ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

The Grain Market

Characteristics

1. There is no national grain market in Ethiopia. Poor communications, combined with marked changes in population densities, production conditions and dietary habits even over relatively short distances, have resulted in a number of semi-autonomous markets. These naturally give rise to wide regional price differences and contribute to the severe price fluctuations characteristic of thin markets.

2. The internal marketing system consists of numerous merchants, traders, agents and brokers. The largest of these is the parastatal Ethiopian Grain Corporation (para 11). The system is very fragmented; even the Corporation handles less than 1.5% of the domestically marketed supply (excluding imports). The fragmentation is accompanied by a lack of adequate financing, which encourages wide seasonal and inter-seasonal price fluctuations. The consequent price instability is detrimental to both producer and consumer.

3. There is no overall market intelligence system. Inadequate data make estimates of supply and demand quite unreliable. The problems posed by the size and nature of the country are compounded by the variations in the cereal intake of market dependent consumers. Nevertheless, there is considerable evidence that the more important merchants are well informed of price movements in major market centers. Such information does not reach the majority of farmers, who are thus open to exploitation.

4. These market imperfections are further compounded by a lack of credit for the smaller farmers. Outside minimum package and comprehensive development areas, credit is available only at annual rates of interest which may range from 100% to 200%, except to those who can meet stringent collateral requirements (200% against short-term loans in the case of the Commercial Bank of Ethiopia). The need to borrow for food or traditional festivals before the harvest contributes to market "flooding" after the harvest as crops are sold in order to repay debts. 1/

5. While little can be done to change such factors as varying population densities, production conditions and dietary habits, improvements are

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1/ Given the general price instability described above, the physical distribution of grain appears to be reasonably efficient and some three-quarters of a million tons are moved annually from producer to consumers.

possible in such areas as: (a) the extension of the financial and other resources available to the larger traders, including the Ethiopian Grain Corporation; (b) the spread of market information; and (c) the extension of credit availability.

Size

6. In 1970 the market dependent population was probably about 4.7 million (Table 1), with the greatest single concentration in Addis Ababa (0.8 million); of the remaining urban population of 1.4 million, only Asmara (0.2 million) is capable of exerting a significant "pull" effect. The balance of the market dependent population is scattered over the country, with the largest concentrations probably in the major cash crop areas. The rates of population and income growth of this market are estimated 1/ to be 4.2% and 4.0% per annum respectively.

7. It is to this sector of the economy that participants in the MP Program must look to for the disposal of the greater part of their incremental production. Recent sharp falls in prices indicate, however, that demand is inelastic in the short term, although there may be significant cross elasticities between cereal types and varieties.

8. The remainder of the population is at or near subsistence level with no income growth in real terms. Participation in the market is probably mainly confined to exchange between types of grain (i.e., teff exchanged for millet) the difference in value being taken in cash or kind.

Government Activity

9. The Ministry of Commerce and Industry and the Ministry of Agriculture have prime responsibility for grain marketing: the former through the Grain Board and Grain Corporation and the latter through its Planning and Programming Unit and Economic Research Division. The Ethiopian Standards Institute is responsible for the enforcement of weights and measures legislation.

10. The Grain Board, created in 1950, performs an overall regulatory function in regard to domestic purchase and sale as well as export of agricultural products. It operates a small inspection service which up to now has been confined to produce intended for export. Expansion of this service to "all main points" in the marketing system is planned for 1972/73. The Grain Board is also involved in the production, distribution and sale of seed and advises the Standards Institute in regard to the establishment of quality standards. The Grain Board is funded through inspection fees.

11. The Grain Corporation was created in 1960 with limited liability; its object (as amended in 1964) is "to encourage increased production of

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1/ Estimate based on Central Statistical Office, Ethiopia, CSO Statistical Bulletin Nos. 6 and 9; Government's Third 5-Year Plan; and IBRD Agricultural Sector Survey.

agricultural products...by stabilizing the market, improving the quality... and exporting agricultural products." Although its charter provides that the Corporation "shall have all the powers necessary for the achievement of its objective...," it has not had the financial and managerial resources needed to make it a significant force in the market. Never intended to have monopolistic powers, but rather to have sufficient trading ability to influence the market, the Corporation has made genuine efforts to carry out a stabilizing role, but has not made effective contact at farm level. Its status is now that of a trader/speculator operating with public funds. Greater policy and financial support from Government is needed.

