786	93000
Possible intervention effects								
improved coordination and quicker turn around								
"Target" Buying Price	4	nights			30000	30000	30000	30000
"Target" Buying Price	2	nights			31743	31836	31891	31910
% increase in buying price					6%	6%	6%	6%
improved main road and reduced transport costs								
"Target" Buying Price	3000	transport/bag to destn			31000	31000	31000	31000
	25%	cost redn			3%	3%	3%	3%
improved transport efficiency								
"Target" Buying Price	20%	cut all transport costs			31520	31460	31424	31412
					5%	5%	5%	5%
Base' Trader Income per Day:					6214	15857	44786	93000

APPENDIX A.3

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INDICATIVE BUDGET FOR LONG-DISTANCE TRADER BUYING OUTSIDE DAMONGO							
Purchase in market							
			Bag size (kg)	Price (c)	Price per kg (c)		
Buying Price			140	31000	221		
Selling Price			125	54000	432		
			Bags Bought:	**10**	**20**	**50**	**100**
Costs (Cedis per Bag)			Total				
Return Fare			12000	1200	600	240	120
Board + Lodge in District	2800	1	2800	280	140	56	28
Loading / Unloading (per bag)			1750	1750	1750	1750	1750
Transport of Maize to destn (/bag)			7500	7500	7500	7500	7500
Taxes and fees (/bag)			750	750	750	750	750
Rebagging (/bag)			2000	2000	2000	2000	2000
Return Fare to destn			12000	1200	600	240	120
Other costs/bag			1300	1300	1300	1300	1300
Expenses in destn		3	10000	1000	500	200	100
Total per Bag				16980	15140	14036	13668
Cost per kg				121.286	108.143	100.257	97.6286
PROFIT PER BAG BOUGHT				12500	14340	15444	15812
Profit as % of destn Price				20.7	23.7	25.5	26.1
Return on Capital (% p.a.)				2377	2836	3129	3230
Financing cost/bag @		100% p.a.		366	352	343	341
Net income per Day				30335	69941	188757	386785
Net income per day before financing				31250	71700	193050	395300
Possible intervention effects							
improved coordination and quicker turn around							
"Target" Buying Price	1 nights			31000	31000	31000	31000
"Target" Buying Price	0 nights			34405	34725	34917	34981
% increase in buying price				11%	12%	13%	13%
improved main road and reduced transport costs							
"Target" Buying Price	6000	transport/bag to destn		32500	32500	32500	32500
	20%	cost redn		5%	5%	5%	5%
improved transport efficiency							
"Target" Buying Price	20%	cut all transport costs		32980	32740	32596	32548
				6%	6%	5%	5%
Base' Trader Income per Day:				31250	71700	193050	395300