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"Maize Supply and Price Situation in Somalia:
An Historical Overview and
Analysis of Recent Changes

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MAIZE SUPPLY AND PRICE SITUATION IN SOMALIA: AN HISTORICAL OVERVIEW AND ANALYSIS OF RECENT CHANGES[1]

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1.0 Introduction

Maize is a basic staple in southern Somalia, whose output has expanded during the past decade. The available official statistics suggest that Somali producers have cultivated more land to maize during the 1980s than during the 1970s. Aggregate maize production has expanded, while sorghum production has stagnated. Maize yields appear to have risen more rapidly than sorghum yields. Imports have fluctuated considerably, depending on overall availability of food grains in particular years. What are the factors that have contributed to increased maize output in Somalia? How important have rainfall, market liberalization, and real price trends been in the expansion of maize production and stagnation of sorghum production?

The objectives of this paper are threefold. First, it will present and discuss the available data on the maize supply and price situation in Somalia, with special focus on changes in the 1980s (section 2.0). Second, the paper will examine factors contributing to maize expansion (section 3.0). Last, it will assess in a preliminary way the possibility and opportunity for continued expansion in maize output (section 4.0).

2.0 Maize Supply and Price Situation in the 1980s

2.1 Inconsistent Data: The Food Security Analyst's Dilemma

In Somalia, as in many African countries, the available sources of cereals production and import data are not always consistent. This is illustrated by the different sources of maize production and import data in Table 1. While the production data are quite consistent, estimated imports during the 1980s, particularly during the 1982-1984 period, seem to conflict the most. Collecting import data in Somalia is difficult, as there are numerous commercial importers and food aid donors. A good deal of commercial food import data goes undetected and unrecorded (Jaffee, 1985).

The time-series in Table 1 illustrate the dilemma of food security analysts in many African countries. When there are discrepancies in data sources, which series does the analyst choose? On what grounds can one justify the choice of one series as opposed to another? What are some of the crosschecks that can be performed to gauge the internal consistency of one source of time-series data? Although this section will not answer these questions in a generalizable and definitive way, it will examine carefully the GSDR maize and sorghum statistics for discernible trends and internal consistency.

While the official agricultural statistics of the GSDR and other sources of data are open to question, it should be noted that the Ministry of Agriculture (MOA) is trying to improve its estimation of crop area, production and yield, with assistance from the EC supported (since January 1986) Food and Early Warning System (FEWS). The FEWS also began to gather commercial import data from shipping agencies and port authorities at the main Somali ports (Mogadishu, Kismayo, Berbera) in

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January 1986. In addition, the World Food Programme (WFP) has improved collection of import data on cereals and other commodities by systematically contacting all food aid donors.

For the purposes of the following analysis, this paper will use the maize and sorghum area cropped, production and (calculated) yield estimates of the MOA, which are presented in Table 2 and Figures 1-3.

2.2 Maize and Sorghum Production Data

This section will examine trends in maize and sorghum area cropped, production and yields since 1970, using the official GSDR statistics. The internal consistency of the time-series for each crop will be assessed, and production trends will be compared.

2.2.1 Maize Area, Production, and Yields

Area cropped to maize during the 1970s was remarkably uniform, averaging 149,000 hectares per annum. Total maize production was highest during the 1970s in the 1972-74 period, averaging 156,000 metric tons a year, but it dropped off precipitously to 92,000 and 90,000 hectares in the drought years of 1975 and 1976. For the most part, the maize area cropped and production data for the 1970s appear plausible and consistent.

Trends in the estimated maize yields during the 1970s are somewhat puzzling. Calculating maize yields from the aggregate area cropped and production figures, it is noteworthy that yields averaged 959 kilograms per hectare during the first five years of the 1970s (1970-74), and 691 kg./ha. during the latter half of the decade (1975-79). Part of this difference can be explained by the two drought years, which pulled yields down in the 1975 and 1976 to 657 and 600 kg./ha. respectively. Nevertheless, yields remained low (730-735 kg./ha.) in 1977-79.

While the GSDR data show that maize production stagnated during the 1970s, they suggest that maize area cropped, production and yield were significantly higher in the 1981-86 period than during the 1970s. We will exclude 1980 from this comparison, when area cropped and production were [illegible] low, since it was a drought year. Average area cropped increased from 149,000 hectares in the 1970s to 207,000 hectares a year from 1981 through 1985, expanding to a record high of 234,000 hectares in 1985. Aggregate maize output expanded from 157,000 metric tons in 1981 to 383,000 M.T. in 1985, a 144% increase in output associated with a 19% expansion in area cultivated. Calculated yields more than doubled from 797 kg./ha. in 1981 to 1637 kg./ha. in 1985. Both production and yields appear to have risen steeply beginning in 1983, as shown in Figures 2 and 3.

The expansion in maize area during the 1980s is generally consistent with changes in the macroeconomic and agricultural policy environment in Somalia beginning in the early 1980s, as will be discussed in greater depth in section 3.0. The dramatic increase in yields is less easy to accept and explain. As a crosscheck on yield estimates calculated from aggregate official statistics, we can compare microlevel estimates of yield, based on yield plot data and farmer reported estimates.

During the past several years the national extension service has been collecting yield plot data from contact farmers in the Lower and Middle Shebelle. Yields for Gu 1986 ranged between 9 and 23 quintals/hectare and averaged 12-15 quintals/ha across some 20 villages in the Middle Shebelle. Farmer estimates of yield in six villages of the Lower Shebelle, reported by Boateng, David and Mire in the AFMET funded farm management studies, averaged 1613 kilograms/hectare in 1985 and 1467 kg./ha. in 1984 (Boateng, David and Mire, 1986). In 1984 average yields ranged across the six villages from 982 kg./ha. to 1900 kg./ha. (Boateng, David, Mire, Feb./March 1985). In presenting detailed crop budgets, the extension project researchers use 1200 kg./ha. as the typical yield on farms cultivating maize in pure stands using traditional methods, 1400 kg./ha. as the typical yield for farms using insecticide but not fertilizer on pure maize stands, and 2000 kg./ha. as the typical yield for farms using both fertilizer and insecticide on pure maize stands. Since most farmers in Somalia do not use fertilizer, insecticide and improved production methods, yields are more likely to average in the 800-1200 kg./ha. range than in the 1400-2000 range.

Other yield evidence has been recorded for farmers participating and not participating in the FAO Fertilizer Programmme and the AFMET extension project in three villages in the Lower Shebelle, as shown in Table 3 (see Mohammed Ali Abukar and M. Jain, 1986; Boateng et al., November 1985). Farmers participating in the programs received improved seed (Somtux variety), fertilizer, insecticide, and extension advice regarding use of these inputs and improved management practices, while non-participating farmers received none of these inputs or extension. The yields of the participating farmers, shown below, averaged 2591-3511 kg./ha. in the three villages, and ranged between 1436-4798 kg./ha. In contrast, the yields of the non-participating farmers were predictably far lower. Non-participants averaged 1407-2009 kg./ha., and their yields ranged from 887 to 2795 kg./ha.

Table 3

Maize Yields in Three Villages of the Lower Shebelle, Gu 1984
(in kg./ha.)

Village	Participating Farmers		Non-Participating Farmers	
	Mean Yield	Yield Range	Mean Yield	Yield Range
Dar es Salaam	2591	1436-4639	1407	887-2092
Ugunji	3273	1657-4639	1664	929-2912
Sigaale	3511	2350-4798	2009	1296-2795

Source: Boateng, David, Mire, AFMET papers, 1985 and 1986.
Mohammed Ali Abukar and M. Jain, Puntland Journal, 1986.

Note: The sample size was 10 participating and 10 non-participating farmers in each village.

It should be noted that the reported yields for both the participating and non-participating farmers are likely to be greater than yields in most maize producing areas of Somalia. The three villages in the Lower Shebelle are close to the river and have better access to irrigation, as

well as relatively good soils. Furthermore, villages where credit projects and the extension service operate are generally larger and more accessible settlements, so they will have more incentive to produce for the market and better access to inputs available from non-governmental sources. The data were collected from progressive farmers who participate in input providing credit projects, as well as producers who probably benefit from a positive demonstration effect, or who may obtain inputs from banana producers, large farms with better access to inputs, or participants in input-providing projects.

The Food Security research will examine reasons for yield differences among farmers in ten villages in the Lower and Middle Shebelle where credit programs and the extension service are active, as shown in Table 4. The three villages cited in the Table 3 are included among the sample villages. Farmers in a fourth village, Bulo Sheikh, were surveyed by TAMS researchers as part of a feasibility study in November 1985. Approximately one-third of the sample farms received inputs on credit in 1986, while the other two-thirds did not participate in input-providing programs.

Without a better microlevel data base and with crude aggregate production data, it is not possible to substantiate whether maize yields have increased dramatically during the past several years, as suggested by the MOA data. T.G. Hart, a CIMMYT agronomist, estimates that maize yields in Somalia range between 200 kg. and 2 tons per hectare, but he also states that yield potential of 2-3 tons per hectare is "very plausible for average farmers" (Hart, 1984). The yield issue will be discussed further in section 3.0, in which factors contributing to maize expansion will be examined.

2.2.2 Sorghum Area, Production, and Yields

While the official statistics show that maize area expanded in the 1980s relative to the 1970s, trends in sorghum cultivation appear to be quite different. As shown in table 2 and figure 1, area cropped to sorghum expanded steadily from 1970 through 1982, nearly doubling over the twelve year period. Since the record high hectarage of 540,000 achieved in 1982, sorghum area fell off to 364,000 ha. in 1985. While area cropped averaged 477,000 hectares from 1976 to 1982, it dropped to an average of 404,000 hectares in 1983-85. In contrast, area cropped to maize rose from an average of 147,000 hectares per annum in the second half of the 1970s to 207,000 hectares in 1981-85. Although maize area cropped began to rise before sorghum area fell, the data seem to imply that some of the area planted to sorghum may have been shifted to maize cultivation. However, maize is largely an irrigated crop, and sorghum production is concentrated in areas outside of irrigated zones. The World Bank argues that expansion in maize output is primarily the result of increased area cultivated to maize (World Bank, 1986). While this is plausible, the MOA data do not bear this out.

