Background paper for the
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All-Africa Review of Experiences with Commercial Agriculture

Case Study on Food Staples

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CASE STUDY ON FOOD STAPLES

SECOND DRAFT

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1 Why Study Food Staples[1]?

Despite Africa's suitability for growing many food staples and their importance as cash as well as food crops for millions of African farmers, Africa's dependence on staple imports is growing and there has been limited success in developing intra-African trade in these crops and virtually no demonstrable success in exporting them beyond the continent. Nor has there been much success in developing trade in processed products from food staples. Why this is so is an important question in its own right for understanding what it takes to achieve commercial success in African agriculture. But a study of food staples is also important for other reasons. Africa's demand for food staples is growing rapidly and is projected to about double by 2020. Moreover, an increasing share of this demand will become commercialized as the continent becomes more urbanized. This offers considerable growth in national and regional markets for food staples which in value terms may far exceed the potential growth of all high value agricultural products, at least for the next couple of decades. If Africa's farmers could capture a good share of this growth then this would make a significant contribution to growth and poverty reduction on the continent.

Food staples can also act as a constraint on the commercial development of other crops since the high and uncertain costs of purchasing food staples in much of Africa lead farmers to place a high priority on self sufficiency. In this context, increasing the productivity of staples can be key to releasing land, water and labour for the production of other cash and export crops. Finally, because food staples are grown by small farms across Africa, broad based productivity gains in these crops can have far reaching impacts on the rural poor.

2 Performance of the Food Staples Sector.

On average, African staples production has not kept pace with population growth, leading to increased import dependence, worsening poverty and malnutrition, and greater risk of famine in drought years. However, it is note worthy that not all African countries have done badly. West Africa in particular has performed much better than the rest of Africa since 1979/81 (Figure 1) and average food production in Africa has actually grown at a compound rate of 2-3 % per year in recent decades. The problem is not so much that staples production has not responded to past investments, but that for much of Africa past growth rates have been insufficient relative to an average population growth rate of nearly 3%.

Table 1 shows the changes in area, yield and production for maize, rice, total cereals and cassava since 1979/81. Three year averages are used to smooth out the impact of annual fluctuations.

[1] We focus on cereals and cassava in this paper. Livestock products are considered in a separate case study paper.

Figure 1: Per Capita Agriculture Value Added (constant 2000 US$)

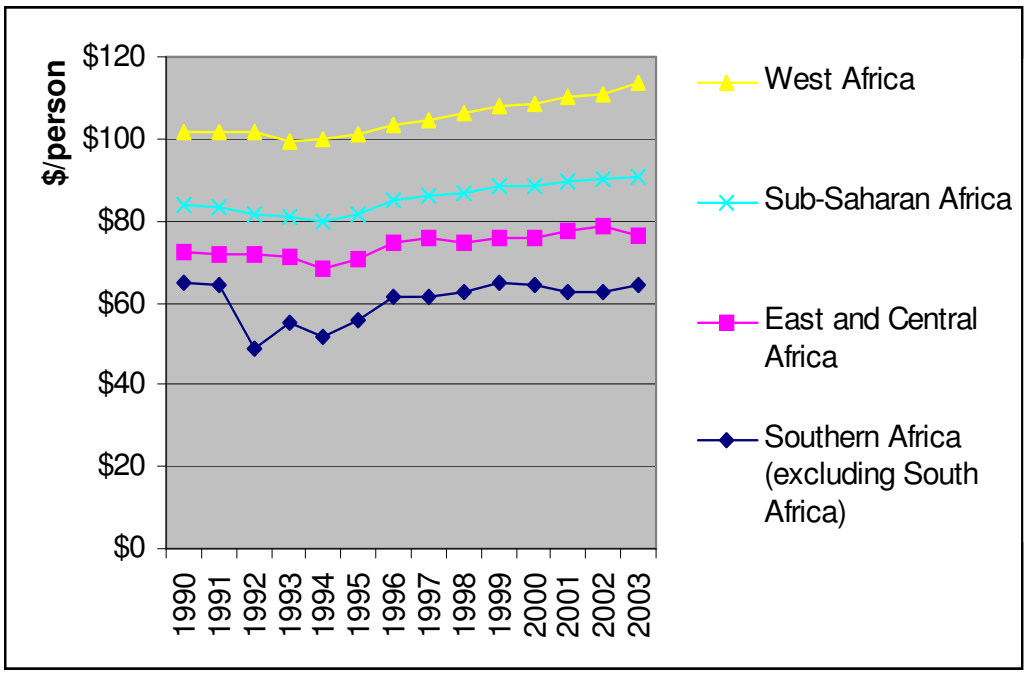


Table 1: Changes in Food Staple Production, 1979/81 to 2003/05, Sub-Saharan Africa

	1979/81	1989/91	2003/05	% increase 1979/81- 2003/05
Maize				
Area (10^3 ha)	16,592	23,456	24,022	44.8
Yield (t/ha)	1.518	1.419	1.629	7.3
Production (10^3 t)	25,190	33,288	39,124	55.3
Rice (paddy)				
Area	3,345	4,716	5,659	69.2
Yield	1.209	1.555	1.551	28.3
Production	4,046	7,333	8,776	116.9
Total cereals				
Area	49,057	66,176	79,361	61.8
Yield	1.084	1.058	1.169	7.8
Production	53,182	70,040	92,803	74.5
Cassava				
Area	6,750	8,627	11,406	69.0
Yield	7.001	8.047	9.581	36.9
Production	47,255	69,423	109,283	131.3
Total roots and tubers				
Area	8,026	10,387	15,182	89.2
Yield	7.148	8.372	10.025	40.2
Production	57,373	86,961	152,203	165.3

Note: Area is harvested area.
Source: FAOSTAT

According to Table 1, total cereal production for Africa increased by 74.5% between 1979/81 and 2003/05, driven primarily by area expansion (extensification) rather than yield increases (intensification). On average, cereal yields increased by a mere 7.8% over the entire period and remain at a remarkably low 1.17 tons per hectare.

Production of roots and tubers increased by 165.3% between 1979/81 and 2003/05. The growth was driven largely by cassava production. Yield growth for roots and tubers played a much bigger role than with cereals, increasing by 40% over the period.

There is considerable regional variation both in the relative importance of different staple food crops and in their production trends.

Looking first at cereals, maize accounts for around 40% of total cereal production in Sub-Saharan Africa, but this ranges from 80% in Southern Africa to 25% in West & Central Africa. Conversely, sorghum accounts for just under 25% of total cereal production, but this ranges from around 30% in West & Central Africa and East Africa to less than 5% in Southern Africa. Millet is of similar importance to sorghum in West & Central Africa, but accounts for only 7% of cereal production in East Africa and 2% in Southern Africa. Rice production accounts for about 15% of total cereal production in West & Central Africa, but 5% or less in the other two regions. Finally, wheat accounts for around 10% of total cereal production in East and Southern Africa, but is negligible in West & Central Africa[2].

If one then adds cereal production together with production of cassava and yams[3], cassava and yams together account for 50% of total staples production in West & Central Africa, around 30% in Southern Africa, but only around 20% in East Africa.

Meanwhile, Table 2 shows the production trends by region. Southern Africa has made little progress in expanding its total cereal production since 1979/81, and both the harvested area and yield have remained flat. Per capita cereal production in the region is thus much lower now than it was in 1979/81 and imports have grown (Jayne et.al. 2006).

Table 2: Changes in Area and Yields for Food Staples by Region, 1969/71 to 2003/05

Crop	1979/81	1989/91	2003/05	% increase 1979/81 to 2003/05
Maize				
East Africa				
Area (10^3ha)	4,141	5,264	6,523	57.5
Yield (kg/ha)	1.328	1.508	1.578	18.8
Production (10^3 t)	5,502	7,938	10,295	87.1
Southern Africa				
Area	8,758	9,448	8,818	0.7
Yield	1.876	1.654	1.821	-2.9

[2] All figures are from FAOSTAT (accessed May 2007) unless otherwise stated.
[3] For these calculations, the production quantity of cassava and yams is multiplied by 0.42, which is the food energy equivalent value of fresh cassava in relation to maize (FAOSTAT).

Production	16,433	15,628	16,064	-2.2
West & Central Africa				
Area	3,692	8,743	8,680	135.1
Yield	0.882	1.112	1.470	66.7
Production	3,255	9,722	12,764	292.1
Rice				
East Africa				
Area (10^3ha)	304	455	502	65.1
Yield (kg/ha)	1.132	1.899	2.187	93.2
Production (10^3 t)	344	864	1,098	219.2
Southern Africa				
Area	149	156	248	66.4
Yield	0.906	0.994	1.101	14.7
Production	135	155	273	102.2
West & Central Africa				
Area	2,891	4,105	4,908	69.8
Yield	1.234	1.538	1.509	22.3
Production	3,567	6,314	7,406	107.6
Total Cereals				
East Africa				
Area (10^3ha)	14,677	16,185	24,316	65.7
Yield (kg/ha)	1.009	1.077	1.081	7.1
Production (10^3 t)	14,809	17,431	26,282	77.5
Southern Africa				
Area	12,365	13,036	11,703	-5.4
Yield	1.617	1.471	1.665	3.0
Production	19,994	19,186	19,496	-0.2
West & Central Africa				
Area	22,013	36,954	43,341	96.9
Yield	0.835	0.904	1.085	29.9
Production	18,378	33,423	47,024	155.9
Cassava				
East Africa				
Area	960	1,292	1,337	39.3
Yield	9.692	9.512	10.180	5.0
Production	9,304	12,290	13,611	46.3
Southern Africa				
Area	1,329	1,537	2,090	57.3
Yield	4.045	4.227	9.228	128.1
Production	5,376	6,498	19,286	258.7
West & Central Africa				
Area	4,460	5,798	7,978	78.9
Yield	7.304	8.733	9.574	31.1
Production	32,575	50,634	76,385	134.5

Note: Area is harvested area.
Source: FAOSTAT

The disappointing trend in cereal production in Southern Africa is primarily due to poor performance with maize, which accounts for 80% of the region's total cereal production.

South Africa accounts for over 60% of maize production in the region. South African maize production fell by 12% between 1979/81 and 1989/91. Following maize marketing liberalisation in 1996, area planted to maize has fallen further, but this has been compensated for by an increase in yields. By contrast, maize yields in Zimbabwe (until 2000, the second biggest maize producer in the region) have fallen dramatically since the onset of the accelerated land reform programme in 2001. Two countries where both area harvested and yields have recorded noteworthy increases over the period covered by Table 2 are Mozambique and Angola, both of which have been recovering from conflict.

East and West & Central Africa have been more successful, increasing the area and yields of all their major cereals. Total cereal production increased by 77.5% in East Africa, and 155.9% in West & Central Africa. The increase in maize production in West & Central Africa is particularly noteworthy, although maize is not as central to diets in West & Central Africa as it is in Southern Africa. Nigeria accounts for almost half of total maize production in West & Central Africa. During the 1980s, as the government took strong measures to wean the economy off dependence on imported wheat and rice, the area planted to maize increased almost ten-fold[4]. Area planted to maize then remained fairly static until 2003/05, but yields were raised by 30%. Meanwhile, the rest of West & Central Africa recorded steady increases in both maize area (27%, 25%) and yields (24%, 38%) during the two sub-periods considered in Table 2. Mali was the top performer. Here, maize production was promoted especially in the cotton zone, with fertiliser for maize provided to cotton farmers on a credit basis, to be repaid out of cotton proceeds. Maize production has also increased four or five-fold in Senegal and in two other cotton economies, Burkina Faso and Chad.

Although a relatively minor crop in all three regions, rice has made important gains across Africa. The harvested paddy area has increased by two thirds since 1979/81, yields have improved and production has more than doubled in all three regions.

Throughout the CFA Franc zone, the devaluation of the CFA Franc in 1994 made domestic cereal production more competitive against imported rice and wheat. In Sahelian countries, new regional trade opportunities opened up supplying coastal cities, such as Abidjan and Dakar. According to Yade *et al.*, 1999, a sustained supply response occurred where conditions existed (e.g. rehabilitated irrigation infrastructure, "quick win" changes in planting practice, institutional arrangements to facilitate access to fertilisers[5]) for production intensification in response to the new price incentives. The Office du Niger rice production area in Mali did particularly well following the devaluation. By contrast, there was limited support for intensification of small grains production.