12. The Grain Corporation's Planning Unit is expanding its existing radio network to include all provincial capitals and many of the more important dispersed centers of production and marketing. This will facilitate the collection and dissemination of market information. Its Economic Research Division has completed (with USAID assistance) the collection of information for a national grain marketing study which is now being drafted. It is also running a continuous survey of the Mercato market in Addis Ababa; this may be regarded as the first step towards the establishment of a formal market intelligence system. The Standards Institute has not had the resources to enable it to carry out its regulatory functions; it has, however, wide powers of delegation.

13. The experiences of the comprehensive projects have given the Extension and Project Implementation Department (EPID) of the Ministry of Agriculture a significant appreciation of marketing problems; this awareness is reflected in the proposed Minimum Package Program.

14. Government is conscious of the limitations of what is presently being done, and of the fact that there is virtually no direct Government action in the rural grain market. In view of the dependence of the Minimum Package Program (and of agricultural development generally) on improvements in the marketing system, it has approached the Bank for assistance in an overall market study and the preparation of a marketing and storage project.

Marketing Practices

15. The initial assembly and local redistribution of grain are carried out by numerous small traders and agents acting either on their own account or on behalf of larger merchants. Markets are held weekly in most rural centers and daily in urban areas. Most grain is purchased over a platform scale, but occasionally a volume measure is used. There does not seem to be much price competition between traders, although there is little evidence of overt collusion. Quality is determined visually and assessment varies, sometimes considerably, between traders. Standards of grain cleanliness, purity and hygiene are low. 1/

1/ The Grain Board estimates that Eth$14 million is "lost" annually through transportation of foreign matters in grain.

16. At every stage poor marketing practices reduce the return to the farmer and increase the ultimate cost to the consumer:

(a) The failure to enforce standard weights and measures invalidates almost all price information. Overweighing at purchase and underweighing at sale is common; differences of over 20% have been discovered between buying and selling measures of common description and ownership; 1/

(b) The lack of accurate price and market information outside the merchant/trader network further reduces the already weak bargaining position of the small farmers;

(c) Shortage of capital and the onerous credit terms which they themselves have to meet, limit the traders' ability to accumulate grain, thereby creating artifically depressed prices on days when offerings are heavy;

(d) Lack of hygiene and phytosanitary controls in traders' stores results in extremely high losses, further widening the gap between farm gate and wholesale prices; and

(e) Farm to market transportation difficulties almost oblige farmers to sell produce brought to market, regardless of price.

17. For these reasons, plus the lack of credit and low quality of farm and household storage, farmers usually have to sell when prices are lowest and even then do not realize the full value of their production. Moreover, the absence of an obviously fair price structure removes most of the farmers' incentive to bring well-graded, clean produce to market.

Demand

18. There is little reliable information about the cereal intake of either the market dependent or the subsistence population. It is generally accepted that teff and wheat (or wheat products) are generally most in demand, but consumption patterns vary between different regions and income levels. Two series of demand projections have been made, both starting from the same base and distinguishing between the market dependent population (estimated at 4.7 million in 1970) and the subsistence population (estimated at 20.0 million in 1970).

19. The first projection is based on the per capita demand projections shown in Table 2. Per capita disposable income for the market dependent population is projected to increase by 4% per annum, resulting in an increase of cereal intake from 165 kg in 1970 to a saturation level of 190 kg by 1990,

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1/ Experience at WADU

with changes in the relative importance of each type of grain. Wheat and, for some time, teff are expected to be the most desirable, while per capita intake of barley, maize and sorghum are assumed to decline slightly. The market dependent population is expected to grow at an annual rate of 4.2%, of which about half is natural increase and the remainder represents subsistence population entering the market economy (e.g. through the MP program).

20. The subsistence population is expected to grow by only 2.1% per annum versus a total population growth of 2.5% per annum. The average subsistence levels for this group may be expected to remain the same 1/, as will the level and composition of per capita cereal intake at 150 kg.