Although area cropped to sorghum has declined since 1982, calculated yields achieved record highs in 1985 and in Gu 1986. Since sorghum is a rainfed crop, in contrast to maize, which is largely irrigated, one would expect sorghum yields to be highly correlated with annual rainfall. Unfortunately, a complete time-series of annual rainfall data is not available for any of the stations, such as Baidoa, in the sorghum

producing area for the entire 1970-1986 period. Rainfall data for towns in the major maize producing areas are also incomplete. As shown in Table 5, rainfall data are available for most of the months during 1980-1985 for Genale, a town on the Shebelle River in Merca District, which is in the middle of an important maize producing area. Note the missing observations for some months in 1980 and 1985. Despite the data limitations, there does not appear to be a clear cut relationship between rainfall and maize yields. This is not surprising, as maize is essentially an irrigated crop in Somalia, and is therefore less dependent on rainfall than sorghum. Nevertheless, rainfall affects irrigated maize yields, as most of the irrigation is not controlled but rather a form of pre-irrigation or flood irrigation.

2.3 Trends in Maize and Sorghum Prices

2.3.1 Official Maize and Sorghum Producer Prices

The parastatal grain agency, the Agricultural Development Corporation (ADC), sets official producer prices each year before the Gu season harvest. Throughout the 1970s and 1980s ADC set prices well after planting, and growers planting decisions were likely affected by the previous year's prices.

Annual ADC maize and sorghum purchase prices are shown in both nominal and real terms in Table 6. Official producer prices kept pace with inflation from 1971 through 1978, although they lagged inflation somewhat to the extent that growers based planting decisions on previous year prices. After 1978, official grain prices began to decline in real terms. Even though maize buying prices were increased by nearly five times between 1977 and 1984, accelerating inflation more than offset these adjustments. By 1984 the ADC maize offer price was 55% of its 1971 level in real terms. The white sorghum price was only 30% of its 1971 level, while red sorghum had fallen to only 24%. In 1980 ADC purchases of maize and sorghum fell precipitously from late 1970s levels to very low levels for maize and moderately low levels for sorghum (see Table 7). ADC maize purchases remained low until 1986.

Most observers report that parallel market grain prices did keep pace with the rampant inflation that gained momentum in the late 1970s and early 1980s, while official prices declined in real terms (see GSDR and World Bank, 1984). At the same time, the volume of parallel grain market transactions burgeoned, although selling to any person or organization other than ADC was illegal until January 1984. Unfortunately, there are no available parallel market price data at the farm and wholesale level or volume/flow data before the Gu harvest period of 1983, so we must rely on informal and anecdotal sources. These are consistent in their claims that the parallel grain market expanded while the official channel retrenched, particularly for maize.

2.3.2 Parallel Grain Market Prices

During the 1970s ADC exercised monopsony rights and purchased an annual average of 28% of the estimated maize production and 24% of estimated sorghum production (see Table 7). Although this is a relatively high proportion, it is believed (but has not been empirically verified) that marketed surplus of maize constitutes 40-50% of total

annual production (see Jaffee, 1985 and GSDR and World Bank, 1984). Assuming that 40% of maize production is marketed, an average of 12% of grain production was therefore marketed at the village level or in parallel markets during the 1970s. Unfortunately, we have no way of substantiating this conjecture. Cross-sectional and time-series data on farmer production and sales do not exist for the 1970s (and early 1980s). We also lack information about the numbers, types and volume of parallel market traders.

By most reports, active and transparent parallel grain markets had emerged by the early 1980s, largely in response to price differentials between parallel and official prices (see Abukar, 1987). ADC bought only 13,000 metric tons of maize from 1980 to 1984, an average of 2600 tons a year over the period. From 1982 through 1984, maize buying virtually ceased, as only 3000 tons were purchased. The official price data clearly show that prices offered by ADC declined in real terms beginning in 1979, as shown in Table 6.

Although we lack data on farm level and wholesale prices offered in the parallel market before August 1983, retail grain prices have been collected in Mogadishu markets from 1977 to the present by the Central Statistical Department of the Ministry of National Planning (CSD/MNP). In 1977 and for much of 1978, recorded retail prices were in fact official (ADC selling) prices. By 1979 the CSD/MNP recorded official and parallel market prices separately. Real maize and sorghum prices in the parallel market kept pace with inflation from 1978 through 1985, with considerable fluctuation that reflected the variation in aggregate production and stocks. Real retail prices were especially high in 1980 and 1984, following poor harvests (see Wehelie). Prices fell off steadily in real terms in 1985 and 1986 (see Table 8), following bumper Gu harvests.

In addition, as shown in Table 9, Mogadishu retail prices exceeded ADC sales prices by 1.5-2 times from 1979 to 1983, by as much as seven times in 1984, by 17% in 1985, and by 7% in 1986. It is important to note that the ADC sales price can be considered a wholesale price (per quintal), while the Mogadishu prices are retail prices (per Suus). Hence, one would expect the latter to exceed the former. The magnitude of difference is quite significant during the 1979-1984 period, so that the parallel market wholesale prices were likely higher than the ADC prices during this period. Given retail markups of, say, 15-20% over the wholesale price in the open market in 1985-86, ADC sales prices were likely about the same as the open market price in 1985 and probably lower on average than the open market wholesale price in 1986. Much of the ADC grain in storage and being sold from storage is reported to be of low quality, however, so that ADC prices would be expected to be discounted relative to privately traded grain (see Kerr, 1987).

Without a consistent series of parallel market prices at the farm level, we cannot demonstrate that open market prices offered to farmers exceeded ADC prices in the late 1970s and early 1980s. Scattered, available price data for the Lower Shebelle (see Table 10) do show, however, that open market retail prices were higher than ADC offer prices except during the immediate post-Gu harvest periods (September-November)

of 1984-1986.[1] Attractive open market prices undermined ADC's ability to compete for producers' marketed surplus during other times of the market year.

2.4 Seasonality of Maize Prices, 1979-1986

In many semi-arid countries of Sub-Saharan Africa cereals production is concentrated in one growing season. In Somalia, 70-80% of the maize in most years is produced during the long rains, or Gu season (see Table 11). The Somali maize crop is comprised of 90-120 day maturing varieties, which are planted in April or early May and harvested beginning in mid-August. The remaining 20-30% of annual maize output is produced during the short rains or Der season. Der maize is generally planted in late September or early October and harvested in early January.

Given the seasonality of maize production, we would expect that prices would be seasonally lowest after the Gu harvest in September and October. Prices would then rise mildly until the Der harvest (January), dropping somewhat at harvest before rising steadily until the next Gu harvest. This pattern would, of course, vary during years when there is no or little Der harvest or a poor Gu harvest. Farmers' selling and storage practices would also affect price seasonality. Cross-price relationships between maize and sorghum and between maize and imported cereals would also affect maize price seasonality. Unfortunately, price data are not available for long enough time series, and income data are generally not available to estimate own price and cross-price elasticities of demand. Nevertheless, nearly ten years of retail price data are available for Mogadishu, which permits an analysis of seasonality.

Using the seasons subroutine of the M-STAT software program, seasonal indices are calculated which illustrate the seasonal pattern of maize prices over the 1979-1986 period, averaged across years. Figure 4 depicts the grand seasonal index for maize, which closely corresponds to our expectations. Maize prices are seasonally lowest in the September-November period after the Gu harvest and seasonally highest during the May-July period before the Gu maize crop is harvested.

Interestingly, Mogadishu retail maize prices peak in May and drop off slightly in June and July, whereas one might expect that maize prices would peak in June or July. There are several possible explanations for this. First, some early maturing maize varieties may be harvested and enter market channels as early as late July during years of early Gu rains and planting. Second, the maize crop is beyond the critical flowering period by the second half of July, and farmers and traders would have a good idea of the relative size of the upcoming maize

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[1] It is reported that many farmers retail maize to consumers in secondary town and tertiary village markets in the Lower Shebelle. We would expect the price received by farmers when they sell small quantities to consumers in local markets to exceed the ADC price, which is clearly not a retail price. The ADC price may not be a farm level price for some farmers, because ADC buying points tend to be concentrated in large villages and towns in the Lower Shebelle region.

harvest. In relatively good crop years, farmers holding surplus maize stocks from the previous and earlier years might then decide to sell off some of these stocks in anticipation of replenishing their stores with grain from the upcoming crop.

It must be noted, however, that the seasonal indices are calculated using moving averages (the ratio-to-moving average technique), which disguise year to year variability in price peaks and troughs. The months of the peaks and troughs cannot be predicted exactly from one year to the next but vary in response to 1) local grain production patterns, which are in large part a function of a stochastic variable, rainfall (or rather, a set of variables including and affected by rainfall), as well as a function of 2) the magnitude and timing of grain imports, and 3) the variability or uncertainty in policies affecting production, imports and various macroeconomic variables (differential inflation rates, exchange rate movements, etc.). It is noteworthy that the corrected standard errors for the monthly indices are highest for August, January and May. May is the peak month, while August and January are relatively low months.

Given the seasonality of maize prices, there are likely to be positive returns to storage, although once again, seasonal price movements are not entirely predictable. If they were predictable, then private agents (both farmers and traders) would take no risks in storing grain purchased in the immediate post-harvest period for later sale during periods of relative scarcity, and their profits (returns to storage) could be calculated precisely in advance. Clearly, private traders in Somalia are not able to predict future prices or net returns to storage. They always face the risk that commercial or concessional imports will arrive, flood local markets, substitute for locally produced grains, or compete directly with the locally produced cereals and depress local grain prices, leading to negative returns to storage during some years.

One objective of the Food Security research program is to determine the extent to which farmers store maize and traders buy maize for storage in anticipation of seasonal price rises. Small farmers in most African countries face cash needs that are met through food crop sales in the post-harvest period. Traders are typically undercapitalized and forced to turn over their stocks quickly. This behavior suggests that storage is not often planned, which may in fact exacerbate price seasonality. Jaffee argues that most traders attempt to turn over their stocks rapidly (Agricultural Sector Review, 1985), but there is limited informal evidence that medium to large Somali farmers do store grain in order to profit from seasonal price patterns. By storing grain, private agents perform a useful function in the food system. To the extent that the private sector plays this role, public agencies are relieved of a costly and burdensome task.