Cassava has also been a success story in both Southern and West & Central Africa where yield and area gains have led to more than doubling of production since 1979/81. The story of cassava in Nigeria is told in a later section of this chapter. In Southern Africa cassava accounted for 13% of total staples production in 1979/81 (29% in 2003/05). Its rise has somewhat reduced the hegemony of maize, which accounted for 71% of total staples production in 1979/81 (58% in 2003/05).

[4] In the early 1980s, fertiliser subsidies provided some incentive for increased maize production, even whilst the heavily overvalued exchange rate advantaged food imports over domestic production.
[5] The CFA Franc devaluation raised the price of fertiliser as much as or, in the case of poor output price transmission, more than the price of the crops themselves.

3 Factors Influencing Staples Production Trends in Africa

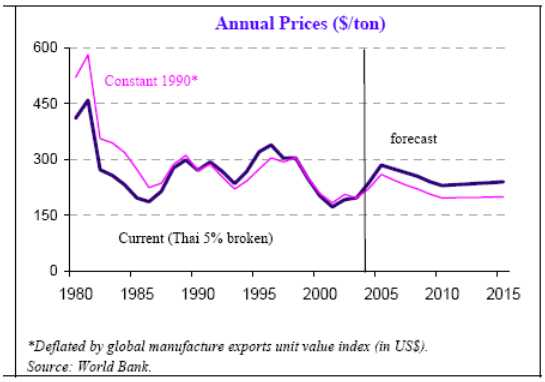
In this section we consider a number of factors that have influenced both commercialised and subsistence production of staple foods in Africa over the past 25 years and which continue to shape the prospects for commercialised production of staple foods.

3.1 Declining World Prices

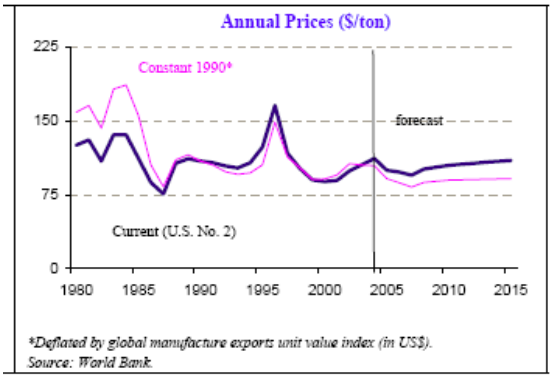
World prices for cereals have trended down in recent years despite strong demand from the livestock feed industry (mainly in Asia) (Figure 2). This decline has been driven by productivity growth in nearly all parts of the world except Africa and by OECD farm support policies. The outlook is for continued low prices, though the recent upsurge in demand for feedstock for biofuels, especially maize in the USA, may help firm cereal prices in the future.

Figure 2. Trends and forecasts for world cereal prices

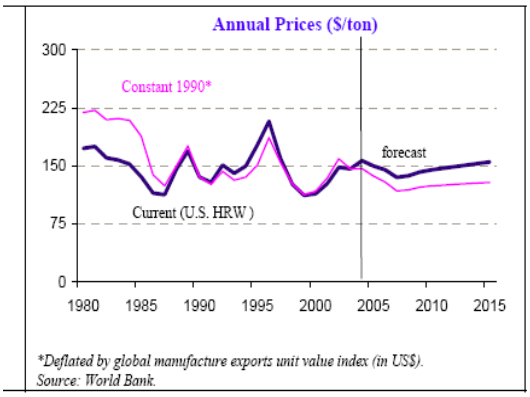
Rice



Maize



Wheat



In combination with the high domestic transport costs within Africa, uneven productivity gains and some liberalisation of food import regimes, these declining world prices have encouraged penetration by food imports into many of Africa's rapidly-growing coastal cities.

3.2 Consumer Preferences for Rice and Wheat

In many of Africa's major cities (many, but not all of which, are located on the coast) middle-upper income consumers increasingly consume wheat or rice in preference to maize or other traditional staples. Based on consumer surveys conducted in Nairobi in 1995 and 2003 Muyanga *et al.*, 2005 found that maize consumption had fallen amongst all income quartiles over the period between the surveys, whilst consumption of wheat products and cooking bananas had risen. Although the lower three income quintiles consumed more maize products than wheat products by weight, the top three quintiles spent more per month on wheat products than on maize products. Furthermore, although rice consumption had fallen over the period, the top quintile spent as much on rice products as on maize products per month.

Taking Sub-Saharan Africa as a whole, FAOSTAT data[6] show that cereals accounted for a fairly constant 30-34% (by value) of total imports of agricultural products during 1995-2002. Within this, rice imports accounted for a fairly constant 31% of cereals imports (by value), whilst wheat imports rose from 50% to 55%.

Growing urban demand for rice and wheat can be seen as opportunities for African producers. In the appendix to this chapter, we describe CDC experience producing wheat for the Zambian Copperbelt market. However, we also note the modest production base from which African rice and wheat production begins. In quantity terms, rice production in Africa is only 10% of total cereal production. Meanwhile, not only is wheat production even less than rice (5% of total cereal production), but it is also highly concentrated in South Africa and Ethiopia. Aside from these two countries, only five African countries (Sudan, Kenya, Zimbabwe, Zambia and Tanzania) currently produce more than 100,000 tons of wheat per year.

The recent experience of Nigeria, however, suggests that consumer preferences for rice and wheat can be modified by either policy or product innovation (see below).

[6] The data reported here were accessed in November 2004.

3.3 Low Value-Weight Ratio

Unlike many of the products considered in this study, cereals and cassava have a low value-weight ratio – typically US$100-200 per ton (see Figure 2). When combined with the high freight transport costs within Africa (Hine and Rizet, 1991; Hine *et al.*, 1997), this has several important implications for both commercialised and subsistence production of staple foods in Africa. These include:

- Inland producers find it hard to compete with imports from international markets in (large and rapidly-growing) coastal cities. This is compounded by the impact of high transport costs on the fertiliser prices faced by these inland producers;
- By contrast, there are market opportunities for producers in inland regions and landlocked countries in selling to neighbouring regions that are still far from the coast. The appendix to this chapter provides one example of this. Examples of cross-border trade rendered profitable by the insulating effect of high transport costs are maize export from eastern Uganda to western Kenya and (hypothetically) from Zambia into DR Congo;
- In inland regions and landlocked countries, market prices are disconnected from movements in world prices, except in extreme (good or bad) years;
- In landlocked countries, the difference between import and export parity price for cereals is large. Thus, prices can rise substantially in years of poor harvest and collapse in years of good harvest (a disincentive for producers to invest too heavily in production intensification). Both of these effects are exacerbated by the low volumes of cross-border trade in cereals in Africa (Diao *et al.*, 2003), but also encourage politicians to intervene in cereal markets, supposedly to help stabilise prices (Poulton *et al.*, 2006);
- Given the large fluctuations in cereals prices between good and bad years, many smallholder households find it too risky to rely heavily on market purchases of food staples. They, therefore, continue to devote the majority of their land to staple food production for own consumption, even when higher value crops for sale to market could generate them higher incomes. This important point is elaborated further in section 4.2.

3.4 Limited Productivity Enhancement

Increased investment in transport infrastructure and services is clearly important if African producers are going to be more competitive against food imports into the continent, let alone hope to compete as exporters of staple food crops on international markets. The other side of the same coin is that, given Africa's high transport costs, it is imperative to raise the productivity of staple food production if African producers are to continue to compete even in their own domestic markets. The yield figures in Table 2 suggested that there has been, at best, mixed success in raising productivity.

Likely sources of productivity enhancement for staple food production in Africa include adoption of: improved seeds, complementary inputs (most notably fertilisers, but in some cases possibly also herbicides), animal traction (for ploughing, planting and weeding) and improved cultural practices. A concerted extension effort is a likely precondition for many of these changes. With very few exceptions (e.g. interlocked support for maize production through the cotton parastatal, CMDT, in Mali), staple food production relies on mainstream

government extension agencies. In many cases these have suffered from reduced budgets and staff demoralisation over the past two decades. In the following paragraphs, we offer a few comments on improved seeds, fertilisers and agronomic practices.

For sorghum and millet, much research work has focused on improving performance under conditions of very low rainfall, hence working with minimal (if any) inorganic fertiliser inputs. Except where red sorghum is grown for the brewing industry, sorghum and millet production tends to have a strong subsistence orientation. Breeding efforts thus tend to be left to the public sector (either NAROs or CG centres). FAOSTAT figures show a disappointing yield trend since 1979/81. In both Eastern and Southern Africa, average yields of both sorghum and millet were lower in 2003/05 than they were in 1979/81. As with other cereals, yields in West & Central Africa show a more encouraging trend, increasing 12% (millet) and 26% (sorghum) between 1979/81 and 2003/05. In the case of millet, average yields in West & Central Africa are now roughly 50% above those in East Africa and double those in Southern Africa. In the case of sorghum, average yields are similar across regions.

Whilst there have been notable exceptions (e.g. Piha, 1993), much work on maize has focused on producing improved seed varieties that perform well with moderate-large quantities of inorganic fertiliser. These are then promoted as packages. Such efforts underpin the strong performance of high potential areas such as Trans Nzoia, Uasin Gishu and Nakuru districts in Kenya (Nyoro *et al.*, 1999)[7] and were at the heart of the short-lived maize "green revolutions" in southern Africa in the 1980s (see below). However, as well as requiring reasonably reliable rainfall, adoption of such packages requires institutional arrangements that can make inorganic fertiliser both available and affordable to smallholders. In the maize "green revolutions" in southern Africa in the 1980s (and indirectly within the Malian cotton zone), single-channel marketing systems facilitated credit recovery. However, the authors are unaware of any credit system in Africa that supports widespread fertiliser access by smallholder maize producers within a liberalised marketing framework. Moreover, with the removal of input subsidies as part of the market liberalization programs implemented in the 1980s and 1990s, many African farmers have faced much higher input costs than their counterparts elsewhere. Costs are particularly high in land locked countries and areas with poor infrastructure and market access[8], where farmers can pay 3-4 times the world price for fertilizer.

A decade or more after the ending of input subsidies across much of Africa, therefore, there is now a renewed wave of interest in fertiliser subsidies in maize-dependent countries (primarily in Southern and Eastern Africa). The smarter of these new schemes, such as that in its second year in Malawi at the time of writing this chapter, are based on vouchers, rather than across-the-board price subsidies. This limits the cost of the subsidy programme and means that benefits can be more evenly spread across the full range of smallholder households.

[7] The maize surplus districts of Kenya provide an interesting counter-example of an area where over 90% of maize producers apply inorganic fertiliser, at mean application rates of around 200 kg/ha, without either an input subsidy or (since 1990) any significant credit provision to support input use. This high level of fertiliser use appears to be explained by maize marketing policies that have raised producer prices well above world market levels (for at least a proportion of output), plus liberalisation-driven increases in the efficiency of the domestic fertiliser marketing system that have offset increases in the international price of fertiliser over the past decade (Ariga *et al.*, 2006).

[8] In East and Central Africa, only 25% of the rural population and 16% of the cropland lie within 2 hours of normal travel time from an important market centre, defined as towns with 50,000 or more people (Table 3.7, Omamo, et al., 2006).

Meanwhile, private seed companies have been willing to invest in the production of improved maize seed, because many of the varieties are hybrids.

For rice, research yielded a major break through in the mid-1990s in the form of Nerica, the new rice for Africa. This is a drought tolerant upland rice that yields 50% more than existing varieties even without use of fertilizers and pesticides. It does even better when fertilizer is applied. Like the recent TMS cassava varieties (see later), it promises to benefit large numbers of small farms that do not have access to modern inputs. Nerica is still at an early stage of dissemination but is expected to be grown on about 200,000 hectares in 2007 and produce 750,000 tons, mostly in West Africa (WARDA website). Its development is timely since rice consumption in West Africa has been growing at 6% per annum since 1973 and imports have been growing at 8.4% per annum since 1997 (WARDA website) and already exceeding 4 million tons per year (Table 7). There is an excellent market opportunity to build on a technology breakthrough while also assisting many of the poorer farmers in West Africa.