21. Table 2 shows projected per capita and total demand by type of cereal, under the above assumptions. The results are to be interpreted as indicating minimum demand: (a) the saturation level of 190 kg of cereals per capita for the market dependent population assumes that non-cereal foods will be available to make up adequate diets (i.e., if such foods were not available, per capita cereal intake might be higher); and (b) the projected differential in the demographic growth rates of the two groups of population is an extrapolation of past trends, but might be larger if rural development were to pick up faster.

22. In the second projection (Table 3), no saturation level has been assumed and per capita demand for the market dependent population has been projected exponentially, using constant and largely positive income elasticities of demand for all types of cereals. 2/ The results are to be interpreted as indicating maximum demand for this group of population. Assumptions for demand by the subsistence population are as given in the first projection.

23. Various other projections of national average consumption have been considered. FAO 3/ indicates 163.4 kg for 1970, rising to between 170.1 and 175.0 in 1980. USAID 4/ projects an average of 150.69 kg for 1973. EPID 5/ postulates an availability of 183.92 kg for 1970 with demand rising to 224.63

1/ Actually, a small income gain for this group is expected, but this is accounted for by the differential in demographic growth rates between the two groups of population.

2/ Elasticity coefficients used are roughly in line with those in projections by EPID and FAO. However, EPID and FAO used these in estimating demand by total population, and not separately for the market dependent population.

3/ "Agricultural Commodity Projections," 1970-80, FAO, Rome 1971.

4/ "Food Production and Utilization," W.G. Eichberger, USAID, Addis Ababa 1966.

5/ EPID Publication No. 6, July 1972.

kg in 1985. Other (unpublished) studies reveal much lower figures, while the Planning Unit estimates maximum likely consumption at 160 kg for Northern and central provinces. Consumption is less in southern provinces where ensete edulis (false, or dumb banana) reduces the relative importance of cereals in the diet. All figures are on a net basis.

24. The weighted average of the consumption figures (152.85 kg) used as a basis for the projections is somewhat below that used by FAO, and considerably less than that used by EPID. There is evidence that both organizations have seriously underestimated storage losses, which are unlikely to be less than 25% of total production. The average consumption is, however, rather higher than that projected by USAID and the two components (165 and 150 kg) were agreed to be "realistic" by the Ethiopian Nutrition Institute in discussions with the mission.

25. It must be emphasized that the projections set out in Tables 2 and 3 are based, unavoidably, on data which are less than adequate for the purpose. Not enough is known about consumption habits or the effects and cross effects of income and price upon demand for different cereals. The collection of information from which to derive income and price elasticities of demand should be an early objective of the Central Statistical Office and the Economic Research Division.

Supply

26. Since production figures have tended to be derived from population and consumption estimates rather than based upon field observations, quantification of present and future supply/demand relationships is hazardous.

27. The trend since 1946 has been undeniable: cereal exports have declined sharply and imports, particularly of wheat and flour, have risen. Therefore, the rate of production growth must have been below that of market demand, and over time has probably not exceeded an average of 2.1%. This figure has been used in projecting possible supply/demand imbalances through 1990.

28. In the effort to indicate the increasing supply/demand gap in which marketed incremental MP production may expect to find a market, no allowance has been made for the impact of comprehensive development projects, nor for the inevitable response from commercial farmers (both of which have been taken into account in estimating future price trends). Table 4 shows a total cereal deficiency by 1980 of 331,000 tons under the minimum demand projection and 413,500 tons under the maximum projection. Some 266,000 tons of this gap would be filled by marketed incremental output of the Minimum Package Program. By 1990 the deficiency would be 813,000 tons and, 1,231,000 tons, respectively, of which 432,000 tons would be filled by the MP. Shifts in demand patterns for individual cereals are expected to lead, through changes in relative prices, to changes in comparative advantages for different cereals and hence to roughly parallel changes in output patterns in MP areas.

29. It must be noted that demand for the two cereals which show the greatest response to proposed innovations (maize and sorghum) is expected to grow least in relation to the overall increase in demand. A continuing market and agronomic research program will, therefore, be necessary to ensure that economically attractive alternative crops are developed for that land which is released for commercial production through the increase in yields of essentially subsistence crops. Substantial price declines following over-production normally have a serious effect on emergent commercial producers. This point should be carefully considered at all stages of planning and execution if the projected adoption and production rates are not to be severly jeopardized.