2.5 Grain Imports

As suggested in section 2.1, the time-series data for grain imports in Somalia have the most inconsistencies and discrepancies of the agricultural sector data. This is not surprising, given the incompleteness of the commercial import data, and the different means used to track imports. The USDA, Foreign Agricultural Service (FAS), as well as FAO, try to match export data with countries' own import figures. The Somali Government is not able to do this type of consistency checking.

While the various sources of import data are consistent for imports during the 1970s, they differ for the period 1981-1985. Maize imports in 1982 were 25,000 M.T. according to the MOA and the Agriculture Sector Review (ASR), yet 125,000 M.T. according to the USDA. The figures diverge equally as radically for 1983 and 1984. While the MOA and the ASR report 175,000 M.T. for 1983, USDA puts imports at 110,000 M.T. The former two cite 105,000 M.T. for 1984; USDA reports 27,000 M.T. How can such vast differences be explained? Unfortunately, the only way to crosscheck estimates of commercial imports may be to plow through old bills of lading and invoices (at the major ports). The commercial imports may be understated, failing to capture underinvoiced or unrecorded shipments. Food aid and refugee shipments are better documented, especially since 1984. Nevertheless, there appear to be inconsistencies in the import data, and trying to reconstruct the grain import situation of past years may be difficult.

Fortunately, in the interest of better tracking of food imports, the World Food Programme (WFP) and the Food Early Warning System (FEWS) of the MOA have been collecting detailed data on grain arrivals at the three principal ports, Mogadishu, Kismayo and Berbera. The WFP has been collecting detailed and comprehensive food aid data from all donors since 1984 and the FEWS began systematically collecting commercial food import data since January 1, 1986. Available data for maize arrivals at Mogadishu from both organizations are summarized in Table 12. The data represent arrivals at the port and not actual distribution or sales to consumers.

Since 1985 a food aid coordinating committee of representatives of various donor agencies has met periodically, under the WFP's direction, to review Somalia's food aid needs. This committee recommended in mid-1986 to halt commercial maize imports, given the estimated high levels of privately and publicly held stocks of maize. Over 12,000 metric tons of maize were stored in ADC warehouses in Mogadishu alone in January 1987. According to the WFP and FEWS data, only 2,000 metric tons of total 1986 maize imports of 32,519 M.T. were commercial imports.

There are likely lags of a week to several months between the time of arrival at the port and distribution in market channels. This lag is likely shorter for commercial imports, which are probably moved into the Mogadishu market and other important towns as soon as possible. Food aid distribution has longer lags than commercial imports. Food aid is either shipped to refugees or auctioned to private wholesalers under ADC's direction.

Although no reliable data are available, there is informal evidence that refugees sell as much as one-third of their grain in order to earn income which is used largely to diversify their diets through purchase of dairy products, sugar, tea and other commodities. Before the refugee grain arrives in local upcountry markets, it must be moved from Mogadishu to the refugee camps, and then sold by the refugees in local markets. Most of the camps in southern Somalia are found a couple hundred kilometers or more from Mogadishu clustered near the Ethiopian border to the west of Baidoa, around Qorioley, and in Hiraan, as seen in Figure 5.

If one-third of the maize bound for refugees entered private market

channels in 1986, 8989 metric tons leaked from the refugee channel, which is a significant amount of maize (and maize meal). Most of it arrived at the port of Mogadishu since July 6, 1986, and much of this maize may have reached commerical market channels by the harvest and post-harvest periods. This has likely had an effect on maize prices, which were depressed in the post-Gu harvest period of 1986. Open market farm level maize prices were reported to be 1200 So. Sh. per quintal and lower in the Lower Shebelle in September-October 1986. This was well below the ADC support price of 1500 So. Sh., which is reported to be maintained on a selected and sporadic basis.

From the limited available data, it is difficult to evaluate the effect of food aid and refugee shipments on maize markets in southern Somalia. It is quite likely, though, that food aid arrivals have contributed to the low levels of post-Gu harvest maize prices in 1985 and 1986. As shown in Table 12, much of the food aid and refugee maize shipments arrived at the port of Mogadishu between the months of June and August for 1985 and 1986. Given the probable one to several month lags before imported food aid is auctioned or sold by refugees to upcountry consumers, it is possible that much of this maize entered market channels in the July through October period. There is informal evidence that imported maize indeed arrives on the domestic market around harvest time. Farmers interviewed in villages of the Lower Shebelle complained about how imported maize sold in local markets at harvest time has depressed maize prices in recent years, particularly in 1985.

An important area for further research is to obtain more detailed information on how and when maize is distributed and auctioned once it reaches the port of Mogadishu. How much of this maize remains in Mogadishu? How much commercial and concessional maize becomes available in town and periodic markets in maize consuming areas, and when does it become available, after it leaves the port? What effects do these imports have on domestic maize prices? Do untimely releases of imported maize on local markets exacerbate seasonal swings in maize prices? If so, what are the policy implications regarding maize imports?

3.0 Factors Contributing to Expansion of Maize Output

3.1 Expansion in Maize Area vs. Yield Increases

Using statistics compiled as part of the 1985 Agriculture Sector Review, the World Bank concludes that increased maize production is mostly a function of increased area harvested (World Bank, 1986). According to the Agriculture Sector Review (ASR), area harvested tripled between 1980 and 1984-85 from 109,000 to 350,000 hectares, and more than doubled from an average of 149,000 hectares in 1977-79 to 1984-85. (Note that the ASR 1985 estimate of area is provisional). Over the period 1977-85, calculated yields were virtually unchanged, averaging 0.78 metric tons per hectare.

The MOA estimates of area, production and yield are quite different, however. Area has expanded since 1981 relative to the late 1970s, but

this expansion has not been so dramatic as suggested by the Agriculture Sector Review data. The MOA reports that area expanded to 234,000 hectares in 1985, well below the ASR's estimate of 350,000 hectares. Unlike the ASR data, the MOA data show that yield doubled from an average of 0.72 tons per hectare for three of the four years in the period 1978-1982 to 1.63 tons in 1985. MOA calculated yields are significantly above ASR yields for 1983-85.

Choosing which of these series is correct is problematic. Looking at data disaggregated to the regional and district level is one form of consistency check. Unfortunately, such disaggregated figures are not available before 1982, and there are serious gaps in the data from 1982-85, particularly at the district level. Food and Early Warning System estimates of area cropped and production are available at the regional level from 1982 to Gu 1986, except for Der season 1984, as shown in Table 11. District level estimates are available for the Gu seasons of 1983, 1985 and 1986 (see Table 13).

The regional estimates show that 46-53% of area cropped to maize in Somalia in 1982-1986 is found in the Lower Shebelle. Farms in the Middle Shebelle account for another 14-24% of total maize area. In the 1982-86 period, 63-79% of total maize production has come from the two Shebelle regions, which corresponds closely with area cropped proportions. The concentration of maize cultivation in the Lower and Middle Shebelle is consistent with informal reports and our expectations. Proximity to the Mogadishu market, higher population density and more intensive land use than in most other regions of Somalia, and the existence of at least a crude gravity irrigation system are the reasons for the predominance of the two Shebelle regions in maize production. Area cropped to maize has expanded in the Lower Shebelle since 1982, as shown in Table 11, though not quite as dramatically as in the Middle Shebelle, where area increased from 30,100 to 49,000 hectares between (Gu and Der of) 1982 and Gu 1986. Calculated maize yields were lowest at 718 kg./ha. in both regions in 1982, but much higher in 1983, 1985 and the Gu seasons of 1984 and 1986, exceeding 1450 kg./ha. for each region in three out of four years over the 1983-86 period. In sum, while area cropped to maize clearly increased in the Lower and Middle Shebelle from 1982 to 1986, yields attained significantly higher levels from 1983 to 1986 (mean of 1511 kg./ha. across the two regions) than during the 1977-1982 period, when they averaged 789 kg./ha for all of Somalia.

While maize area and output have expanded the most during the 1980s in the Lower and Middle Shebelle regions, area and output have stagnated in the Lower and Middle Juba since 1982. According to the Food and Early Warning System estimates, maize area cropped reached 20,600 hectares in the Middle Juba and 25,000 hectares in the Lower Juba in 1982. It did not come close to these levels in 1983-1986, declining absolutely to a combined total of 24,500 hectares in 1985. Maize in the Lower and Middle Juba comprised 22% of total maize area in Somalia in 1982, but only 10% in all of 1985 and 12% in Gu 1986. It may be that producers have shifted to higher value cash crops, such as bananas, grapefruit and watermelons. USAID funded studies of the maize subsector in the Lower Juba and land use in the Juba River valley may shed further light on this issue.

Examining the maize data for other regions raises puzzling questions. Area cropped was greater in Gedo region (Upper Juba River valley) in 1985

than in either the Middle or Lower Juba regions (by 55% and 70% respectively), but it fell off significantly to only 42% of maize area in the Middle Juba and 57% of area in the Lower Juba in the Gu season of 1986. There may be a plausible explanation for this anomaly, but the degree of variability is suspect. Looking at the district level data raises further questions.

Another surprising finding is the precipitous decline in maize area cropped in Hiraan (Upper Shebelle) from 1982 to 1986. It is likely that much of the maize cultivated in Hiraan is not irrigated. If so, one would expect farmers to have put more area under dryland maize in 1985 and 1986, which were years of abundant rainfall.

A last puzzling finding is that maize area cropped expanded from nothing in 1982 and 1983 to 10,800 hectares in Gu 1986 in Northern and Central Somalia. Although maize cultivation is concentrated in Southern Somalia, the extent to which maize has become important in the diet of people in Central and Northern Somalia is unclear. FEWS claims that earlier estimates in Northern and Central Somalia assumed no maize area and production and were not based upon empirical verification. It is also possible that some producers grew maize during the wet years of 1985 and 1986 as an early maturing, dryland food security crop, or perhaps as a source of livestock feed.