Finally, investment in improved varieties of cassava also tends to be undertaken by the public sector, as (like open pollinated seed varieties) cassava stems are a common pool good. The most widely adopted of the improved varieties of cassava in Africa in the past couple of decades are those produced by IITA for West African producers. Cassava has several additional advantages over maize, which have hastened its adoption in the period under consideration. It is more drought tolerant; it can deliver a good yield without expensive fertiliser, and its harvesting is much less seasonal. This latter point means that it is not subject to the same intra-seasonal price swings as maize, so producers are less likely to be discouraged by collapses in price, whilst production expansion can proceed without state (or other) efforts to stabilise prices. In the Nigerian case reported below, the state did, however, play an important role in funding the multiplication and dissemination of planting sticks of the improved varieties, which facilitated widespread adoption.

4 Who Produces Staple Foods and Why?

4.1 Dominance of Small Farms

Farms of less than 2 hectares in size account for 70-90% of all farms in many African countries and for the lion's share of food staples production (Spencer, 2002). Much of this food staples production is consumed on the farm, so only a small proportion of it enters the market. Nevertheless, small farms still account for the bulk of marketed surplus in many countries. In much of Africa even "large" farms rarely exceed 10 hectares and, though they sell larger shares of their staples production, they are still not major providers of the total marketed surplus. Exceptions arise of course in countries like South Africa, Kenya, Mozambique, Zambia and Zimbabwe.

There are good reasons for the dominance of small farms in food staples production in Africa. Farm mechanization has not been successful in most of Africa despite some ambitious mechanization programs in the past. Difficulties in maintaining machines and obtaining spare parts and fuel have undermined many investments. Nor has animal draft power spread widely in many countries, being constrained by disease problems and seasonal shortages of feed and labour for animal maintenance (Delgado and McIntire, 1982; Pingali et al., 1987). Without viable labour saving technologies, small farms with their better per hectare endowments of

unpaid family labour retain a competitive edge over large farms. The prevailing land tenure and inheritance arrangements also make it difficult for farmers to consolidate land into larger holdings. In fact, far from consolidating land, African farms are getting progressively smaller (Jayne et al., 2003).

The previous arguments notwithstanding, in South Africa, Zambia, Kenya [??] and, until recently, Zimbabwe, large-scale commercial farms have produced a large share of marketed cereals, if not total cereal production. Key reasons for this include their historical legacy of high quality land, well connected to major urban centres, plus good access to capital[9].

The experience of the Commonwealth Development Corporation (CDC) in Southern Africa helps identify some of the key constraints to large scale commercial production (see Annex I). CDC projects were most successful where suitable land was plentiful and local markets were strong and protected from low cost imports by high transport costs (e.g. the Zambian copperbelt). Production of a new crop (e.g.wheat) to substitute for rapidly growing imports was also more successful than production of existing crops like maize in competition with peasant farmers. On the other hand, large scale farms in land scarce contexts (e.g. Malawi) were much less successful and fuelled some resentment amongst smallholders. In all cases, it did not prove profitable to produce for export at international prices.

4.2 Smallholder Commercialisation and Staple Food Production

It is now a well-attested fact that the majority of smallholder households in Sub-Saharan Africa are net deficit in food production terms and that only a minority sell any food staples at all in an average year[10]. Illustrating this for the case of Kenya, Nyoro *et al.*, 1999 found that around 70% of households in the high potential maize zone were net sellers of maize, but in none of the other six major agro-ecological zones in their survey did the proportion of net seller households exceed 30%. Yet, almost all households grow staple foods and, in most cases, they devote the majority of their land area to them. It is thus not uncommon for studies of food crop marketing to find that the top 10% of producers account for 50% or more of marketed surplus. Similarly, studies of cash crop systems tend to find that, within a given area of smallholder producers, it is the larger farms that engage more heavily in cash crop production (especially where larger farms also equate to higher land:labour ratios), leading to similar distributions of cash crop sales.

In section 3.3 we argued that this subsistence orientation persists because rural food markets in Africa are risky and subject to wide seasonal price variations. In this context small farm households are rational to prioritise the growing of subsistence food crops, even when growing other crops for market would yield a higher mean return in a normal year. In this section we develop this argument further. The corollary of this argument is that the expansion of commercial agriculture will generally have to go hand in hand with investments that increase the productivity of food staples.

There are two main strands of literature that investigate the relationship between subsistence and commercial agricultural production amongst smallholders. The first concerns the impacts

[9] Initial development of many of these enterprises was also assisted by protected domestic markets and favourable treatment by colonial regimes and later post-Independence governments in the provision of key inputs like R&D, credit and imported fertilizers (Lele and Agarwal, 1989).
[10] One of the first articles in the literature establishing this was Weber *et al.*, 1988.

of cash crop production on food security and nutrition. NGO and other critics of the promotion of cash crops have argued that cash crop production absorbs women's labour and may also justify men taking over land previously controlled by women. It thereby diverts these resources from food production for household consumption. Meanwhile, the resulting income is controlled by men, who prioritise personal consumption (e.g. of alcohol), marrying other wives or investment in fixed assets, rather than providing for the household's immediate food and nutritional needs.

A seminal work in this literature is von Braun and Kennedy, 1994. Summarising across their case studies, they found that households that invest in cash crops rarely sacrifice food security to do so. Specifically:

- Farms adopting new "commercial" crops or technologies often devote a considerably smaller share of their land to food crops for own consumption than do non-adopters. In absolute terms, the area that they devote to food crops for own consumption may also be smaller. However, they generally achieve higher yields in their food crop production. As a result, per capita production of food for own consumption was as often higher for adopters than for non-adopters as vice versa.
- Higher incomes as a result of adoption of new "commercial" crops or technologies generally lead to higher calorie intake, although the increase is less than proportional due to increased non-food expenditure shares and a preference for more expensive calories (good for other aspects of nutrition). "Any negative tendencies to spend less for food because of loss of income control by women or because of increased involvement in market (cash) transactions are generally small and are more than compensated for by increased incomes due to commercialization" (p78).
- There is "no evidence for an adverse effect on child nutrition from increased commercialisation, even when income is held constant" (p46). Equally, though, child health indicators rarely improved, despite higher incomes, as (aside from food) additional incomes were rarely spent on items with short-run health benefits. The authors argued that increased incomes should be combined with public action to deliver improved health outcomes.

Whilst this first strand of literature examines the impact of commercial agricultural production on the food security of those who have already engaged in it, the second considers whether household concerns about food security act as a constraint to adoption of commercial agriculture. Specifically, if food markets are unreliable, inefficient or highly volatile, it is argued that farm households will prioritise feeding themselves and hence will only cultivate very small quantities of crops intended for sale if they expect to experience a food deficit (Fafchamps, 1992; Jayne, 1994). Thus, under production conditions better suited to oil crops than to grains, Jayne, 1994 found that, "Controlling for differences in household assets and location, grain-surplus households in five semi-arid regions of Zimbabwe were found to cultivate 48% more oilseed crops for the market than their grain-deficit neighbours" (p388).

Some evidence for this food-security-as-constraint-to-commercialisation view is also found in the studies reported by von Braun and Kennedy, 1994. Thus, whilst several of the authors in that volume calculated that returns to land and/or labour were significantly higher under cash cropping than under food production for own consumption, adopting households generally devoted only 40% or less of their land to the new "commercial" crops or technologies, which was less than they continued to devote to subsistence food crops. Meanwhile, the smallest farms in the study areas were under-represented in cash crop schemes for various reasons, including both administrative selection (where this occurred) and their own choice.

The case study by Peters and Herrera, 1994 neatly summarises why smallholders in Malawi plant on average around 80% of their land to maize. Prices of purchased maize are both high and unpredictable in the annual "deficit period" (December-January). However, in addition to this there are strong taste preferences for local maize varieties pounded in a traditional way and there are cultural reasons as to why cash resources within the household tend to get exhausted more readily than retained food stocks, hence making the latter more reliable as a food security reserve.

Of course, the two aspects of the relationship between cash crop production and subsistence food production are not mutually inconsistent. Indeed, if adoption of a cash crop only occurs when concerns related to food security can be allayed, then non-negative outcomes of cash crop production on food security are likely to be observed.

More recently, Pandey *et al.*, 2006 have carefully investigated the role of upland rice in the farming systems of the northern uplands of Vietnam. Yields of upland rice are lower than for lowland rice, so households that have both upland and lowland plots tend to plant less upland rice in their upland plots[11], which are better suited to higher value cash crops (tree or horticultural crops) or even maize (a cash crop in this context). In more accessible areas, households can also readily obtain rice through the market from nearby lowland areas, so also produce less upland rice. However, in more remote areas, households cannot rely on obtaining reasonably priced rice through the market and hence plant a much higher proportion of their plots to upland rice. Within the subset (210 households) of their household survey dataset that did not have lowland rice plots, Pandey *et al.*, 2006 show that higher upland rice yields are associated with a lower proportion of total area planted to upland rice and a higher proportion planted to cash crops. In a similar vein, Poulton and Ndufa, 2005 found that, within three subdivisions of Siaya and Vihiga districts in western Kenya, households that achieved higher maize yields in the long rains season had more diversified cropping patterns (away from maize) in the short rains season, controlling for farm size.

Pandey *et al.*, 2006 argue that, "Rice productivity improvement can thus be an important strategy for escaping from poverty while assuring food security. Improvements in household food security can thus facilitate and reinforce the process of commercialization rather than negating this process, as is believed in some policy circles. [Contrary to these same beliefs] ... a more gradual approach that is based on enhancing food security first before launching a major commercialization progam for uplands is likely to be more successful in bringing about the desired change (von Braun and Kennedy 1994). Examples abound where commercialization programs that did not give due consideration to food security have performed poorly in the uplands of Vietnam and elsewhere." (p77).

In the context of Vietnam, intensification of staple food production for home consumption may be a prerequisite for diversification into commercial agriculture principally in less accessible areas that cannot rely on food purchase from the market. However, basic infrastructure and transport is better in much of Vietnam than in most of Sub-Saharan Africa, whilst local food markets are also generally better developed (assisted by greater population density and the fact that the nation as a whole is rice surplus). In Sub-Saharan Africa, intensification of staple food production for home consumption may be a prerequisite for

[11] Some upland rice is, however, still typically planted, as it is harvested before lowland rice and is available in time for consumption during the main lean period, September-November.

widespread diversification into commercial agriculture in many areas - not just the more "remote" ones.

We note, however, that policies to promote staple intensification amongst food deficit households with small-medium land holdings, as a means to eventual diversification into production of other crops for market, are likely to be different from policies to (further) expand staples production amongst existing surplus producers. Thus, policies that raise the price of food staples should provide incentives for the latter to further expand their production, but will only worsen the trap that the former find themselves in, reducing the already scarce cash that they have to buy improved seeds or fertiliser. In areas of average or higher agro-ecological potential, but poor market development, a system of input vouchers for staples production might assist diversification into higher value crops, if accompanied by other interventions to simultaneously promote such alternative crops[12]. However, in semi-arid areas significant staples intensification may always be too risky for producers to contemplate. In such cases, widespread commercialisation of agriculture might only come with improved market access, allowing both purchases of staples and opportunities to sell crops more suited to local growing conditions. The Machakos area in Kenya may be illustrative here (Tiffen *et al.*, 1994).

4.3 Food Staples and the Poor

Food staples production is pro-poor because it is grown by farmers across Africa, including most small farms. Increases in cereal yields, if based on inputs or technologies that can be widely used, can have an enormous impact on poverty. Not only does it lead to greater on-farm productivity for many poor farmers, but it brings down food prices for everyone else. This price effect may not be very large in urban areas in today's open economies, especially in Africa's coastal cities, but for most Africans who live in areas where transport costs add significantly to the cost and unreliability of imported foods, increases in local food production can still be enormously helpful.