Cereal Prices

30. There are no reliable time series data for farm gate prices. The only series on cereal prices relates to monthly wholesale market quotations for Addis Ababa, and these have been used in assessing producer prices. Table 5 shows simple average wholesale prices for 1962-1971 along with annual changes. Table 6 gives the monthly prices for the same period as percentages of the unweighted annual average price. Data supplied by the Grain Corporation have been used, single lowest and highest quotations being omitted.

31. From these data, theoretical "normal" wholesale prices have been calculated for 1970 (Table 7). These are substantially lower than actual 1970 prices and except for wheat and maize (presently Eth$19.93 and Eth$11.81 respectively) are very close to the average prices for the first seven months of 1972. The "normal" price for wheat is probably slightly inflated due to the relatively high proportion of imported wheat sold in Addis Ababa over the 1962-1971 period. The current price for maize reaffirms the short, term inelasticity of demand for this cereal in Addis Ababa.

32. Transport, wholesale and local trader margins have been deducted from these prices to arrive at farm gate prices. The average distance of the minimum package areas from Addis Ababa is estimated at 300 km, and the average transport cost based on a 1971-72 survey is Eth$0.08/ton-km, or Eth$2.40 per quintal. Wholesalers' margin is estimated at 20%, local traders' at a flat Eth$0.50 per quintal and farmers' transport at Eth$0.20 per quintal. Reductions in marketing costs through improved competition have been conservatively estimated for 1975 and 1980, as have savings in local transport (Table 8). No allowance has been made for reduction in road transport rates.

33. It must be emphasized that the derived producer prices are "model" ones; that is, they relate only to Addis Ababa. The market conditions influencing prices for individual MP areas will, of course, vary considerably. For example, growth rates for the urban (largely market dependent) population vary from 0.0% to +22.8%, and the effects on increased local demand will have to be taken into account in planning the selection of new areas.

34. Future price developments are a matter for conjecture, particularly as the recent decline has been due to an increase in marketed supply independent of the MP Program. The part of the increase attributable to uncontrollable factors (e.g., the weather) as opposed to an increase in planted area cannot be assessed and, in any event, the present absence of an effective stabilizing agency results in magnified seasonal price movements. Current prices cannot, therefore, be taken as a guide for the future. They do underline the need not only for an improved market structure, but also for flexibility of approach within the Project and the early compilation of a national production and marketing plan.

35. Over the long term the floor prices for marketed production will be determined by cost of production or export value, whichever is the higher. Production costs are critical for maize. Various estimates have been made 1/ which range from Eth$5.25 to Eth$22.31 per quintal; even the lowest is considerably above projected export prices for conventional destinations.

36. Domestic cereal prices in Ethiopia have little relationship to those ruling in world markets, mainly due to the different purposes for which the products are used; the prices of sorghum and barley are similarly influenced in neighboring markets where Ethiopia enjoys a geographic advantage over most competing suppliers. It is consequently assumed that these crops will continue to command a premium over maize. Therefore, in the short term when surpluses due to MP production are not expected, price levels are unlikely to alter materially and production costs, particularly for maize, will be of greater significance than world market prices.

37. Movements over the longer term will be influenced by increased relative demand for wheat, the possible development of other uses for barley, maize and sorghum and by possibilities for crop diversification. Production from the program is never expected to meet more than 25% of total market demand: relative price movements are therefore, likely to depend more on circumstances outside the Project areas. This further underlines the need for a flexible approach to crop coverage in MP areas.

38. Wheat prices are projected to stabilize somewhat below import parity and those of maize, sorghum and barley, at or a little above costs of production. On this basis, exports cannot be considered. Teff prices are expected to retain a reasonable consonance with those for wheat. Because of relative pressures through production costs, savings in marketing costs are liable to accrue more to the farmer than to the consumer.

39. With this in view, and assuming that the sector presently supplying the market (but outside MP areas) maintains past growth rates, no violent price changes are anticipated. There is, however, likely to be a gradual decline in wholesale prices, partially offset by greater marketing efficiency.