Trying to solve some of the anomalies in the disaggregated area and production data is beyond the scope of this paper and the Food Security project study. This study is concentrating on the Lower and Middle Shebelle regions, which produce most of Somalia's maize. Nevertheless, the purpose of this discussion has been to look beyond the aggregate data in order to understand better what has been going on at the regional and district levels in the 1982-1986 period. Through such an examination the reliability of both the aggregate and disaggregated data are called into question, and the food security analyst becomes wary of making pronouncements about the determinants of expansion in maize output.

3.2 Liberalization of Cereals Markets

ADC was granted a statutory monopoly in the grain trade by the GSDR in July 1971 (under law no. 51), which it retained until 1984. Private grain trading was illegal before January 1984, when the Government of Somalia decreed that producers were obliged to sell only 5% of their grain output to ADC. Some observers state that the private trade was implicitly recognized in August 1982, when a Presidential Circular was issued. This circular "has been interpreted as permitting farmers to store as much grain as they like and as relieving them of their former obligation to sell output to ADC" (GSDR and World Bank, 1984).

Despite the illegality of private grain sales before 1982 or 1984, parallel grain markets emerged by the early 1980s. This was in part the result of an interacting set of specific circumstances, and in part a response to the steady decline in real producer prices offered by ADC throughout the 1970s. The second oil price shock of 1979 had a negative impact on balance of payments and GSDR budgetary resources. This was followed by a poor 1980 grain harvest. The government could only provide limited funds for ADC to make grain purchases. Even with limited

funding, ADC's ability to compete with the emerging private trade was seriously undermined by far higher parallel market prices. As a result of these factors, ADC maize purchases in the 1980s became a far smaller proportion of aggregate output than during the 1970s.

There is little doubt that market liberalization has had a positive effect on maize area cropped and output. Although the parallel grain market operated perhaps as early as the late 1970s and certainly in the early 1980s, farmers and traders faced risks of fines and confiscated stocks. There was also likely to be some uncertainty as to the legal status of the private trade from August 1982 to January 1984, given the ambiguity of the 1982 Presidential circular. Nevertheless, the effect of market liberalization on maize output may be somewhat overstated by enthusiastic advocates. By most accounts, parallel grain markets were vibrant by 1982, and tolerated by the government. It is also alleged that large quantities of concessional imported maize and other cereals were sold on the parallel market, contributing to its brisk development.

Other factors contributing to the expansion in maize output were good weather, particularly in Gu 1984-Gu 1986, and possibly marginally higher levels of input use in selected areas (see section 3.3). Although most maize in Somalia is irrigated, irrigation techniques are crude and controlled irrigation is not commonly practiced. Therefore, rainfall remains a very important factor affecting maize yields and output.

The success of irrigated agriculture in Somalia in a given year depends in large part on the amount and spacing of rainfall. The amount of rainfall affects the water level of the Shebelle and Juba Rivers, which in turn affects the effectiveness of the irrigation system. A common irrigation practice in Somalia is to pre-irrigate or flood irrigate maize fields before planting. After this initial flooding and infiltration of the surface water, supplemental irrigation is more often than not gravity irrigation. When rainfall is low and the river levels are low, it becomes difficult, if not possible, to irrigate by gravity, except in areas where an elaborate system of irrigation canals has been established, as in the area around Jenale. In areas where the irrigation infrastructure is not well-developed, or where the river banks are high, pump irrigation is necessary. There is limited but consistent evidence that few farmers have pumps or access to pumps. Pumps, parts, and fuel are generally in short supply. If maize does not receive adequate rainfall or irrigation water during the flowering period, yields fall off significantly.

Examining the weekly distribution of rainfall in the maize producing areas and Shebelle River flow data during the growing seasons for the past decade would help to determine whether inadequate water affected yields. Unfortunately, the rainfall data are available for only a few urban and semi-urban locations on a monthly basis, and there are frequent gaps of several months, and in some cases several years, in the few available series. The Food and Early Warning System (FEWS) has collected rainfall data at selected locations in 1986, and it is working to improve collection and analysis of rainfall data in 50 sites. TAMS has analyzed river flow and water availability in the feasibility study for the Genale Irrigation Rehabilitation scheme (TAMS, 1986). In years of low rainfall, the river level and flow are low, and the existing irrigation system is unable to provide the required irrigation water in many areas. Pumping

is necessary in poor years, and pumps, spare parts and fuel are in short supply.

3.3 Input Use

Maize yields in Somalia may have increased as a result of higher levels of input use. We use the term inputs broadly to refer to improved seeds (SOMTUX), fertilizer (urea principally, as well as some compound fertilizers), insecticide (Basudin and Durisban), tractors, mechanical pumps and diesel fuel. This paper will not discuss in depth the subject of agricultural inputs, and the recent liberalization of input marketing. The interested reader is referred to the Agricultural Inputs discussion in the Agriculture Sector Review (1985) and the COWICONSULT agricultural inputs study (1984). It is important to note, however, that liberalization of input marketing has not led to much of a private sector response. Seeds, insecticide and fertilizer are generally only available from GSDR sponsored and donor funded projects, from participants in these projects, and from commercial banana producers associated with SOMALFRUIT. On the other hand, private importation and distribution of agricultural equipment is much more common. As registration of large farms in irrigated areas continues, the private equipment trade will develop further.

Data on input use is notoriously poor in Somalia. The Foreign Trade returns report annual imports of fertilizer, insecticide, tractors and pumps. The annual reports are issued several years late, and underinvoicing and underreporting may lead to low estimates. Urea is produced locally, but detailed information on distribution channels and urea use by region or district is not available. Imports of tractors and mechanical pumps can give the analyst an idea of the changes in the stock of equipment, but this stock data does not tell how effectively and at what capacity the equipment is being used. Without adequate maintenance and spare parts, agricultural equipment breaks down and remains inoperative for long periods. Periodic fuel shortages also limit equipment use. Finally, equipment may not be used effectively. For example, mechanical plowing may exacerbate problems of waterlogging and uneven water application. Since farmers rely heavily on mechanical plowing in the Shebelle River valley, yet most have to rent tractor hire services, late plowing is not unusual, which has a negative effect on yields. General unavailability of certain equipment, such as land levelling equipment, and limited understanding of the need for precision land levelling, may greatly reduce the effectiveness of other inputs (Clyma, 1984). In the final analysis, while limited aggregate data on input imports and production are available, information about how, where and by whom the inputs are used is lacking, so it is difficult to gauge the effect of input use on maize output. The Food Security project will attempt to complete and update the official, aggregate data on input importation and production in Somalia.

Limited input data are available from a few microlevel studies in the Lower Shebelle region. A non-random survey of small farmers in the Shalambood and Faraxaane areas in the Lower Shebelle, conducted by TAMS in Dec 1985, shows that relatively few farmers use insecticide (15 of 102; 33 of 113) and fertilizer (6 of 102; 29 of 113) (TAMS, 1986). The AFMET farming systems studies show that farmers in six villages with good market access are better able to obtain insecticide, which is widely

used, than fertilizers, which are available only through credit programs or from farmers participating in these programs. The AFMET survey villages are associated with the extension service, the FAO Fertilizer Programme, and the UNCDR credit scheme. As a result, farmers have better access to inputs, and they are generally knowledgeable about their effectiveness.

One of the objectives of the Food Security farm level study will be to document knowledge of the benefits of input use, and actual acquisition and use of purchased and rented inputs in the sample of villages with better access and where credit programs are operating in the Lower and Middle Shebelle. Our knowledge of input use and practices is clearly limited, which makes it difficult to assess the effect of input use on maize output.

3.4 Changing Land Tenure and Use Patterns

Several simultaneous developments in Southern Somalia have led to changes in land use in the Shebelle River valley in recent years. Liberalization of agricultural markets has made grain production more attractive in the mid-1980s than in the late 1970s, and rapid urban growth has spurred demand. As demand for maize has expanded, the value of arable land near Mogadishu has increased. There is reported to be a private market for land and increasing absentee landholding. This has attracted new entrants to agriculture, who are mainly alleged to be civil servants, traders and urban investors (Hoben, 1985). Through knowledge of land registration requirements and contacts with GSDR officials, these individuals are able to register land which is sometimes uncultivated, may serve as dry season grazing for herds of pastoralists, or may be cultivated by small farmers who lack legal tenure. In sum, these largely urban investors are able to acquire access to higher value land which is irrigable or potentially irrigable.

When these investors are able to acquire land, they often hire farm managers and laborers to cultivate grain and other crops on this land. Most of this produce is probably sold. This contrasts with small farmers, who must consume and store much of their maize. If largeholders were to displace small farmers and gradually gain access to a larger share of the irrigable land, grain production would become more of a commercial enterprise. In this scenario, small farmers would become laborers on larger farms, and they would cultivate small plots of their own or on the land of the larger farms, which would be provided by the large farmers in exchange for labor.

The changes in land tenure described above would likely result in changes in crop mix and in marketed surplus of grain without an increase in total land area under cultivation. In some instances larger farmers would put new land under cultivation, or small farmers would reduce fallow periods and cultivate all available land on their holdings. In a reconnaissance survey of 39 settlements in the Lower and Middle Shebelle carried out in September 1986, the Food Security project found that nearly all of the villages have reduced or eliminated fallow periods in order to expand area cultivated (Wehelie and Holtzman, 1987). This is one form of intensification of land use, where higher cropping intensity results in output expansion. Changes in land tenure patterns might also lead to higher levels of inputs use per unit of land and consequent

higher yields. More evidence on the extent and effect of intensification will become available as the University of Wisconsin's Land Tenure Center examines patterns of land tenure and land use in the Lower Shebelle.

4.0 Potential for Further Expansion of Maize Output

4.1 Irrigation Rehabilitation and Expansion

The GSDR has obtained commitments from USAID and the World Bank to rehabilitate irrigation infrastructure in the Lower Shebelle in the Shalambood and Faraxaane reaches. These areas lie in productive areas of Merca and Qorioley districts, which produced an estimated 75,900 metric tons of maize in Gu 1985, or 25.2% of estimated national production. TAMS projects possible maize expansion of 8300 metric tons in ten years (TAMS, 1986). These projections assume greater irrigation efficiency, higher levels of input use, and some shift in the cropping pattern to high value fruit and vegetable crops.