Thirtle et al. (2002) in a cross country study estimate that a one percent increase in crop productivity reduces the number of poor people by 0.72 % in Africa and by 0.48% in Asia. Simulations with economy-wide models of selected African countries show that growth in food staples production is more pro-poor than growth in high value exports (Diao et al., 2006). For the same rate of overall agricultural growth, larger reductions in poverty are achieved by 2015 if that growth is driven by food staples rather than high value export crops. And because of its much smaller size, the high value sector has to grow at much faster (mostly infeasible) rates to provide comparable rates of agricultural sector growth.

5 African Trade in Staple Food Crops

Africa exports only 4% of its total cereal production (Table 5) and about 60% of these exports are to other African countries (Table 6). This is a reasonably consistent story across regions (Table 5), although the proportion of production exported within the Southern African region is slightly higher than elsewhere. Exports have been discouraged by national food policies,

[12] The challenge of providing a coordinated package of support measures to both promote staples intensification and simultaneously assist diversification should not be underestimated, however.

low cost imports from outside Africa, and by a wide array of physical and institutional impediments (see later). Some intraregional trade is essential to alleviate the local impact of droughts, but much of this trade is typically provided by external food aid agencies rather than through normal market mechanisms.

Table 5. Staple production and trade by sub-region and major commodity

Region	Major commodities	Production (million tons)	Exports (million tons)	Imports (million tons)
East Africa	Maize	10.26	0.10	0.82
	Wheat	2.08	0.05	2.71
	Rice	3.71	0.01	0.77
	Sub-total	16.04	0.16 (1.0%)	4.30
Southern Africa	Maize	16.01	1.59	1.41
	Wheat	2.57	0.29	1.85
	Rice	0.28	0.03	1.49
	Sub-total	18.86	1.91 (10%)	4.75
West Africa	Maize	10.18	0.03	0.26
	Wheat	0.10	0.08	3.57
	Rice	7.34	0.01	4.47
	Sub-total	17.62	0.12 (0.7%)	8.29
Sub-Saharan Africa	Maize	36.45	1.73 (4.7%)	2.48
	Wheat	4.75	0.42 (8.8%)	8.13
	Rice	11.33	0.05 (0.4%)	6.73
	Sub-total	52.53	2.19 (4.2%)	17.34

Source: Diao et al., 2003

Table 6. Food staple exports from Sub-Saharan African countries,
1996-2000 annual averages

	Total exports	SSA to SSA	SSA to Rest of world
	(million $US)		
Maize	287	150	137
Cassava	2	0	2
Other cereals	207	160	47
Total agricultural exports	18,400	1,870	16,530

Source: Diao et al., 2003

Table 7. Food staple imports by Sub-Saharan African countries,
1996-2000 annual averages

	Total imports	SSA to SSA	Rest of world to SSA
	(million $US)		
Maize	272	150	127
Cassava	0	0	0
Other cereals	2,572	160	2,412
Total agricultural imports	10,125	1,870	8,255

Source: Diao et al., 2003

Commercial scale processing of food staples is still at an early stage in Africa, and most processing is undertaken at household or community levels for local needs. While processed products account for a significant share of intra-African food trade they remain small in absolute value.

6 Outlook for Food Staples

Food staples have not yet served as the kind of growth sector for Africa that they did in Asia during the Green Revolution. Lacking an alternative engine of growth on the scale required, Africa has remained mired in poverty and food insecurity. Rapid commercialization and growth of the food staples sector is badly needed to help launch an economic transformation of the continent and to meet rapidly growing food needs. But if the food staples sector is to grow more rapidly, there will need to be an adequate market, and African farmers will have to become more competitive with imports. We explore the future market potential for food staples in this section, and then return to the issue of how to make food staples in Africa more competitive with world imports.

To a large extent, Africa can create its own market for food staples. With over 600 million people and population growth of 3% per annum, Africa's demand for food staples will continue to grow at 3-4% per annum. This trend seems likely to continue until at least 2020 (Rosegrant et al., 2005).

Table 8: Projections of cereal production, demand and net imports to 2020

	Production		Demand		Net Imports	
	1997	2015	1997	2015	1997	2015
Million metric tons						
Maize						
East Africa	5.672	8.846	6.686	10.698	0.579	1.852
Southern Africa	6.638	10.212	7.640	11.862	0.755	1.650
West and Central Africa	4.725	8.233	4.909	8.245	0.169	0.012
Northern	3.800	5.633	3.694	5.930	0.076	0.297
Nigeria	5.383	8.066	5.751	9.236	-	1.170
Total SSA	26.218	40.990	28.680	45.971	1.578	4.981
All cereals						
East Africa	8.967	14.503	10.817	17.524	1.315	3.022
Southern Africa	9.779	15.590	12.287	19.270	2.278	3.679
West and Central Africa	9.417	17.222	13.930	23.934	4.519	6.712
Northern	20.532	33.681	22.676	37.796	2.290	4.114
Nigeria	20.608	33.004	22.795	37.498	1.972	4.494
Total SSA	69.303	114.000	82.505	136.022	12.374	22.021

Source: Diao et al. (2003) based on FAO data for 1997 and IMPACT baseline projections for 2015

The projections in Table 8 are derived from IFPRI's global food model, IMPACT. Covering 32 crop and livestock products, this model has 36 regions globally, of which 5 are in Sub-Saharan Africa (North, East, West, South and Nigeria). Under a baseline scenario that

assumes 3-4% growth each year in per capita income and 1-2% growth in crop yields, demand for cereals grows by 2.8% per year and maize demand by 2.7%. These increase to 4.4% and 4.0% respectively under a more optimistic scenario that assumes GDP growth rates of about 8% per annum and crop yield growth of about 3% per annum.

Cereals account for the lion's share of the total value of agricultural output in Africa (Table 9), hence growth in food staples offers a very large market compared to the alternatives. Under the optimistic scenario, for example, there would be $50 billion or so of additional demand by 2020 at 1996-2000 producer prices. This market opportunity far outweighs the likely growth in high value agriculture. If African farmers could capture a decent share of this growing market, there would be plenty of scope for them to increase their food staples production by 3-4% per year. The trick is not to grow faster than 4% on average unless one can sell to neighboring countries. Unlike many higher value products, food staples also have relatively low credence attributes making them much easier products for small farmers to sell in today's markets. Growing global demand for biofuels may also lead to higher cereal import prices for African countries, which would increase the demand for domestically produced food staples (Rosegrant et al., 2006).

Table 9. Size of Africa's agricultural trade and markets

Market	Value ($ billion)
Traditional exports to non-Sub-Saharan Africa	8.6
Non-traditional exports to non-Sub-Saharan Africa	6.0
Other exports to non-Sub-Saharan Africa	1.9
Intra-Sub-Saharan Africa trade	1.9
Domestic markets for food staples	50.0

Notes:
a) All figures are averages for 1996–2000,
except the data for domestic which are 1997 figures.
b) Does not include the value of high value products
consumed within Africa
Source: Diao and Hazell (2004)

Small farms will not get rich growing food staples. But if they could increase their yields from the current average of about 1 ton per hectare to 2 or 3 tons per hectare then this would be a good first step up the ladder out of poverty. Some small farmers would grow and sell market surpluses, but many others would be able to meet their food needs from a smaller land area and use the land and labour saved to grow other higher value crops or livestock (see earlier) or to engage in nonfarm activity.

The prospects for increasing commercial food staples production in Africa would also improve if the Doha round of the WTO trade negotiations succeeds. If the OECD countries dismantle their agricultural protection and support policies, global models suggest that world cereal prices could increase by 10-15%, at least in the short to medium term. This would help improve the competitiveness of African farmers in their own markets. Without such reforms and with continuing neglect of the food staples sector, Africa will become increasingly dependent on food imports (Table 8) that it cannot afford except at very concessionary rates.

7 Lessons from Past Successes with Food Staples

Africa has not been without its successes in accelerating food staples production at regional and country scales, though not always on a sustainable basis. In this section we briefly examine the successful experience with hybrid maize in East and Southern Africa and cassava in West Africa to see what lessons can be drawn for future ventures.

7.1 Maize in Eastern and Southern Africa

One of the most successful African experiences in increasing the productivity of food staples occurred in Eastern and Southern Africa during the second half of the past century. Originating from plant breeding programs and support programmes for white settler farmers in colonial regimes, newly Independent governments in Kenya, Malawi, Zambia and Zimbabwe expanded these programmes to include the smallholder sector. This included sustained public expenditure on plant breeding and extension programs[13], grain marketing boards that bought up maize at guaranteed minimum prices, and coordinated credit and farm input systems. Maize production grew at respectable rates during the boom period of these policies (Table 10).

Table 10. Maize production growth

	Boom Period	Growth (% p.a.)	Period of Uncertainty	Growth (% p.a.)
Kenya	1965-80	3.3	1990-2000	-1.5
Malawi	1983-93	3.1	1994-2000	4.4
Zambia	1970-89	1.9	1990-2000	-2.4
Zimbabwe	1980-89	1.8	1990-2000	-0.2

Source: Smale and Jayne (2004)

Difficulties arose because the financial costs of these programmes escalated over time and by the 1990s had become unsustainable (Smale and Jayne, 2003). They were eventually phased out as part of the structural adjustment programmes, leading to a collapse in farmer incentives and a regression in maize production (Table 10). Yet even today farmers in East and Southern Africa still plant 58 percent of their maize area in improved varieties and obtain a 50% yield advantage over local varieties.

[13] In Zimbabwe, however, much of the seed production and distribution was handled by the private sector in the form of SeedCo (Eicher, 1995).

Smale and Jayne (2003) draw some important lessons from this experience for guiding future successes. They note the importance of:

- Sustained investments in agricultural research. We quote: "Seed genetic change is a necessary but not a sufficient condition for improving the welfare of African smallholders. Maize successes in the future will continue to depend not only on strategic breeding improvements to relieve specific environmental and disease problems and enhance the stability of net returns to farmers, but also on enabling these advances to release land for alternative uses and diversify the income sources for farmers, regions, and nations. Continued development of improved seeds and seed markets and a realistic understanding of farmers' needs remain critical. Patience and the commitment to steady funding are crucial. Lead times for plant breeding average roughly a decade, while new livestock technologies may demand 15 to 20 years. Long-term commitment to agricultural research remains essential."
- Financially viable input and credit delivery systems for smallholders. As noted earlier, with limited progress to date in developing viable credit systems to support staples intensification by smallholders, there is instead a renewed wave of interest in fertiliser subsidies in maize-dependent countries.
- Political pressure and responsiveness. Again, we quote directly from Smale and Jayne (2003): "Can a local constituency be formed to successfully stake a claim on public resources over the long run to support agricultural research, marketing institutions, and other kinds of growth-promoting public goods? The experiences with maize in the four case study countries underscore the strong connection between agricultural development and governance. The early success of the maize industry in Kenya and Zimbabwe can be attributed largely to the strength of the institutions built by settler farmers, which provided a constituency to encourage sustained public and private support for the sector. Today farm lobbies are uniformly weaker and smallholder farmers continue to be poorly represented in the political process. A crucial issue is how the key growth- and equity-promoting investments in agricultural research, infrastructure, and market institutions can be financed. Perhaps most important, from where will the domestic political pressure for these public investments come?"

7.2 Cassava in Western Africa

Cassava is Africa's second most important staple after maize, in terms of calories consumed. It is the major source of calories for 40% of Africans. Unlike maize, cassava is vegetatively propagated and requires few if any purchased inputs. This makes it an ideal crop for small farmers, and reduces the need for coordinated input delivery and credit systems, a problem that has plagued the maize revolution. Since it can be planted throughout the rainy season and harvested over a period of up to 18 months, it offers important flexibility in the timing of labor inputs, harvesting and marketing. With limited international trade in raw cassava, production gains can also lead to lower consumer prices that are especially beneficial to the poor.

In the past three decades, cassava breeding programs centred on IITA have produced a number of new varieties in West Africa called the Tropical Manioc Selection (TMS). Bred for disease resistance, high yield, early bulking, and root shapes that will accommodate mechanical processing, the TMS varieties have routinely generated substantial yield gains of about 40%, even without fertilizer (Nweke, Haggblade and Zulu, 2004) and produce returns to land that are up to twenty times greater than those achieved with local varieties and manual

processing. Diffusion of these varieties has stimulated increases in cassava production in many parts of East and West Africa (Table 2). Nigeria is now the world's largest cassava producer, having overtaken Brazil. Both Nigeria and Ghana have increased their cassava production fourfold since the 1960s.