1/ Experience Incorporated: "Production and Marketing of Feed Grains in Ethiopia," Phase 1, p. 12.

Substantial inter-seasonal fluctuations are liable to occur during early years, as happened during 1971-72, but these will be dampened by an improved marketing structure. A major reduction of costs and/or a substantial alteration in exchange rates would appear to be necessary if exports are to be achieved.

40. Estimated price developments are shown in Table 9; import and export parity prices for wheat and maize, respectively, are illustrated in Tables 10 and 11.

Marketing and the Minimum Package Program

41. Incremental production from the Project is unlikely to exceed 25% of incremental market requirements. The incomes of participating farmers, therefore, could be affected at least as much by changes in marketing practices and by the level of commercial farmers' output as by the innovations adopted in the MP areas. The progress of the MP Program must, if its benefits are to be fully realized, be matched by an early development of the infrastructure and organizations needed for an efficient national grain market.

42. It is envisaged that this could be carried out under a separate marketing and storage project. Bank assistance has already been requested for the preparation of such a project; it would be an essential complement to the MP Program. Subject to the results of further investigation and preparation, its objectives should probably include:

(a) Development of an efficient information service (including crop estimation) and broad pricing policy;

(b) Enforcement of existing weights and measures legislation;

(c) Introduction of a simple grading system and related price incentives;

(d) The improvement of market storage in rural areas;

(e) Provision of grain-cleaning facilities;

(f) Integration of complementary activities carried out by different parastatal organizations with a view to:

(i) developing a parallel marketing channel to stimulate and improve efficiency on the part of small merchants;

(ii) providing ready outlets for farmers' produce, possibly through a floor price system (this would depend on the evolution of the information service); and

(iii) providing a marketing structure on which MP market centers could depend.

(g) Development of an overall production and marketing plan; and

(h) Provision of technical systems.

43. The development of cooperatives (which would be included in the Project) should help overcome the lack of bargaining power of individual farmers by encouraging the assembly of larger amounts of cereals in one place (the marketing center). The effectiveness of associations or cooperatives in marketing depends on both management ability and the caliber of the information available to such management. Participating farmers will be extremely vulnerable to market pressures outside their control and it will be some time before cooperative managers have both the knowledge and the experience to be able to understand and anticipate these pressures. They will also have to be sufficiently respected to convince the members of the reasons for the marketing actions proposed.

44. Until substantial reserves of cash and experience have been accumulated, no cooperative or marketing association is in a position to 'run' the market, even when a good intelligence system exists. The relatively experienced marketing management of CADU has so far accumulated 10,700 tons of wheat that can only be sold at a substantial loss, while cooperative management at WADU is faced with a similar situation on two other commodities. It is therefore of the utmost importance that producers in MP areas should have direct access to an alternative, or parallel marketing channel (e.g. a revitalized and reorganized grain corporation) where an assured, fairly priced and constant outlet may be found.

45. Grain Corporation silos and stores are well situated in relation to most MP areas; some are presently unused and all are under-utilized. A close working relationship between EPID and the (reorganized) Grain Corporation could be of considerable benefit to both organizations and the country as a whole.

Summary

46. The lack of a national grain market in Ethiopia has given rise to wide regional price differences and severe price fluctuations; lack of credit and adequate storage facilities for the smaller farmer have further compounded market imperfections. Current prices are not, therefore, a valid indication of future trends. There is likely, however, to be a gradual decline in wholesale prices, which would be partially offset by greater market efficiency. The rate of production growth has been below that of market demand, and it is in this increasing supply/demand gap that incremental MP production may be expected to find a market. This incremental production is unlikely to exceed 25% of total market demand, and relative price movements will therefore probably depend on circumstances outside the MP areas. The progress of the MP Program must, if its benefits are to be fully realized, be matched by the development of the infrastructure and organizations needed for an efficient national grain market. The development of cooperatives is seen as an important step in the integration of the farmer in a more centralized market structure. A separate marketing and storage project would also be an essential complement to the MP Program.