In addition to the proposed Shebelle rehabilitation, there are plans to rehabilitate irrigated land in the Lower and Middle Juba River valley and to develop newly irrigated land in the Middle and Upper Juba. In completing the Fanoole dam and constructing the Bardeere dam, output of a wide variety of crops, including rice, sugarcane, fruit and maize will expand. Smallholder maize production would likely increase with construction of the Bardeere dam. The World Bank projects that area under controlled irrigation will increase from 30,000-50,000 hectares in the mid-1980s to 130,000 hectares in the year 2005 with consequent expansion in maize output.

The improved irrigation efficiency and the expansion in irrigated area will lead to a significant increase in maize output. It will be important to monitor the effects of such an increase on the supply and price of maize.

4.2 Technological Change

Maize production will also expand to the extent that production technology is improved. This can take the form of improved packages of divisible inputs, such as higher yielding seeds, fertilizer and insecticide, or more lumpy inputs such as precision land levelling, pumps and tractors and associated equipment for land preparation and hauling. Improved agricultural practices, such as better water management, better maintenance of irrigation channels, row planting, more optimal planting densities, better timing of land preparation, and improved weeding, can also be considered important dimensions of improved maize production technology.

At present only small numbers of farmers have access to even the divisible input packages mentioned above. These farmers are generally participants in GSDR sponsored credit schemes. Only the very wealthiest and largest producers can afford to invest in precision land levelling, pumps and tractors. Yet rental of tractor hire services is common in the Shebelle regions, although demand greatly exceeds supply during peak periods of land preparation. This results in late land preparation and late planting for many smallholders, with consequent reductions in maize

yield.

The National Extension Service (NES) is actively promoting better agricultural practices in the Lower and Middle Shebelle regions. It received significant financial support under the USAID funded AFMET (Agricultural Farm Management and Extension Training) project, but this funding has ceased. In villages of the Lower and Middle Shebelle where the NES is active, extension agents work closely with "contact farmers," who are necessarily a receptive minority. Through such efforts and cultivation of demonstration plots, the NES attempts to promote improved farm practices.

4.3 Trend Towards Larger Holdings

Informal yet consistent information suggests that formation of larger land holdings is proceeding in the Lower Shebelle region in response to market opportunities. Larger units are not necessarily more productive; in many parts of Africa it has been demonstrated that higher yields are achieved by smaller farms. Structural changes in farm size and composition may not lead to greater aggregate maize output, but marketed surplus may increase. This depends on several factors. First, the crop mix of larger farms may differ from that of smallholders. If large farms shift from maize to production of other crops, both aggregate maize production and marketed surplus could decline (assuming no change in technology or total area cultivated), but this is unlikely given the projected area expansion. A second important factor is how hired wage laborers who work on larger holdings are compensated. If compensation is in the form of maize, marketed surplus might not increase. If laborers are granted small plots to cultivate their own maize, a large proportion of maize output on the large farms would likely be marketed.

Changes in land tenure and use are complex and require detailed, painstaking research. The Food Security project will neither examine this issue in the necessary depth nor analyze changes over a suitably long time frame. Nevertheless, the project will estimate maize output and marketings on farms of different sizes in the Lower and Middle Shebelle. A separate study of medium to large farms could provide valuable information on marketed surplus of larger farms, which constitute a large percentage of cultivated area in the Lower Shebelle (see TAMS, 1986 for data on farm size distribution in Shalambood and Faraxaane).

4.4 Cereals Import Policy

Cereals import policy will affect local producers' incentives to expand maize output. Both the volume of imports and the timing of their arrival and distribution in local markets are critical considerations. Far more research is required to make sense of current grain import policies, import distribution channels and the effects of imports on prices of local grains and on producer incentives. The Food Security project will do research on farmer maize production, farm, wholesale and retail cereals prices, and the private trade in cereals. The project will also attempt to assemble available secondary data on commercial and concessional imports and standard operating procedures for releasing food and refugee aid. Research resources will not be sufficient to trace in a systematic and detailed way the channels by which imported cereals are

distributed. This would entail a separate study. The Food Security project will attempt to assess in a broad and preliminary manner the effect of imported grain on producers' incentives and cereals prices in local markets of the Lower and Middle Shebelle.

4.5 Demand Considerations

Limited available information suggests that urban food consumption patterns are shifting in large Somali towns such as Mogadishu. In a recent non-random survey of urban households in Mogadishu, women respondents reported that they prefer to consume imported, ready to cook cereal products rather than maize and sorghum, which require additional processing time and expense (see Wehelie and Wehelie, 1987). Imported cereals include wheat flour, spaghetti, and rice. Many Mogadishu residents settled relatively recently, and their consumption patterns may not have changed much, although this has not been empirically verified. Maize and sorghum are preferred cereals in rural areas and widely consumed in secondary towns. Wheat flour, pasta and rice are preferred by many urban consumers, particularly those of long time urban residence. A shift in urban consumption patterns does not take place overnight, and poorer urban consumers are likely to buy the cheapest source of calories. This has generally been locally produced maize or sorghum, except during drought periods, rather than imported foodstuffs.

How much shifts in consumption patterns have been induced by policies that have discriminated against locally produced grains is unclear. The extent to which such changes in consumption patterns are reversible is also unknown. Certainly, increasing consumption of wheat flour, pasta and rice has been encouraged by an overvalued exchange rate, as well as by transferring of large volumes of food aid to privileged groups and agencies at less than market prices.

Clearly, much more research needs to be done on food consumption patterns of different socioeconomic groups in rural and urban areas in order to better understand present and likely future demand relationships. The Food Security project will not do primary data collection on demand issues in urban markets. Limited information will be obtained from farm households on grain consumption, and the project will be able to assess rural households' overall food security situation. The Central Statistical Department of the Ministry of National Planning (CSD/MNP) completed an urban household budget and expenditure survey in Mogadishu in 1984, during which detailed information was collected on sources of household income and purchases of food and many other products. When the analysis of this survey data is completed, it is hoped that the MNP/CSD will make available better information about Mogadishu consumers' food purchasing and consumption patterns.

5.0 Summary and Conclusions

Maize output in Somalia has expanded dramatically since the 1970s. The available official statistics suggest that increased area has been cultivated to maize, and that maize yields may also have increased since 1982. The relative importance of area expansion and yield increase in affecting maize production cannot be determined given data limitations and inconsistencies. Efforts are underway to improve MOA estimates of

area and production of key crops. An important area of further research will be to assess in more than the preliminary way that has been attempted in this paper the factors contributing to increased maize output.

At the micro level, the Food Security research project will examine maize production practices, factors affecting different maize yield levels among farms, and households' food security situation and strategies. Collection of weekly price data at the wholesale, and secondary town retail level will complement ongoing retail price collection in Mogadishu, carried out by the CSD/MNP. Better price data will allow for analysis of seasonal price trends and market margins, as well as a better assessment of the incentive structure facing producers, marketing agents and urban consumers. The performance of the marketing system in terms of spatial and temporal pricing efficiency will also be easier to evaluate. Limited and preliminary research on the volume, timing and [redacted] standard operating procedures for release of commercial and concessional food aid will be initiated. A detailed and careful examination should be the subject of another study. Also beyond the scope of the Food Security project is an examination of the functions, costs, standard operating procedures, and policy options of ADC, ENC and other parastatal organizations. This does not mean that the project will ignore how ADC maize pricing policies and purchase/storage decisions affect the strategies and behavior of farmers and private traders.

The purpose of this paper has been to assemble available secondary data, to suggest hypotheses and raise questions, and to propose further areas of research. It is hoped that the paper will stimulate a critical and frank examination of the available data presented, the preliminary conclusions drawn, and the issues raised.

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Table 1

COMPARATIVE MAIZE PRODUCTION AND IMPORT ESTIMATES, 1970-1986

(in '000 metric tons)

	Maize Production Estimates				Maize Import Estimates		
Year	MOA	ERS	FAO	Ag Sector Review	MOA	ERS (FAS)	Ag Sector Review
1970		95	109	122.1	1.0	1.0	1.0
1971	129.0	129	101	99.4	27.5	27.5	27.5
1972	153.0	153	141	114.9	0.0	0.0	0.0
1973	164.0	164	81	98.9	0.0	1.0	0.0
1974	150.0	150	89	96.8	11.0	15.0	11.0
1975	92.0	92	124	103.8	50.6	70.0	50.6
1976	90.0	90	88	107.6	51.8	55.0	51.8
1977	111.3	111	111	111.3	23.0	23.0	23.0
1978	107.7	108	108	107.7	15.0	15.0	15.0
1979	108.2	108	108	108.2	30.0	30.0	30.0
1980	110.5	111	111	110.0	110.0	110.0	110.0
1981	157.3	157	157	142.0	90.0	129.0	90.8
1982	150.0	150	150	150.0	25.0	125.0	25.0
1983	120.0	235	235	235.0	175.0	110.0	175.0
1984	270.0	250	200	270.0	105.0	27.0	105.0
1985	383.0	320		382.0	20.5	50.0	
1986	335.3	310		381.9	5.5		

Table 2

MAIZE AND SORGHUM AREA CROPPED, PRODUCTION AND YIELD ESTIMATES, 1970-1986

Year	MAIZE			SORGHUM		
	Area Cropped '000 Ha	Total Production '000 MT	Maize Yields Kg	Area Cropped '000 Ha	Total Production '000 MT	Sorghum Yields Kg
1970	122	122	1000	290	158	545
1971	134	129	963	280	129	461
1972	157	153	975	390	149	382
1973	166	164	988	345	128	371
1974	173	150	867	330	126	382
1975	140	92	657	400	135	338
1976	150	90	600	490	140	286
1977	151	111	735	458	145	317
1978	147	108	735	420	141	336
1979	148	108	730	461	140	304
1980	109	111	1018	457	140	306
1981	197	157	797	517	222	429
1982	209	150	718	540	235	435
1983	204	120	588	402	120	299
1984	189	270	1429	445	221	497
1985	234	383	1637	364	222	610
1986	245	336	1371	385	252	655

Sources: GOS, Ministry of Agriculture, FEWS; USDA/ERS

Note: Yields are calculated from area and production estimates, rather than measured.