Nweke, 2004 document the "cassava transformation" that has taken place in Nigeria and Ghana - from "a low-yielding famine-reserve crop to a high-yielding cash crop increasingly prepared and consumed as gari". The TMS varieties were released in 1977. In the mid-1980s they were the beneficiary of a big promotional effort by the Nigerian government, which in 1985 banned rice, wheat and maize imports and sought instead to stimulate domestic food production. A cassava promotion programme was instituted 1984 and received additional support from IFAD in 1986 to enable it to distribute stem cuttings of TMS varieties free to farmers. Partners in the promotion programme included the national research institute NRCRI, the World Bank, IFAD, churches, the Nigerian Cassava Growers' Association (the establishment of which was encouraged by IITA) and oil companies. A 1989 study found that 60% of cassava farmers had adopted TMS varieties.

Initially, urban consumers may have turned to cassava as their preferred rice and wheat was no longer available. In addition, as cassava production rose and rural roads were improved, its relative price fell. However, an equally important change occurred in the attitude of urban consumers, who came to see gari (toasted, ready-to-eat-or-cook flour made from cassava) not as an inferior food, but as a convenience food of choice suited to urban lifestyles. This example offers hope for other countries where imports of rice and wheat are currently escalating.

Research institutes attempted to produce mechanical graters for gari preparation, but in the end the preferred models were those developed by local artisans, based on designs from neighbouring countries. The graters released women's labour (previously tied up with the fermentation of cassava) to plant more cassava and greatly increased the returns to labour from cassava production.

Finally, Nweke, 2004 note the importance of an Africa-wide biological control programme (again, IITA-led) that averted disaster from cassava mealybug (a big problem in Nigeria throughout 1971-1986). More generally, they emphasise the importance of regional research collaboration in the cassava story: “Over the past three decades, the sharing of genetic material - primarily from IITA to national programs, but also between countries - has proven critical in responding to crises and sustaining ongoing yield gains. For contiguous small countries sharing common agro-ecological zones, the benefits of collaboration have been evident in the numerous successful cassava varietal exchanges over the past decades. The repeated rapid spread of disease and pests across national boundaries has instilled a recognition of the value and even the necessity of continued regional collaboration”.

Although Nigeria is now the world’s largest producer of cassava, it is not yet a significant producer of processed cassava products, such as livestock feed and starch, that are sold on world markets. In the past few years, initial efforts have been made to export cassava to the Chinese market. However, whilst clearly competitive on import parity terms, Nigeria is still a higher cost producer than Thailand, the world price leader. Further investments in rural

infrastructure, and further developments in crop breeding[14] and cassava processing, are needed to transform the crop into a competitive export crop (Nweke, 2004; IFAD, 2004). There is, however, high level political commitment within the country to achieve this. If Nigeria does this, it will be the first example of African export success in a low value commodity, outside of the slightly special case of sugar.

8 Policies for Promoting the Commercialization and Trade of Food Staples

The food staples sector in Africa is large and of immense importance to the vast majority of Africa's poor. Moreover, the sector faces growing domestic and regional markets for raw and processed products that provide a potential opportunity for the sector to become an important engine of pro-poor economic growth, much as the food staples sector did in Asia during the Green Revolution. However, the food staples sector in Africa is a difficult one to grow. Production is spatially distributed over vast areas, most with poor infrastructure and market access. It is undertaken mostly under risky and rainfed growing conditions, and is dominated by large numbers of small farms. Past neglect by governments and donors alike has led to technological stagnation at low yields, poor input services, and high transport and marketing costs. Despite the use of labour intensive production methods and few purchased inputs, African farmers are being undercut by low cost food imports.

One strategy for developing a larger commercial food staples sector is to focus developments in areas with the highest agricultural potential and market access, much as the Green Revolution began in Asia's better endowed regions. This was the approach taken by the colonial regimes and though they were generally successful in meeting national food needs, their focus on large settler farms led to higher production costs, and hence state support, than necessary. A similar regional focus, but engaging primarily small farms and market friendly policies could be a more efficient and pro-poor strategy today.

While such a strategy could serve as the cutting edge, still the vast majority of small farms who live in less favoured areas cannot be neglected. Increasing food staples productivity is essential for reducing malnutrition and poverty and for freeing up land and labour for other productive activities. Food staples production in many of these less favoured areas is also essential for supplying local and regional markets that do not have ready access to lower cost food imports. As the success with TMS cassava varieties has shown, sometimes a relatively low cost investment can make a tremendous difference to the welfare of small farmers living in a variety of difficult environments.

Several important lessons can be drawn about the kinds of policies that are needed to support more rapid growth and commercialization of the food staples sector in Africa. These are discussed below.

Agricultural R&D

A key message from the maize and cassava successes is the importance of sustained, long-term research programs and effective seed multiplication and distribution systems. The widespread availability of improved varieties of maize and cassava were key to the successful

[14] According to Nweke, 2004, for competitive export as either animal feed or starch, Nigeria needs to develop varieties that can be harvested in under 12 months without significant yield loss and which are amenable to mechanical peeling. Yields are currently up to 14.7 tons/ha in Nigeria (FAOSTAT data show an average of 11 tons/ha), whereas they reach 22 tons/ha in Thailand.

experiences with these crops in East and West Africa. These varieties took many years to develop and this was achieved through sustained cooperation between various national and regional public research programs. The public sector still has a key role to play in financing R&D for food staples, but has more options today in terms of forming useful partnerships with the private sector. The private sector is also better placed today to take on the multiplication and distribution of improved seeds.

Strengthening domestic markets

African farmers face a number of disadvantages in competing with imports in their own domestic markets. In most cases, the liberalization programmes of recent decades have successfully removed direct and inefficient interventions by the state but privatization has not been as extensive as hoped leaving large numbers of farmers without adequate access to credit, key inputs and marketing services (Kherallah et al., 2002).

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It is important to recognize that at the level of development of most African countries the markets for food staples are inherently different from markets for many high value products and need greater public attention. Many producer markets for high value products have been successfully taken over by the private sector and this is in part because of their higher profit margins and greater integration into export and retail markets. However, hardly any credible evidence exists to suggest that the private sector can successfully take over the producer market chains for staple foods during the early stages of agricultural development. As farmers struggle with low productivity and high subsistence needs, low input use, low incomes, poor infrastructure, high risks, and the like, the amount of profit to be made in market chains for food staples and associated farm inputs remains low and unattractive for much private investment. There is also a growing body of studies showing that important institutional and market failures are to be expected at that level of development in credit, input and output markets, making private sector solutions to the coordinated supply of all these key services unlikely (Dorward, et al. 1998; Fafchamps, 2004).

There is also increasing recognition of the need for improved intra- and inter- seasonal price stabilisation to smooth weather induced shocks that arise in rainfed farming systems (see for example World Bank, 2005) and general agreement that this should be supported by greater investment in rural infrastructure. Whilst the expansion of intra-regional trade in food staples (see below) should over time reduce the need for domestic interventions to stabilise food prices in individual national markets, there is a “catch 22” situation in that many of the domestic interventions that have been, and are still, relied upon themselves discourage the development of intra-regional trade. Ideally, price stabilisation interventions should, therefore, be designed in such a way as to be compatible with free cross-border trade in food staples (Poulton *et al.*, 2006).

Promoting intra-regional trade

Intra-African trade in food staples remains at very low levels. Although most countries grow many of the same food crops, especially maize, there are latent differences in their comparative advantage, even within the same sub-regions (Diao et al., 2003). For this reason alone one should expect to see significantly more intra-regional trade in food staples. Intra-regional trade could also be a relatively efficient way of smoothing out the impacts of droughts on production and prices at country and sub-regional levels. The potential for intra-regional trade in food staples will also grow with escalating food demands in Africa. Many densely populated and land scarce countries will find it increasingly difficult to meet their

growing demands from domestic sources and will have to turn to greater imports. The IMPACT model projections displayed in Table 8 show a doubling of cereal imports by African countries from 12 to 22 million tons by 2020. In principle, there is no reason why much of this demand could not be met from African sources.

Trade in food staples was for long discouraged by national food policies that placed a high priority on self sufficiency, and vestiges of these policies still prevail in many countries, despite the recent market liberalization programs (Jayne et al., 2005). There are also many physical and institutional impediments to cross-border trade within Africa, including differences in SPS requirements, rules of origin and quality and product standards (Mita, undated). Regional trading blocs like COMESA can play a key role in facilitating the removal of many of these trade barriers and in achieving greater regional harmonization on trade issues.

Food aid may have discouraged intra-regional trade since food is either brought in at concessionary rates from OECD countries, or procured and shipped between African countries in ways that crowd out private sector initiatives. However, one of the biggest impediments to large-scale private investment in cross-border trading capability – particularly in Southern and Eastern Africa - is the unpredictable behaviour of governments in imposing export bans whenever they fear food shortages in their own markets. Whilst this harms surplus producers near border areas and has longer-term negative impacts on the development of private trading networks, it is not hard to see why politicians are mistrustful of dependence on cross-border trade for national food security when their regions are trending ever further into food deficit[15]. In time of need, will food supplies be available for purchase in neighbouring countries and will those neighbouring countries allow that food to be exported? For governments – expected by their electorates to take action to ensure food availability in times of scarcity – to make credible, long-term commitments to allow free cross-border trade in staple foods, the following conditions are likely to be required:

- A perception that food will be readily available within the region in all except the very worst years. In stark contrast to this, the IMPACT model and others like it project increasing food deficits in Southern and Eastern Africa over the coming decade. This suggests that more effective measures to stimulate aggregate food supply might be required *before* a significant increase in intra-regional trade in staple foods occurs.
- That credible commitments are also made by neighbouring countries. This suggests that regional organisations such as COMESA may indeed have a role to play in moving Southern and Eastern Africa towards greater intra-regional trade in food staples – when the time comes.

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Annex: Commercial Cereal Production in Central Africa: Getting it Right, Getting it Wrong

1 Introduction

One of the major failures of African development post-independence has been the continent's growing reliance on imported food crops, at a time when India achieved broad self-sufficiency and Latin America became a major exporter. During the 1970's and 1980's CDC came under pressure from the Ministry of Overseas Development to do more to support African food crop production. CDC was active in promoting seed production companies (in Tanzania, Malawi and Ivory Coast) but was reluctant to become directly involved in basic food production.

A widely held view within CDC at this time was that while the model of large-scale, "corporate" production of classical plantation crops such as tea, rubber and palm oil was commercially competitive, it was not a viable solution to meeting Africa's basic food requirements, e.g. for maize or beef.

It was believed that medium and large-scale family farms, (typical of European settlers in Zimbabwe at the time), could achieve higher yields at lower costs, especially lower overhead costs.

It was also believed that peasant production, although generally lower-yielding, could also undercut estate-crop production since peasant farmers used few cash inputs and relied on unpaid family labour.

There was a view that governments were under constant pressure to regulate food crop prices, almost always in the interest of cheap food for urban consumers at the expense of reasonable prices for rural producers. Finally since food crops were needed for import substitution they would not generate foreign exchange earnings and in many African countries at this time businesses could not survive unless they had their own sources of foreign exchange.

General CDC policy was therefore to avoid direct involvement in basic, cereal food crop production.

In 1995 there was an example of indirect involvement when CDC provided a successful loan of £20m to support commercial farming in Zimbabwe, channelled through commercial banks in the country for on-lending to their credit-worthy clients.

Nevertheless CDC did sometimes become directly involved in producing basic food crops for local markets, usually as part of diversified crop production systems, e.g. along side coffee or tobacco production.
This case study compares the contrasting experience of large-scale commercial cereal production by the Commonwealth Development Corporation[16] during the 1980's and 1990's on four ventures which it controlled and managed:

Zambia Mpongwe Development Corporation (Mpongwe)

[16] The author was a non-executive director of Mpongwe from 1988-93 and Chairman of Mpongwe and Munkumpu from 2000-2004. The author undertook a detailed review of Tanwat's performance and prospects on behalf of CDC in 1986.