February 1973

ANNEX 2
Table 1

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Estimated Composition of Market Dependent Population 1970

	Population				
	Total	Market Dependent	%		% Rate of Growth
URBAN:	'000				
Addis Ababa	796.8	788.8	99		7.0
Asmara	219.8	217.6	99		7.6
Other Urban	1,276.1	1,212.3	95		6.2
RURAL					
Agricultural	20,983.1	1,049.2	5		2.1
Non-Agricultural	1,434.7	1,434.7	100		2.1
	24,710.5	4,702.6	19	Weighted Average	4.2

Sources: CSO Statistical Bulletins Nos. 6 and 9.
SRI Report No. 16 Marketing of Grains and Pulses in Ethiopia and Discussions with Ministry of Agriculture ERD and PPU.

February 1973

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AGRICULTURAL MINIMUM PACKAGE PROJECT

Cereal Consumption by Market Dependent Population 1970-1990

First Projection

Year	Population ('000)	Consumption Per Capita (kg)	Consumption					
			Wheat	Teff	Barley	Sorghum	Maize	Total
			('000 tons)					
1970	4,700	165.0	117.5	352.5	117.5	117.5	70.5	775.5
71	4,897	167.2	128.8	374.2	121.5	121.5	73.0	818.8
72	5,104	169.3	140.9	396.6	125.6	125.6	75.6	864.1
73	5,317	171.3	153.7	419.5	129.7	129.7	78.2	910.9
74	5,541	173.2	166.8	443.3	134.4	134.4	80.9	959.6
75	5,773	175.0	180.7	467.5	139.1	139.1	83.7	1,010.4
76	6,016	176.7	195.6	492.7	144.1	144.1	86.6	1,063.0
77	6,269	178.3	210.7	518.4	149.5	149.5	89.6	1,117.7
78	6,532	179.8	226.7	544.8	155.1	155.1	92.7	1,174.4
79	6,806	181.2	243.7	571.7	161.0	161.0	96.0	1,233.3
1980	7,092	182.5	261.0	599.3	167.0	167.0	100.0	1,294.3
81	7,390	183.7	279.3	627.4	173.7	173.7	103.5	1,357.5
82	7,700	184.8	298.8	656.1	181.2	181.2	107.8	1,423.0
83	8,024	185.8	318.5	685.2	187.8	187.8	111.5	1,490.8
84	8,361	186.7	339.5	714.8	195.2	195.2	116.2	1,561.0
85	8,712	187.5	361.5	744.9	203.0	203.0	121.1	1,633.5
86	9,078	188.2	384.0	775.2	211.5	211.5	126.2	1,708.4
87	9,459	188.8	407.7	805.9	224.4	224.4	131.5	1,785.9
88	9,856	189.3	432.7	836.8	229.7	229.7	137.0	1,865.8
89	10,270	189.7	459.1	867.8	239.3	239.3	142.8	1,948.3
1990	10,702	190.0	487.0	898.9	249.3	249.3	148.8	2,033.3

Note: May not add due to rounding.

Assumptions:

(a) Average 1970 per capita consumption 165.0 kg as follows: wheat 25.0; teff 75.0; barley, 25.0; sorghum and other cereals, 25.0; maize 15.0.

(b) Income elasticities of demand: wheat 0.7, teff 0.4, barley, maize, sorghum 0.3 declining variably with income and time.

May 2, 1973

ANNEX 2
Table 2

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Cereal Consumption by Market Dependent Population, 1970-1990
Second Projection