Figure 1

Maize and Sorghum Area Cropped

In Somalia, 1970–1986

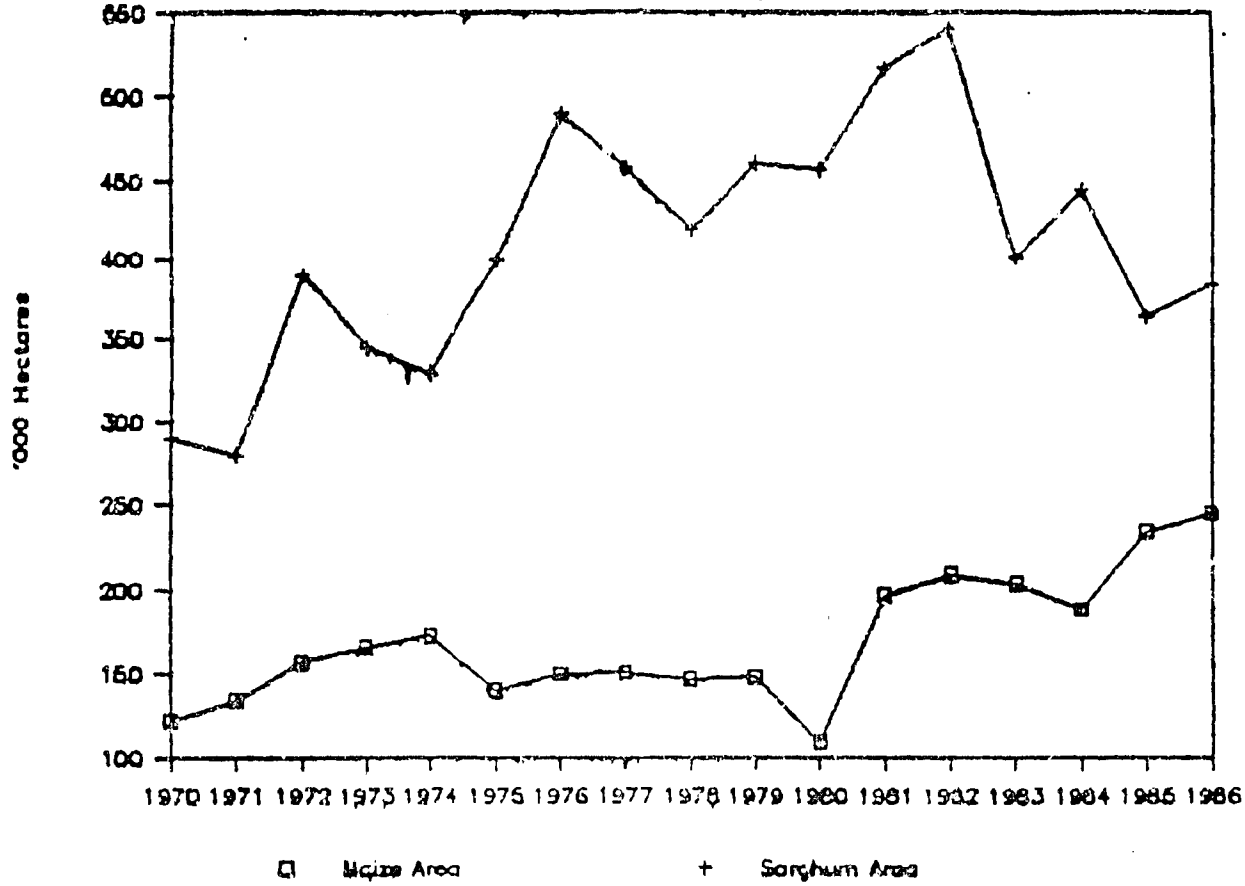


Figure 2

Maize and Sorghum Production

in Somalia, 1970–1986

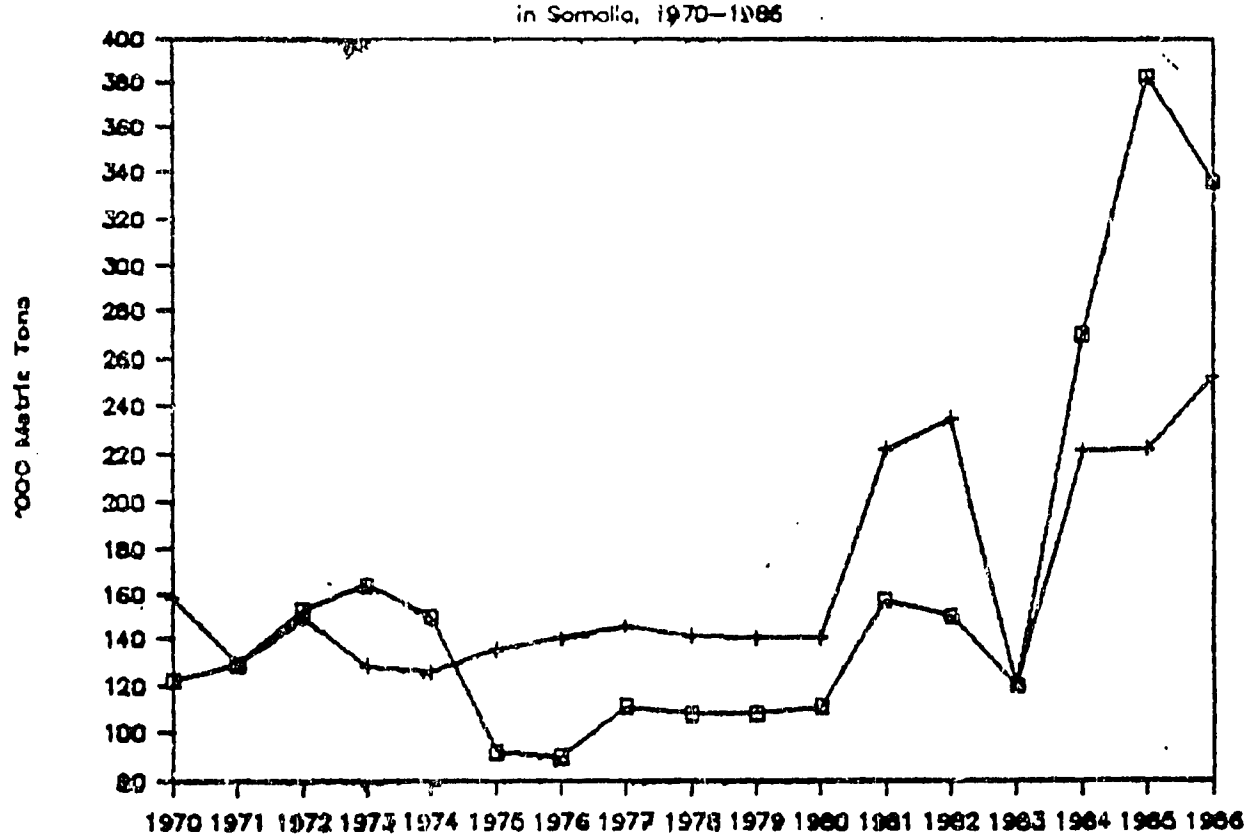


Figure 3

Maize and Sorghum Yields

In Somalia, 1970–1986

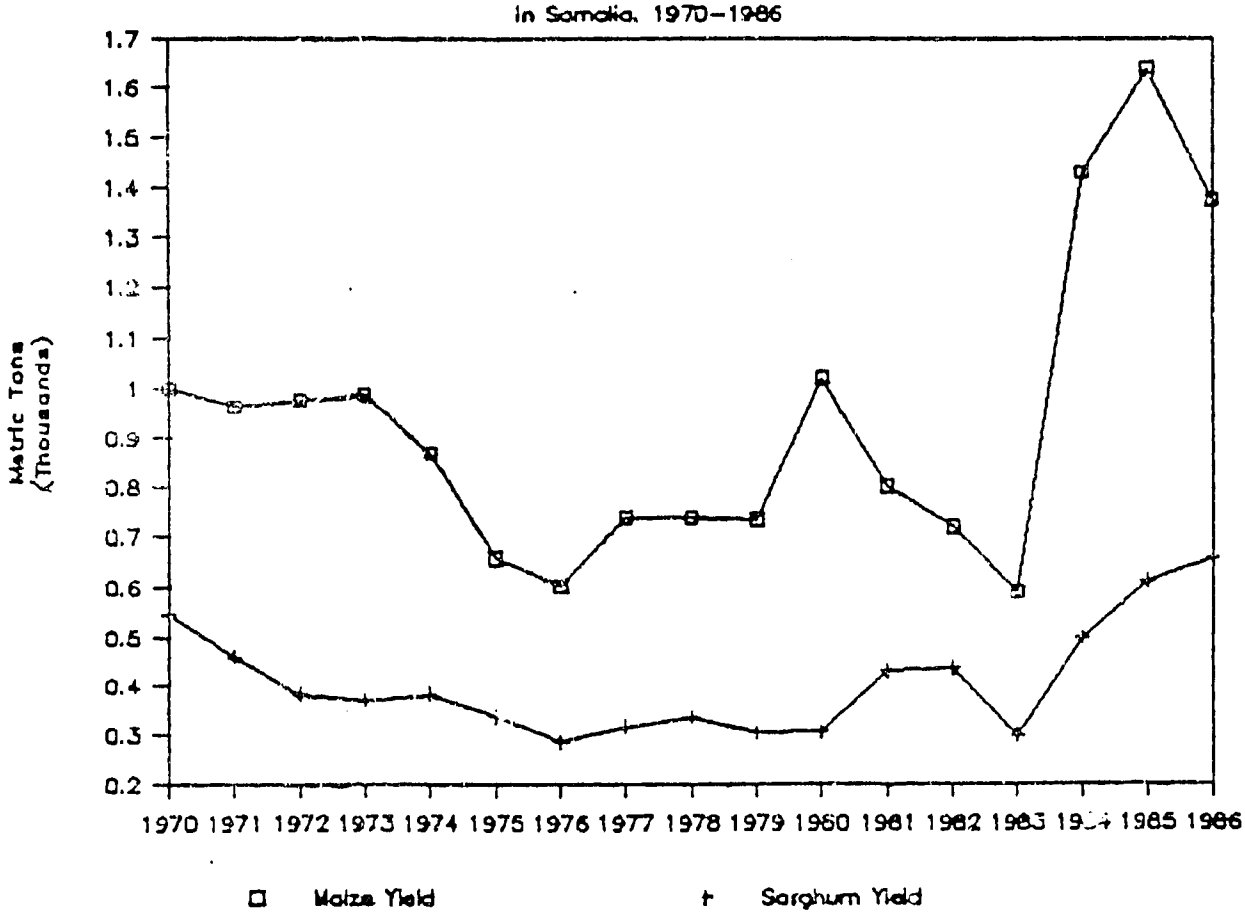
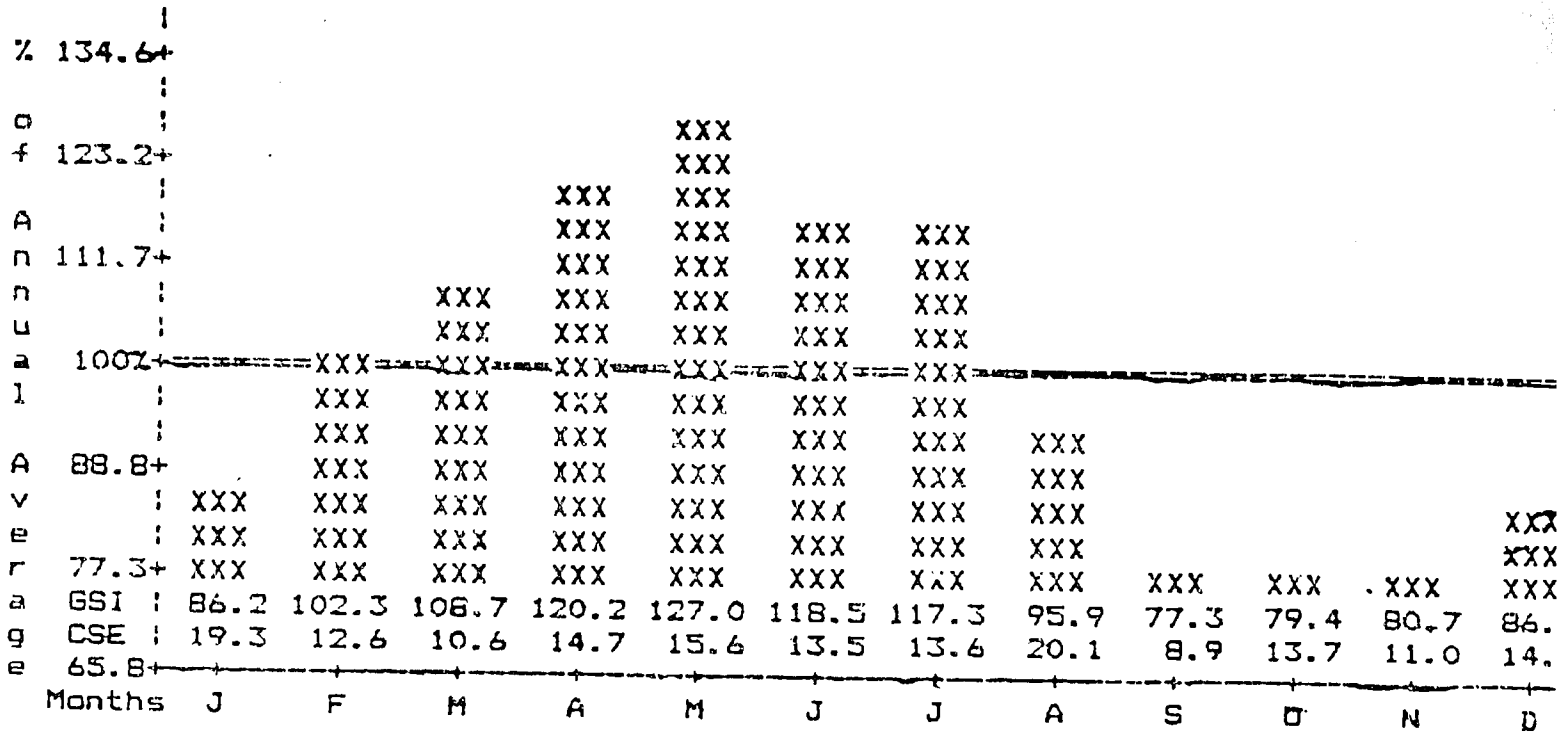


Figure 4

GRAPH OF THE GRAND SEASONAL INDEX
FOR
MOGADISHU RETAIL MAIZE PRICE FROM JAN. 1979 TO DEC. 1986



GSI. IS THE GRAND SEASONAL INDEX
CSE. REPRESENTS THE CORRECTED STANDARD ERROR

THE 100% LINE IN THE BARCHART REPRESENTS THE AVERAGE OF 30.563 CURRENCY UNIT OVER THE 8 YEAR PERIOD OF ANALYSIS OF COMMODITY PRICE DATA.

THE MONTH INDEX VALUE INDICATES BY HOW MANY PERCENTAGE POINTS EACH MONTH'S VALUE LIES ABOVE OR BELOW THE ANNUAL AVERAGE.

THE STANDARD ERROR OF 19.3 FOR JANUARY INDICATES THAT THE JANUARY VALUE WILL LIE WITHIN PLUS OR MINUS 19.3 PERCENTAGE POINTS OF ITS MEAN IN 7 OUT OF 10 YEARS.

Table 4 FOOD SECURITY STUDY SAMPLE FRAME

REGION	DISTRICT	SETTLEMENT	SETTLEMENT SIZE	TOTAL NO. UNCDF FARMERS	FOOD SECURITY SAMPLE FAO FARMERS	FOOD SECURITY SAMPLE RANDOM CONTROL	FOOD SECURITY SAMPLE RANDOM UNCDF
Lower Shebelle	Merca	Ugunji	250	101		25	10
		Sigaale	360	25		25	7
		Samey-Sargy	70		5	23	
	Afgoi	Bariire	542	33		25	8
		Darasalaam	300	33		24	7
		Aw-Dheegle	653	68		18	12
	Qorioley	Bulo Sheikh	263	12		25	9
Middle Shebelle	Jowhar	Kallundi	60	19		25	9
		Bannagney	100	20		24	11
		Baarey	73	20		25	9
Subtotal	Lower Shebelle		2438	272	5	165	58
Subtotal	Middle Shebelle		233	59		74	29
TOTAL SAMPLE				331	5	239	82

Note: Total Food Security Household Sample Size is 326.

Table 6

NOMINAL AND REAL ADC PURCHASE PRICES FOR MAIZE AND SORGHUM, 1971-1986

(in So. Sh. per quintal)

Year	MAIZE		WHITE SORGHUM		RED SORGHUM		CPI
	NOMINAL PURCHASE PRICE	REAL PURCHASE PRICE	NOMINAL PURCHASE PRICE	REAL PURCHASE PRICE	NOMINAL PURCHASE PRICE	REAL PURCHASE PRICE	1986=100.0
1971	35	1213	40	1387	40	1387	2.9
1972	35	1251	40	1429	40	1429	2.8
1973	45	1510	45	1510	45	1510	3.0
1974	50	1419	50	1419	50	1419	3.5
1975	55	1307	55	1307	55	1307	4.2