	Munkumpu Farms (Munkumpu)
Tanzania	Tanganyika Wattle Co (Tanwat)
Malawi	Sable Farming (Sable)

The contrasting experiences both between the ventures and over time are so great that they serve to highlight some of the fundamental requirements for sound agronomic, economic and commercial development.

2 Mpongwe Development Corporation – "Feeding the Nation"

2.1 Origins

Zambia is a large county with many relatively under-populated rural areas, a situation re-enforced by the concentration of around 50% of the population in urban areas, mainly as a result of the development of the mining industry. A small number of areas were developed for commercial farming by the colonial administration, mainly along the line of rail, but large-tracts of land suitable for arable farming remained undeveloped at the time of independence.

During the course of the 1970's Zambia's dependence on one major source of export revenue – copper – and relative neglect of agriculture contributed to a severe foreign exchange crisis. The diet in the urban areas had generally switched towards bread made from imported wheat and away from maize meal and the availability and price of bread became an important factor in national politics. The Government looked for ways to produce more food locally, especially wheat.

The Ministry of Rural Development, Land Use Services Division, undertook an investigation of areas with potential for irrigated, arable farming, that were also within practical reach of support services and infrastructure.

One such area was the Mpongwe block, to the south west of the Copperbelt. Traditionally few people had settled there because of an absence of surface water - the underground rock being limestone - but the soils were known to be fertile. The aquifer is however extensive and by pumping it is possible to developed irrigated crop production.

2.2 Research/Pilot Phase

In 1978 the Government of Zambia with support from the European Development Fund established a research project and pilot phase to test the viability of irrigated wheat production at Mpongwe, in rotation with rainfed soya, with the intention of developing a smallholder settlement scheme if the pilot farm proved successful. Management was provided by a UK consultancy firm, Landell Mills Associates (LMA). Diesel pumps were installed to pump water from a natural crevice in the aquifer.

A pilot farm of 1,140 ha was developed and the trial results were successful. In the 1983/4 season, Mpongwe achieved yields of 6.2 tonnes/ha for wheat and 2.3 tonnes/ha for soya.

2.3 Commercialisation

In 1983 the decision was taken to proceed to commercial-scale development. However it was decided that irrigated wheat production was not suitable for a smallholder settlement scheme. Soya/wheat production in Zambia was entirely based on mechanised technology which needed to be used on a large-scale to be economic, and for which smallholders had neither experience nor capital to contribute. The Government decided therefore to develop Mpongwe as a large-scale state farm.

35,400ha of land was demarcated in a single block, of which at least 15,000 ha was expected to be suitable for arable farming. A 99 year land-lease was issued to a newly registered legal entity – Mpongwe Development Company Ltd. The existing government owned assets, and responsibility for project implementation, were handed to the main state industrial holding company, the Zambia Industrial and Mining Corporation (ZIMCO). LMA were retained as managers. The Government instructed ZESCO, the state electricity corporation, to connect the area to the national grid, which would substantially reduce the cost of water pumping for irrigation.

There was uncertainty about how much water could be reliably pumped from the aquifer and it was decided to limit the area of irrigated cropping to 1,100 ha. Since there was far more arable land available it was decided to clear a further 3,000 ha for the development of rainfed maize and soya production.

Given the chronic shortage of foreign exchange in the country it was also decided that some export crops should be grown, since exporters of "non-traditional" products were allowed to keep 50% of any foreign exchange they earned. It was decided to grow gladioli as cut flowers for immediate foreign exchange generation, to help pay for management fees. In addition it was agreed to plant around 400 ha of irrigated coffee (leaving 700ha for wheat) which, after 3-4 years, would provide a long-term source of foreign exchange with which to service foreign debts and finance equipment replacements. There was also to be a crop trials/diversification project to try and identify other crops suitable to the area.

A number of international development agencies participated as minority shareholders and lenders in order to provide the foreign exchange needed to develop the project including the International Finance Corporation (IFC) and the DEG of Germany. CDC provided a loan of £1m and acquired an 8.5% stake in the equity. In recognition of the minority shareholders' participation, Mpongwe was granted executive autonomy, i.e. exemption from the normal regulations governing the operation of state-enterprises.

The next five years were difficult. The project was implemented as planned and average yields of wheat (5.8 tonnes/ha), maize (7.2 tonnes/ha) and soya (2.1 tonnes/ha) were good, but costs were higher and revenues less than budgeted and there were regular financial crises with the need to raise fresh finance and to reschedule debt service payments. Some of the main problems were:

- the production of gladioli was a technical success but involved substantial financial losses. The price obtained in Europe barely covered the cost of local and international transport alone (Mpongwe being approximately 400km from the international airport). However transport and airfreight costs were paid for in local currency, so gladioli production continued in order to provide Mpongwe with a source of foreign exchange

- coffee yields were reasonable (around 2 tonnes/ha) but below expectation which had been based on Zimbabwean experience (around 3 tonnes/ha)

- Government controlled the price of food crops – maize, wheat and soya – and during this period prices were usually set at relatively low levels (below import parity) in order to help keep food costs low for urban consumers. In addition the crops were bought by state-owned enterprises which generally had a poor record for paying on schedule

- high inflation rates and exchange rate instability which made financial planning and working capital management difficult.

The financial difficulties reached a peak in 1988/89. The Government announced a controlled maize price that was less than Mpongwe's variable costs of production. It was decided therefore not to plant. Instead, since the price of sorghum was not controlled, Mpongwe entered into an agreement with National Breweries (another ZIMCO subsidiary) to grow sorghum for brewing under contract, with a price formula that guaranteed that all of Mpongwe's costs would be covered plus a margin depending on production achieved. National Breweries also agreed to part pre-finance the crop to help Mpongwe's cash flow crisis.

The contract was attractive in principle, but Mpongwe had no previous experience of growing sorghum on a commercial scale, and the attempt to grow nearly 2,000ha was a complete failure, with yields so poor that the crop was not worth the cost of harvesting. Not surprisingly National Breweries sought to obtain a refund of the monies advanced. While a sensible compromise was eventually reached, Mpongwe's financial crisis had deepened and a complete financial restructuring was needed.

Zimco proposed that all debts be eliminated. Lenders were offered the choice of either converting their loans to equity or selling their loans to Zimco at a substantial discount. Minority shareholders were also offered the chance to sell their shares to Zimco if they were reluctant to accept the dilution of their interest due to the debt conversion.

With the exception of CDC all of the other shareholders and lenders decided to accept Zimco's offer and withdraw from the venture. CDC undertook a financial and technical review of the project which confirmed that the Mpongwe area was one of the most fertile blocks of land in central Africa with good long term prospects and that, with no long-term debt, the venture should also be financially sound and capable of steadily developing its huge reserve of as yet uncleared, arable land.

CDC therefore reached an agreement with Zimco to create a 50:50 joint venture, with CDC converting its own debt to equity and providing fresh equity in cash. CDC also took over the responsibility for management and seconded a new general manager (who had previously been the general manager of Tanwat).

2.4 Consolidation

There followed a period of consolidation aimed at increasing productivity and efficiencies and establishing a sound financial track record. Overall this was successful, average yields of

wheat and soya were increased and Mpongwe was able to begin paying dividends to its two shareholders. There were naturally many issues to deal with:

- The production of gladioli was stopped after it was clear that it would continue to make losses.
- Mpongwe developed tobacco production as an alternative foreign exchange earner, but this was abandoned in 1993 after a period of low international prices and pressure from CDC which had been instructed by the British Government to end involvement with the tobacco industry wherever practical.
- Marketing of local food crops continued to be constrained by Government interventions, either directly through price controls or through market interventions, e.g. the large-scale imports of subsidised maize, (via food aid), at times of shortage.

2.5 Expansion

During the early 1990's, after a change of government, Zambia developed practical policies for the almost complete liberalisation of the economy (e.g. abolition of price controls, marketing monopolies, import controls and foreign exchange controls) and for the privatisation of state enterprises. In 1995 CDC was invited to take a majority stake in Mpongwe linked to a commitment to the further development of its arable land. Encouraged by the new economic policies, CDC agreed to inject fresh equity which raised its stake to 70% and financed the clearing and development of a further 5,000 ha of arable land for rainfed maize and soya production and a major expansion of the crop silo complex.

This project took longer to develop than planned (five years) and was slightly more expensive, but nevertheless was profitable and provided a reasonable return on capital (over 10% p.a.). Mpongwe's yields were good, and crop prices, although fluctuating, were generally more attractive.

Zambia continued to be a net importer of wheat, and with economic liberalisation wheat was priced at a full import parity level. Given the high transport costs from Durban to the Copperbelt the average price obtained, of around US$225/tonne, was approximately twice the world market price[17].

Soya pricing was more complex, since there was only one major buyer in the country which had a large-scale plant capable of processing Mpongwe's soya bean crop to produce animal feed and soya oil. Mpongwe's only other major market was to export to a soya bean processor in northern South Africa. Since South Africa was a net importer of soya beans, the processor there was willing to pay Mpongwe a price equivalent to the world market price, plus the cost of transport from world markets to northern South Africa, less the cost of transport from Zambia to northern South Africa. In order to prevent exports, the price offered in Zambia tended to be just above the equivalent available from exporting to South Africa. Prices were thus related to world market levels and typically averaged US$200-250/tonne[18].

[17] e.g. in 1999 Mpongwe's average farm gate selling price for wheat was US$199/tonne. In the same year the average export price of hard wheat from the USA, Gulf Ports was US$112/tonne, and US$96/tonne for soft wheat.

[18] In 1999 Mpongwe's average farm-gate selling price of soya was US$200/tonne, while the average cif Rotterdam price in that year was US$202/tonne.

The maize price was also complex. Zambia tended to hover around self-sufficiency with a large but unreliable peasant crop dependent upon the previous year's prices, the weather and unstable government support policies. (During this period Government was trying to reduce its direct involvement in agriculture but was under political pressure to assist with credit, fertiliser supplies and crop buying). Prices could rise to over US$200/tonne if a regional shortfall was feared, reflecting the high cost of importing maize from the world market, and could also fall below US$100/tonne if a glut was anticipated reflecting the high cost of moving maize out of the country. Normally maize prices were higher than world market prices, e.g. in 1999 Mpongwe's farm-gate selling price averaged US$157/tonne while average price for US maize exports, at Gulf ports, was US$90/tonne.

2.6 Outcomes

In view of the relatively consistent good margin's on wheat, Mpongwe gradually expanded the area under irrigation by stretching the available water resource. By the early 2000's, Mpongwe[19] had 7,800ha of cleared land, of which 600ha was under irrigated coffee, 1,000ha was under irrigated wheat/soya, and the remaining 6,200ha was planted with roughly equal areas of rainfed maize and soya.

Average yields were over 7 tonnes/ha for wheat and maize, and 3 tonnes/ha for soya and coffee.

Turnover was averaging US$18m p.a. and the earnings before fixed overheads, tax and depreciation averaged US$6m p.a. Half of the gross margin, on average, came from the wheat area alone.

In the late 1990's, Mpongwe participated in a "benchmarking" study comparing its arable crop performance with a number of commercial farms in Zimbabwe. Overall Mpongwe's crop yields and gross margins were on a par with the Zimbabwean averages. Mpongwe's overheads per hectare were however much higher, reflecting some of the inevitable costs of "corporate" farming and CDC's additional administrative requirements as an accountable development agency.

The coffee estate has produced mixed results. By the mid-1990's Mpongwe was the largest coffee producer in Zambia, but yields, quality and international prices have been variable and the financial performance has oscillated between substantial profits and operating break-even. Average yields and quality have never quite reached the levels hoped for. Although coffee is a relatively high value crop, it is almost all exported and so net revenues are naturally reduced by the high cost of transport to international markets. However, coffee has been the main source of foreign exchange earnings for Mpongwe, and this has given confidence to investors and to the company's bankers. Nevertheless higher profit margins would have been achieved by using the irrigation water needed for the coffee to produce more wheat. Mpongwe has therefore faced an ongoing difficult choice between diversifying or maximising revenues.

The Mpongwe area itself had been transformed over 20 years. By 2000 Mpongwe was employing approximately 1,000 permanent staff and labour for whom basic housing, primary

[19] The following data are for Mpongwe's operations alone. In 1998 Mpongwe merged with Munkumpu Farms, and this is discussed later in this case study

schooling and basic medical facilities were provided. There was also a seasonal requirement for up to 3,000 casual workers, mainly for coffee picking.

Several other large-commercial farms were also developed in the area (by entrepreneurs of both European and African origin). Following the increase in road freight traffic (fertiliser deliveries to the farms and movement of crops[20] to the Copperbelt), in 2001 the Government constructed a new, all-weather tarred road to connect the Mpongwe block to the national highway system.

There has been a substantial migration of peasant farmers into the village lands within the Mpongwe Block, both to farm on their own account and to take advantage of the seasonal and casual job opportunities available.

There has also been a development of essentially squatter settlements. This has been largely unplanned and has created problems e.g. lack of clean water supply and adequate sanitation, high incidence of malaria and AIDS, theft of growing crops, encroachment on company land. Mpongwe has been criticised for increasing its use of casual labour in recent years, partly as a way of cutting down on employment overhead costs e.g. provision of housing.

During the early 1990's there was criticism of the poor standards of housing, water supply and sanitation provided for many of Mpongwe's permanent, unskilled, employees, leading to serious problems of malaria and a risk of cholera (that at the time was affecting other parts of Zambia). A major housing upgrading programme was initiated in the late 1990's combined with a programme to reduce over-manning.

There has been some local, political criticism of Mpongwe for not developing all of its arable land more quickly and also for the continued employment of expatriate staff in senior positions. Generally Government has rejected such complaints, recognising the contribution that Mpongwe is making to national food security and local employment and the amount of capital that CDC has committed to the venture.

Mpongwe has not been environmentally controversial. The Miombo woodland that has been cleared is not considered to be of high ecological value and is widespread in Zambia. The main ongoing challenge is to ensure the management of the exposed soils to minimise erosion by water and wind.

The ultimate financial profit or loss to CDC from its investment remains to be seen. In 2001 CDC announced its intention to sell most of its agricultural investments world-wide, including Mpongwe. In practice no satisfactory offers were received, and Mpongwe was withdrawn from sale. Potential buyers willing to offer CDC a premium over its investment cost required extended credit terms (i.e. they hoped to pay for Mpongwe out of its own future cash flows), while those willing to pay cash required a substantial discount. Major problems for potential buyers were the perceived risks of doing business in Zambia and the sheer scale of Mpongwe and the consequent amount of capital needed to acquire it and which would be at risk in Zambia.

[20] Mpongwe and Munkumpu alone produce on average 85,000 tonnes of crops per year.

In 2006 CDC transferred direct ownership of its shareholding in Mpongwe to the new African Agribusiness Fund, that it has promoted both to hold its residual African agricultural investments and to make further investments in the sector.

2.7 Critical Success Factors

Mpongwe's development has not been easy, neither has it been an unmixed success. However a large-scale, sustainable, economic asset has been created contributing to food production, export earnings, import substitution, and job creation, and with scope for still further growth in future.

The critical factors include:

Agronomic fundamentals – a large, relatively unsettled, area with good quality soils, relatively reliable climate, and substantial irrigation potential. Mpongwe is essentially a "world class" location for arable crop production.

Appropriate technology – while Mpongwe was pioneering within its own area, the crop production technology used (for maize, wheat, soya and coffee) had had a successful track record both within Zambia and in neighbouring Zimbabwe. Mpongwe maintained close working relationships with research institutes and seed producers in Zambia and Zimbabwe and involved Zimbabwean consultants and managers.

Market opportunity – the opportunity to sell wheat, soya and maize to a relatively nearby urban area (the Copperbelt) within a land-locked country that is normally a net importer of these crops or at best self sufficient. Mpongwe would not have succeeded having to export its food crops onto distant world markets.

Government support – while government has also been a source of problems (there is no escape from politics in the real world) its has fundamentally supported Mpongwe through:

identification of the site
promotion of the pilot phase
allocation of the land on 99-year lease for a nominal rental
allocation of free water rights
free connection to national electricity grid
free provision of all-weather tarred road access
financial assistance to reduce debts at a critical stage
the creation of a liberal crop marketing and foreign exchange regime (eventually)
providing work permits for the employment of specialist, foreign managers

Long-term development finance – EDF support for the research phase; IFC, DEG and CDC support for commercialisation; and CDC long-term financial commitment to expansion were critical, in the context of a country where there was no long-term private capital available for agricultural development on the scale achieved.

Scale – Mpongwe is large and so it is important for all those connected with it[21]. Neither CDC nor the Government were prepared to see Mpongwe fail and worked together to solve the commercial and political problems that arose during its development. Mpongwe is able to justify its own crop storage infrastructure; it attracts major input suppliers (aerial crop spraying, fertiliser supplies, agro-chemicals, seed development and supplies) and is able to market its crops on preferential terms, being the largest single source of wheat, soya and maize in the country. Mpongwe is also able to afford and attract high quality management. CDC initially seconded some of its most senior and experienced agribusiness managers and subsequently hired senior management with experience of running other major agribusiness enterprises in the region.

3 Munkumpu Farms – A Privatisation Success Story

3.1 Origins

The Munkumpu area was another large, homogeneous, block of land, to the west of Mpongwe, identified by the Ministry of Rural Development in the late 1970's as having potential for irrigated, arable farming. It was believed that 10,000ha could be irrigated, 5,000 by pumping from the Kafue river and 5,000 from a dam to collect surface and underground water draining the Mpongwe area to the east.

The Ministry cleared 200ha and began crop trials using a temporary system to pump water from the Kafue river.

In the early 1980's responsibility to implement commercial-scale farming was given to Zambia Consolidated Copper Mines (ZCCM), the state-controlled enterprise which dominated the economy. It already had a farming division, Nchanga Farms, which aimed to help produce food for the mining communities, and it came under pressure from the Government to do more to help develop irrigated wheat production.

24,300 ha of land were demarcated for the project, and a feasibility study was undertaken for ZCCM by professional consultants (Watermayer, Legge, Piesold and Ullman). They recommended that the 5000ha reservoir- based component be implement first as the water could be distributed by gravity and it would avoid the need for costly pumping of water from the Kafue river. It was proposed to develop the downstream irrigation in two phases of 2,500 ha each.

CDC had been a long-term lender to ZCCM and given CDC's reputation as a specialist in agricultural development the Chairmen of the two organisations agreed that a joint venture approach should be tried.

In 1983 CDC appraised the plans and its team reported that a 2,500 ha irrigation project should be technically and commercially viable, but recommended that the investors move cautiously since:

[21] By the early 2000's Mpongwe and Munkumpu combined were producing an estimated 50% of Zambia's soya crop, 40% of the national wheat crop and 3% of the maize crop.

- the soils were light and sandy, there was an erosion risk and the yield potential was uncertain
- the proposed construction of a dam and water distribution system would be costly and should only be undertaken once the agronomic potential of the site had been fully proven
- while the dam site had the storage capacity for 5,000 ha, there was a lack of reliable rainfall data and hydrological studies to shown that there was a reliable, annual flow of water into the dam to supply the full 5,000 ha

CDC therefore proposed that the scheme be developed in phases, starting with a 1,000 ha pilot phase, using water from boreholes. CDC also proposed that it provide the management for the venture. The CDC Board approved an investment on this basis of £2.0m.

ZCCM was however under political pressure to help "feed the nation" and rejected the cautious CDC approach and also rejected the idea of CDC management, believing that it had sufficient experience of its own.

ZCCM therefore opted to implement the dam construction and the full phase I 2,500 ha scheme on its own.

3.2 Position Pre-Privatisation

The Munkumpu scheme was completed around 1990. The dam was constructed by a ZCCM subsidiary and financed by ZCCM's pension fund. 2,500 ha of centre pivot irrigation equipment was installed, to produce winter wheat and summer soya and maize.

The implementation of the project was fundamentally sound, but cropping intensity and yields never reached the expected potential. The scheme was run as a division of Nchanga Farms, (rather than as a separate company). An experienced general manager was recruited but he did not have control of cash flows, procurement, logistics or marketing. There was political pressure to grow maize in summer, but this has a longer growing and harvesting season than soya, and so is difficult to double crop with winter wheat.

Since ZCCM as a whole was normally in a poor state in terms of cash flow and liquidity this was reflected at farm level with shortages of equipment and spare parts and late delivery of essential inputs such as seeds, fertiliser and other agro-chemicals.

340 ha of the centre pivot area were abandoned.

It is believed that the scheme cost somewhere between US$20m and US$30m to complete, and was loosing money prior to privatisation.

3.3 Privatisation

As part of its national privatisation programme, the Government of Zambia put the assets of Munkumpu Farms up for sale in 1995 by international competitive tender.

After two rounds of bidding CDC emerged with the highest bid – of US$7.2m plus a commitment of US$8m of further funds for rehabilitation and development. CDC took control of Munkumpu Farms in December 1995.

Strategically, CDC wanted to acquire Munkumpu Farms because:

- It owned and managed a nearby major farming enterprise (Mpongwe). It therefore was confident that it had the technology and management skills to rehabilitate and operate Munkumpu.

- Mpongwe had become mainly a rain-fed farming operation. Munkumpu, being 100% irrigated, would help to reduce overall financial exposure to climatic risks. It was also thought that surplus water at Munkumpu could be used to extend irrigation at Mpongwe.

- CDC wanted to invest in downstream processing of its agricultural crops. The combined volumes of wheat production expected from Munkumpu and Mpongwe would justify the construction of a wheat flour mill[22].

Initially CDC ran Munkumpu as a 100% subsidiary, giving it a free hand to take whatever decisions were necessary to restore profitability. In 1998 it was decided, with Zimco's approval, to merge Munkumpu with Mpongwe in order to maximise the scope for co-operation and economies of scale.

3.4 The Actual Results Achieved, 1996-2000

The full 2,500 ha of centre pivot irrigation was rehabilitated more quickly than planned:

(hectares)

		1996	1997	1998	1999
rain-fed crops	target	0	800	2,105	2,105
(summer)	actual	1,960	2,460	2,232	2,501
irrigated crops	target	1,000	1,600	2,105	2,355
(winter)	actual	2,160	2,480	2,480	2,497

[22] The flour milling project was implemented with a new mill constructed on the Copperbelt in 1997. It was a technical success but there was general excess milling capacity in the country and operating margins were disappointing. The mill was sold in 2003.

The crop yields achieved were also considerably higher than forecast:

(tonnes/ha)

crop	yield forecast	yield achieved in year 2000
maize	7.0	10.8
soya	2.0	3.7
wheat	6.5	7.3

On average, crop-selling prices were close to prediction:

(US$/tonne)

crop	price forecast	average price 1996-2000
maize	140	142
soya	245	226
wheat	260	251

Overall financial performance was slightly ahead of expectations in year 2000:

(US$m)

	Turnover	Gross Margin
Target	6.0	3.0
Actual	6.4	3.5

3.5 Social Dimension

There were approximately 300 employees working on Munkumpu at the time of privatisation. Privatisation led to an improvement in overall employment terms and conditions.

- All of the employees were offered the opportunity to stay after acquisition by CDC.
- US$ 660,000 was spent during the first 3 years improving housing and domestic water supply.
- There was no overall loss of jobs - during year 2000 there were, on average, 290 permanent employees and 127 seasonal employees at Munkumpu.

The costs of restoring the social infrastructure were somewhat higher than budgeted.

3.6 Expansion

Financially the rehabilitation was a success, with an expected return on capital of around 15% p.a..

CDC initiated a phased expansion programme in 2000. A further 1,500 ha was developed for rainfed arable (maize and soya), and a water right was obtained to pump water from the Kafue River, if required.

In 2004 preliminary plans were commissioned from consultants to develop a further 4,000 ha of irrigated land, to be supplied by a combination of a new canal from the dam and pumping from the Kafue, at an estimated cost of US$10.5m. CDC agreed to subscribe to a further US$4m in equity to implement phase I of this programme.

3.7 Critical Success Factors

By the time that CDC acquired Munkumpu, Zambia had introduced a liberal economic environment:

- no foreign exchange controls
- no significant marketing restrictions
- no significant taxes on farm inputs or on farm products
- no restrictions on "hire and fire" for competence/disciplinary reasons
- Government maintained strategic food reserves but aimed to avoid depressing prices

There was clear, undisputed, land title, based on a 99-year lease from the State.