1976	60	1250	60	1250	60	1250	4.8
1977	75	1413	75	1413	75	1413	5.3
1978	75	1284	75	1284	75	1284	5.8
1979	75	1038	75	1038	75	1038	7.2
1980	120	1042	120	1042	120	1042	11.5
1981	180	1083	160	963	150	903	16.6
1982	180	883	160	785	150	736	20.4
1983	220	791	180	647	160	575	27.8
1984	360	673	220	412	180	337	53.5
1985	1500	2037	1300	1765	1100	1494	73.7
1986	1500	1500	1300	1300	1100	1100	100.0

Source: Agricultural Development Corporation (ADC)

Note: Real purchase prices are constant 1986 prices.

Table 7

ADC MAIZE AND SORGHUM PURCHASES AND PRODUCTION, 1970-1986

(in '000 Metric Tons)

Year	MAIZE PURCHASES	MAIZE PRODUCTION	PURCHASES/ PRODUCTION	SORGHUM PURCHASES	SORGHUM PRODUCTION	PURCHASES/ PRODUCTION
1970	35	122	45%			
1971	60	129	47%	29	95	31%
1972	37	153	24%	38	165	23%
1973	33	164	20%	15	153	10%
1974	20	150	13%	17	137	12%
1975	30	92	33%	13	148	9%
1976	22	90	24%	20	130	15%
1977	31	111	28%	52	145	36%
1978	22	108	20%	61	141	43%
1979	31	108	29%	56	140	40%
1980	4	111	3%	12	140	9%
1981	6	157	4%	23	222	10%
1982	2	150	1%	8	235	3%
1983	0	236	0%	9	120	8%
1984	1	270	0%	12	221	5%
1985	12	382	3%	14	226	6%
1986	19	336	6%	18	252	7%

Note: Estimates for 1986 are provisional. World Bank Agricultural Sector Survey estimates of ADC purchases in 1986 are lower for both maize (11) and sorghum (13).

TABLE 8

NOMINAL AND REAL RETAIL PRICES FOR MAIZE AND SORGHUM IN MOGADISHU, 1977-1986

(in So. Sh. per Suus)

Year	MAIZE		SORGHUM		Consumer Price Index	
	NOMINAL PURCHASE PRICE	REAL PURCHASE PRICE	NOMINAL PURCHASE PRICE	REAL PURCHASE PRICE	1977= 100.00	1986= 100.00
1977	2.48	46.7			100.00	5.3
1978	4.58	78.4	3.00	51.4	110.03	5.8
1979	5.48	75.8	2.59	35.8	136.22	7.2
1980	13.34	115.8	6.61	57.4	217.04	11.5
1981	12.67	76.2	15.40	92.6	313.38	16.6
1982	10.57	51.8	11.23	55.1	384.24	20.4
1983	17.33	62.3	13.75	49.4	524.02	27.8
1984	68.82	128.7	54.00	101.0	1007.37	53.5
1985	58.67	79.7	54.49	74.0	1387.93	73.7
1986	53.68	53.7	46.20	46.2	1884.43	100.0

Source: Central Statistical Department, Ministry of National Planning

Note: Real purchase prices are constant prices, calculated by reflating nominal prices using 1986=100.0.