Supporting infrastructure was reasonable. The area is connected to the national electricity grid that is reliable during the dry season (when the power is needed for the centre pivots), and Government has improved access roads.

The assets acquired, although badly maintained and poorly operated were essentially sound and CDC was able to rehabilitate them quickly.

CDC was an experienced manager of agribusiness enterprises in Zambia and therefore did not have to go through the usual, painful "learning curve".

The Munkumpu area has turned out to be highly productive in terms of yields provided the relatively light soils and irrigation application are managed with care.

The climate is, in broad terms, reliable.

These positive factors have helped Munkumpu to overcome:

- unstable foreign exchange rate
- high inflation rates
- extremely high local interest rates

Munkumpu is an example of the classical benefits hoped for from privatisation. The fundamentals of the business were sound and the overall economic policy framework and physical infrastructure were supportive. What was required was simply to take management

and control out of a restrictive "parastatal system". As a result both the physical assets and the people were able to fulfil their commercial potential[23].

4 Tanwat Arable – Commercial Success in an Artificial Environment

The history of the Tanganyika Wattle Company has been set out in the case study dealing with the early years of the Colonial Development Corporation. It is partly summarised again here to illustrate the contrast with Mpongwe.

Mpongwe and Munkumpu are fundamentally well suited to the production of arable crops, both in terms of the agronomic productivity of the soils and their location relatively close to the urban markets of the Copperbelt. It was an aberration that during the 1980's there were times when artificial exchange rates and price controls made arable crop production unprofitable.

In contrast the Njombe area of the Southern Highlands is fundamentally suited to tree crops (wattle, pines, tea) but is less well-suited to arable cropping. It is too high and wet, yields achievable are relatively low (around 2 tonnes/ha for wheat and 5 tonnes/ha for hybrid maize), and it is remote from the main urban population centres of the country. Nevertheless for most of the 1970's and 1980's 1,400 ha of rainfed, arable cropping was Tanwat's most profitable activity. A severely overvalued exchange rate meant that Tanwat earned little from the export of its main product, wattle extract, but in order to try and save foreign exchange used for food imports the Government usually offered high prices, in local currency, for food and seed crop production.

The profit margins on food and seed crops were so attractive that in 1984 Tanwat obtained approval from CDC for a loan of £1.6m to develop a separate 2,000 ha arable (maize and soya) project at Ndolela, 150 kms to the south. This is a warmer, lower lying area and yields of maize were expected to be higher. However once the forest cover was removed and the first 200 ha planted, the soils proved to be too fragile for annual cropping and the project was abandoned.

During the 1990's the Government began to adopt more rational economic policies and the artificial financial incentives to produce food crops disappeared. Tanwat re-focussed on its traditional tree crop businesses and the development of a new tree crop - tea.

Tanwat was not wrong to diversify into arable farming in the 1970's[24]. It was a necessary tactical move to help it to survive during very difficult economic conditions, and it illustrates the importance of flexibility. However it could never form part of a long term strategy for Tanwat's survival and growth. Tanwat is not a "world class" site for arable crops and is not a competitive producer.

[23] It is noteworthy that not only the assets benefited from being removed from the parastatal system. The original manager of Munkumpu, who had struggled to cope within the ZCCM system, subsequently leased a commercial farm adjacent to Mpongwe and is understood to have done very well, producing rainfed maize and soya.
[24] The establishment of a hybrid maize seed production unit and then the formation of Tanseed were important contributions to the development of arable farming nationally.

5 Sable/Kawalazi Farming – A Privatisation Failure

5.1 Origins

CDC has had a long history of owning and managing commercial and smallholder agricultural projects in Malawi, dating back to the late 1940's.

The Sable Farming and Kawalazi Estate ventures had separate origins, but were eventually merged in an attempt to achieve economies of scale. A wide range of crops was grown, including maize and wheat and for that reason the case study is included in this section.

CDC's involvement began in the north of Malawi in 1984. A block of land had been owned by the Smallholder Tea Authority, but only a small amount of tea had been developed. In 1984 CDC entered into a joint venture with Spearhead Holdings (see below) to develop and manage a 670 ha tea, macadamia and coffee project on the site, to be called Kawalazi. CDC held 75% of the equity and invested an initial £4.2m.

In 1985 CDC agreed to proved a loan of £1.1m to ADMARC (the state-owned Agricultural Development and Marketing Company) for the expansion of its nearby Kavuzi tea estate from 450 ha to 810 ha and for the construction of a new factory, which would also process the tea to be produced at Kawalazi.

The agricultural estates that came to be called Sable Farming were owned by Spearhead Holdings which itself had a complicated history. The youth wing of Malawi's sole political party, the "Malawi Young Pioneers", had a commercial arm called "Spearhead Enterprises" which was intended to provide job and training opportunities for the youths and also to raise revenue for party activities. It went bankrupt in the late 1970's. For many years the liquidator had tried to dispose of the agricultural estates owned by Spearhead, but without success. They were loss making and in part had been located in some of the remoter areas of Malawi for political and security reasons. For example, the 1,600ha Ngapani estate was on the remote eastern side of Lake Malawi. The farm boundary coincided with the border with Mozambique and had been mined to dissuade incursions into Malawi arising from Mozambique's civil war.

A successor company was created, Spearhead Holdings, to take over Spearhead Enterprises assets - owned 40% by the Malawi Government, 15% by commercial banks and 40% by "private shareholders."

Spearhead Holdings, having already entered into a JV with CDC for the development of Kawalazi, invited CDC to review all of its scattered agricultural estates. In 1986 CDC undertook an appraisal of the farms and prepared a major rehabilitation and expansion project for most of them, embracing 18,600ha. The expected returns on investment were not high, but CDC was in part able to utilise Government of Malawi debt service payments made in local currency to help finance the development. The project was seen as having high development value, since many jobs were at stake and Malawi was almost totally dependent upon the performance of its agricultural sector.

CDC recommended that the more promising of the assorted estates be grouped into three new regional companies, each with a distinct shareholder grouping:

- "Sable" for the Southern Region, to specialise in dairy, coffee, tea, arable, tobacco and forestry

- "Impala" for the Central Region, to specialise in tobacco, oilseeds and wheat

- "Kudu" for the Northern region, to incorporate the Kawalazi and Kavuzi estates, to specialise in coffee, macadamia, tea, cotton, wheat and beans

This structure was adopted initially and in 1987 CDC approved an investment of £15m in what was expected to be a £38m development project, with development costs to be partly financed out of self-generated funds. DEG of Germany and FMO of the Netherlands were co-investors. CDC took a controlling interest in Kudu and Sable and a minority stake in Impala. Eventually all three companies were merged into one – Sable Farming – under CDC control.

Subsequently CDC tried various structures for managing its agricultural interests in Malawi including the de-merger of Sable and Kawalazi.

5.2 Outcome

The projects cost more and took longer to complete than CDC had expected, and the yields and profit margins achieved were generally lower than forecast, which undermined CDC's strategy of expanding to achieve profitability.

Some of the projects were technically weak. An expensive dam was constructed to irrigate a relatively small area of wheat; there were extensive plantings of macadamia which failed to produce commercial yields; new coffee plantings failed to achieve the forecasts yields. In addition, tea prices were exceptionally low.

Sable/Kawalazi usually made a small surplus at the operating level, (with plenty of year to year variation depending upon the world market prices of tobacco, tea and coffee) but this was not enough to pay for the group overheads (i.e. expatriate staff, head office in Blantyre) or to service the CDC/DFI loans, and so arrears mounted.

As a result there were little, if any, "self-generated funds" to help meet the cost of the development. CDC agreed to provide much more external capital than it had anticipated at the beginning, mainly based on continuing over-optimistic yield and commodity price forecasts which suggested that financial viability would be achieved once the business expanded further.

Ultimately CDC invested a total of around £40m (including the Kawalazi and Kavuzi investments) before it finally accepted that it had acquired a group of scattered, small-scale estates and farms, of marginal economic potential and which were expensive to control and manage.

The combined Sable group became insolvent. There was no formal liquidation, but CDC threatened liquidation in the mid-1990's and as a result the other DFI's agreed to have their investments purchased by CDC for a fraction of their face value.

CDC wrote-off about £35m of its investment in the late 1990's and sold the estates to Global Tea and Commodities Ltd, a UK-based tea importer and distributor, in 2001, for a consideration similar to the written down book value.

5.3 Social and environmental aspects

There is a severe land shortage in Malawi and so there is always friction between land allocated to large-scale commercial estates and farms and the needs of smallholder farmers. CDC attracted criticism for "subsidising" non-viable commercial estates rather than using an equivalent sum of money to support peasant farming.

CDC was also criticised by DfID for growing tobacco. Eventually DfID directed CDC to stop all new investment in tobacco and CDC was encouraged to get out of the crop wherever possible. This presented some difficulties for CDC in Malawi where tobacco is the main export crop, vital to the economy, with extensive participation by smallholders and was a major element in Sable's viability. Tobacco curing however requires a large amount of fuelwood, and CDC was also criticised for contributing to deforestation.

5.4 Critical Failure Factors

Sable in particular is an example of CDC promoting an agricultural project in the 1980's in order to utilise Government debt service payments made in local currency and to support a de facto privatisation, without adequately assessing whether the venture had the potential to be a "world class" producer of commodities that must compete on international markets.

For Sable/Kawalazi to achieve financial success, it needed to obtain high margins from export crops, mainly tobacco, tea and coffee. Being land-locked, Malawi has to meet high transport costs both for imports (e.g. fertiliser) and to get its export crops to world markets so that profit margins are usually tight, even when good crops are achieved. To have a chance of success it is necessary to maintain tight control of all non-essential expenditure and minimise overhead costs (e.g. expatriate salaries and benefits) – which is difficult to achieve in the context of a company owned by a combination of local and international development agencies. Sable's ultimate sale to a private company probably gave the business its best chance of survival.

In the context of Malawi, Sable/Kawalazi was not able to rely on producing food crops for the local market to achieve profitability (unlike Mpongwe/Munkumpu in Zambia). Maize in particular was being grown in competition with a very large peasant sector and for a relatively small urban market, only approximately 10% of Malawi's population being urbanised. Irrigated wheat was produced on a small scale as a highly mechanised crop in a country where capital is scarce and labour plentiful and cheap.

The experience at Sable/Kawalazi helped to convince CDC that it should in future stress international competitiveness when appraising agricultural investments, (i.e. benchmarking) rather than purely forecasts of FIRRs which are easily manipulated by over-optimism.

5.5 Conclusions from the Four Ventures

The contrasting experiences of the four ventures illustrates some simple but fundamental lessons.

Ideally it is best to start with a strategic objective (e.g. to invest in profitable cereal production) and then to search for an ideal location, as was the case with Mpongwe and Munkumpu, rather than to be offered a location and then try to find something profitable to do with it, as was the case with the Spearhead Holdings farm assets. The former approach leads to focus and specialisation while the latter can lead to unmanageable diversification and sub-economic operating units.

The sound development of new, large-scale, agricultural ventures takes time and is expensive. Financial returns are likely to be low, but long-term sustainable businesses and rural livelihoods can be created provided the agronomic and economic fundamentals are sound.

Higher financial returns are potentially available from expanding existing, successful ventures or from the privatisation/rehabilitation of agricultural schemes that have failed due to mismanagement rather than because of fundamental flaws.

The political attractiveness of the goal of sustainable, profitable rural development or of turning round a failed state venture should not blind investors to the objective reality of international competition. Agricultural projects aiming to produce crops for export need to be "world class" if they are to thrive, while those aiming to supply domestic markets need to be able to compete with both potential imports and other local producers.

It is also noteworthy that even the best of these ventures – Mpongwe and Munkumpu – are high cost producers by world standards and could not survive they had to sell their crops into the world market. The cereals and oil-seed industries of such countries as Brazil, Argentina and Thailand are huge, lean and highly competitive. Substantial economies of scale have been achieved in the bulk handling and transport of cereals and oil-seeds, which are unmatched in Africa, outside of South Africa[25].

[25] in 2004 South Africa was the world's 12th largest exporter of maize, mainly to other African countries