TABLE 9

COMPARISON OF ADC SALES PRICES AND MOGADISHU RETAIL PRICES FOR MAIZE AND SORGHUM

(in So. Sh. per quintal)

	MAIZE		SORGHUM	
Year	MOGADISHU RETAIL PRICE	ADC SALES PRICE	MOGADISHU RETAIL PRICE	ADC SALES PRICE
1971		55		60
1972		55		60
1973		65		65
1974		70		70
1975		75		75
1976		80		80
1977	90	90		95
1978	165	95	110	95
1979	197	95	68	95
1980	480	180	238	180
1981	456	250	554	230
1982	381	250	405	230
1983	624	250-325	495	230-265
1984	2478	325-700	1944	285-500
1985	2112	1800	1962	1700
1986	1932	1800	1663	1700
1987		1900		1800

Sources: ADC and MNP

Note: Mogadishu retail prices are converted from So. Sh. per Suus to So. Sh. per quintal, using the expansion factor of one quintal = 36 Suus.

Table 10

Maize Retail Prices in Jenale, Lower Shebelle

Month	1983	1984	1985	1986
January				
February				
March		2362	2185	
April			2425	
May		3620	2700	
June		3960		
July		2860	1975	
August	1000	1566		
September	570	1525		1429
October	600	1275	1388	1143
November	744	1298	1340	2143
December		1530	1625	2304

Source: 1983 - GSDR and World Bank, "Agricultural Incentives" study
1984-85 - AFMET project extension reports
1986 - MOA, Planning Directorate

Note: August 1984 price is from a SOMCONSULT study.
May-June 1984 prices are for Merca.

Maize Retail Prices in Jenale, Lower Shebelle

Month	1983	1984	1985	1986
January				
February				
March				
April				
May				
June				
July			2020	
August	700	1800	1579	
September			1298	1446
October				1660
November	800	1738	1500	2170
December		2200		2201

Source: 1983 - GSDR and World Bank, "Agricultural Incentives" study
1984-85 - AFMET project extension reports
1986 - MOA, Planning Directorate

Note: November 1983 price is for Balcad.

TABLE 11 REGIONAL DISTRIBUTION OF MAIZE AREA, PRODUCTION AND YIELD

(area in '00 hectares; production in '000 metric tons; yields in tons/ha.)

	1982			1983			Gu 1984			1985			Gu 1986		
Region	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
Gedo	76	5.4	0.71	97	10.9	1.12	87	7.4	0.85	197.6	33.5	1.70	57	9.5	1.67
Middle Juba	206	14.8	0.72	97	9.1	0.94	80	13.5	1.69	128	15.6	1.22	136	21	1.54
Lower Juba	250	17.9	0.72	147	21.9	1.49	101	19.9	1.97	117	16.4	1.40	99.5	13.9	1.40
Bay	0	0		70	2.1	0.30	20	1.4	0.70	65	5.2	0.80	33	1.8	0.55
Bakol	0	0		0	0		1	0.1	1.00	11.7	0.8	0.68	0	0	
Hiran	251	18	0.72	205	9.9	0.48	54	4	0.74	73.9	8.2	1.11	31	3.7	1.19
Middle Shebelle	301	21.6	0.72	479	70.1	1.46	239	26.8	1.12	457.7	73.8	1.61	490	73.5	1.50
Lower Shebelle	1006	72.2	0.72	945	112.7	1.19	665	107.1	1.61	1248	224.6	1.80	1062	164	1.54
North/Central Somalia	0	0		0	0		0	0		44.5	4.1	0.92	108	14.2	1.31
TOTAL SOMALIA	2090	149.9	0.72	2040	236.7	1.16	1247	180.2	1.45	2343.4	382.2	1.63	2016.5	301.6	1.50

SOURCE: Food Early Warning System, Ministry of Agriculture

TABLE 12

SHIPMENTS OF CONCESSIONAL AND COMMERCIAL MAIZE TO MOGADISHU PORT, 1984-86

ARRIVAL DATE	VESSEL	COMMODITY	QUANTITY (M.T.)	ORIGIN	DESTINATION
03-Feb-84	Frosso-K	maize	2080	EEC	
09-Jun-84	Genevieve Lykes	maize	4150	WFP (US)	
11-Jun-84	Genevieve Lykes	maize	3350	WFP (US)	
29-Sep-84	Ming Jade	maize	5400	WFP (US)	
24-Nov-84	Al Hdeidah	maize	2667	EEC	food aid
Total 1984			17647		
03-Mar-85		maize	2996	China	
21-Jun-85	Mesis	maize	4750	WFP (US)	food aid
25-Jul-85	Christine One	maize flour	3670	EEC	food aid
22-Jun-85		maize	4943	EEC	food aid
18-Jul-85		maize	3020	China	
02-Aug-85		maize	9539	USAID	food aid
Total 1985			31365		
02-Jan-86	m/v Kota Timur	maize	3551	China	food aid
04-Mar-86	Argolikos	maize meal	2176	WFP	refugees
24-Apr-86	Beauty E	maize	2000	WFP	refugees
09-May-86	Beauty E	maize meal	454	WFP	refugees
21-Jun-86	Kopalnia	maize	2000	commercial	
06-Jul-86	Maraki	maize	2000	WFP	refugees
06-Jul-86	Maraki	maize meal	998	WFP	refugees
09-Jul-86	Northern One	maize	3480	WFP (Aus)	refugees
24-Jul-86	Pacific City	maize	7091	UNHCR/EEC	refugees
09-Aug-86	Vanil	maize meal	4000	UNHCR	refugees
24-Sept-86	Rafaelia	maize	1000	UNHCR	refugees
11-Nov-86	Francesco	maize	503	UNHCR	refugees
03-Dec-86	Valaria	maize	300	UNHCR	refugees
Total 1986			32519		

Source: Ministry of Agriculture, Food Early Warning System (MOA/FEWS) and World Food Programme (WFP)

Note: Maize meal is converted to shelled maize grain equivalents by dividing by 0.72. Maize flour is converted using the factor 0.6.

Note: Data for 1986 are more complete than data for earlier years. UNHCR purchased 300 metric tons of maize locally in June 1986.

Table 13 Maize Area, Production and Yield by District, Gu 1984-Gu 1986

(area in '00 hectares, production in '000 metric tons; yields in tons/ha.)

Region	District	Gu 1984			Gu 1985			Gu 1986		
		Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
Gedo	Subtotal	87	7.4	0.85	152	25.8	1.70	57	9.5	1.67
	Belet Hawa	3	0		0	0		3	0.3	1.00
	Garba Haarey	7	0		20	3.4	1.70	10	1.7	1.70
	Luk	25	1	0.39	62	10.5	1.69	35	5.6	1.60
	Bardere	42	6.4	1.52	70	11.9	1.70	9	1.6	1.78
Middle Juba	Subtotal	80	13.5	1.69	104	12	1.15	136	21	1.54
	Bcale	20	2.9	1.45	20	3	1.50	17	2.7	1.59
	Sako	13	2	1.54	40	3	0.75	42	6.7	1.60
	Gelib	47	8.6	1.83	44	6	1.36	77	11.6	1.51
Lower Juba	Subtotal	101	19.7	1.77	90	12.6	1.40	99.5	13.9	1.40
	Jamaame	76	14.9	1.96				88.5	12.4	1.40
	Kismayo	25	5	2.00				11	1.5	1.36
Bay	Subtotal	20	1.4	0.70	50	4	0.80	33	1.8	0.55
	Burakaba	2	0.2	1.00	10	0.8	0.80	28	1.4	0.50
	Baidoa	2	0.2	1.00	15	1.2	0.80	5	0.4	0.80
	Kansah Dhere	0	0		10	0.8	0.80	0	0	
	Dinsor	16	1	0.62	15	1.2	0.80	0	0	
Bakol	Subtotal	1	0.1	1.00	9	0.6	0.67	0	0	
	Wajid	0	0		1	0	0.00			
	Ocdur	0	0		3	0.2	0.67			
	Teveglow	1	0.1	1.00	5	0.4	0.80			
Hiran	Subtotal	54	4	0.74	58	6.3	1.09	31	3.7	1.19
	Belet Weyne	12	0.8	0.67	3	0.3	1.00	0	0	
	Bulo Burti	26	1.6	0.62	20	2	1.00	8	1	1.25
	Jalalaksi	16	1.6	1.00	35	4	1.14	23	2.6	1.13
Middle Shebelle	Subtotal	239	26.8	1.12	344	56.8	1.65	490	73.5	1.50
	Jowhar	108	13.1	1.21	144	21.8	1.51	180	27	1.50
	Adan Yabal	1	0.1	1.00	0	0		0	0	
	Balad	130	13.6	1.05	200	35	1.75	310	46.5	1.50
Lower Shebelle	Subtotal	665	107.1	1.61	960	172.8	1.80	1062	164	1.54
	Afgoi	276	44.2	1.60	222	40	1.80	375.5	46.8	1.30
	Wanle Weyne	1	0.1	1.00	22	4	1.82	44.5	3.1	0.70
	Merca	243	44.8	1.84	256	46	1.80	309	55.6	1.80
	Gorioley	119	12.6	1.06	415	74.7	1.80	113	20.3	1.80
	Brava/Sabi/KM	26	5.4	2.08	45	8.1	1.80	220	36.2	1.65
NWC Somalia		0	0		41	3.8	0.93	108	14.2	1.31
TOTAL SOMALIA		1247	180.2	1.45	1808	294.7	1.63	2016.5	301.6	1.50

Source: Food Early Warning System, Ministry of Agriculture
Note: NWC is Northern and Central Somalia