Year	Population ('000)	Consumption Per Capita (kg)	Consumption					
			Wheat	Teff	Barley	Sorghum	Maize	Total
			('000 tons)					
1970	4,700	165.0	117.5	352.5	117.5	117.5	70.5	775.5
1971	4,897	167.7	125.9	373.2	123.9	123.9	74.3	821.2
1972	5,104	170.4	134.8	395.1	130.7	130.7	78.4	869.7
1973	5,317	173.2	144.4	418.3	137.8	137.8	82.7	921.0
1974	5,541	176.0	154.7	442.8	145.3	145.3	87.2	975.3
1975	5,773	178.9	165.7	468.8	153.2	153.2	91.9	1,032.8
1976	6,016	181.8	177.5	496.4	161.5	161.5	96.9	1,093.8
1977	6,269	184.8	190.2	525.5	170.4	170.4	102.2	1,158.7
1978	6,532	187.8	203.7	556.3	179.6	179.6	107.8	1,227.0
1979	6,806	191.0	218.2	589.0	189.4	189.4	113.7	1,299.7
1980	7,092	194.1	233.7	623.6	199.8	199.8	119.8	1,376.7
1981	7,390	197.3	250.4	660.2	210.6	210.6	126.4	1,458.2
1982	7,700	200.6	268.2	698.9	222.1	222.1	133.3	1,544.6
1983	8,024	203.9	287.3	739.9	234.2	234.2	140.5	1,636.1
1984	8,361	207.4	307.8	783.4	247.0	247.0	148.2	1,733.4
1985	8,712	210.8	329.7	829.4	260.5	260.5	156.3	1,836.4
1986	9,078	214.4	353.3	878.1	274.8	274.8	164.7	1,945.7
1987	9,459	218.0	378.6	929.6	289.8	289.8	173.6	2,061.4
1988	9,856	221.6	405.7	984.2	305.6	305.6	182.9	2,184.0
1989	10,270	225.3	434.7	1,042.1	322.1	322.1	192.9	2,313.9
1990	10,702	229.1	465.8	1,103.1	339.7	339.7	203.2	2,451.5

Note: (a) Consumption figures based on average 1970 consumption, 165 kg/capita, as follows: wheat 25.0; teff, 75.0; barley, 25.0; maize, 15.0; sorghum and other cereals, 25.0.
(b) Growth of population 4.2% p.a.
(c) Growth of income 4.0% p.a.
(d) Income elasticities of demand: wheat 0.7; teff, 0.4; barley, maize, sorghum, 0.3
Weighted average, 0.406.
(e) No allowance has been made for price changes

May 2, 1973

ANNEX 2
Table 3

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AGRICULTURAL MINIMUM PACKAGE PROJECT

Projected Cereal Supply and Demand 1970-1990
('000 tons)

	Gross 1/ Production	Gross 2/ Subsistence Requirement	Balance Gross Production	Seed, Other 3/ Use, Store Losses	Net Availability	Market 4/ Demand (1)	Market 5/ Demand (2)	Surplus (Deficiency) (1)	Surplus (Deficiency) (2)	MPP Incremental Production	Net Surplus (Deficiency) (1)	Net Surplus (Deficiency) (2)
1970	5,662.0	4,511.3	1,150.7	33.5%	765.2	775.5	775.5	(10.3)	(10.3)	-	(10.3)	(10.3)
71	5,781.0	4,606.0	1,175.0		781.4	818.8	821.2	(37.4)	(39.8)	3.3	(34.1)	(36.5)
72	5,902.3	4,702.8	1,199.5		797.7	864.1	869.7	(66.4)	(72.0)	6.9	(59.5)	(65.1)
73	6,026.2	4,801.5	1,224.7		814.4	910.9	921.0	(96.5)	(106.6)	17.9	(78.6)	(88.7)
74	6,152.8	4,902.3	1,250.5		831.6	959.6	975.3	(128.0)	(143.7)	25.6	(102.4)	(118.1)
75	6,282.0	5,005.3	1,276.7		849.0	1,010.4	1,032.8	(161.4)	(183.8)	62.0	(99.4)	(121.8)
76	6,413.9	5,110.4	1,303.5	32%	886.4	1,063.0	1,093.8	(176.6)	(207.4)	93.8	(82.8)	(113.6)
77	6,548.6	5,217.7	1,330.9		905.0	1,117.7	1,158.7	(212.7)	(253.7)	132.0	(80.7)	(121.7)
78	6,686.1	5,327.2	1,358.9		924.1	1,174.4	1,227.0	(250.3)	(302.9)	174.6	(75.7)	(128.3)
79	6,826.6	5,439.1	1,387.5		943.5	1,233.3	1,299.7	(289.8)	(356.2)	220.0	(69.8)	(136.2)
1980	6,969.9	5,553.4	1,416.5		963.2	1,294.3	1,376.7	(331.1)	(413.5)	265.8	(65.3)	(147.7)
81	7,116.3	5,669.9	1,446.4	31%	998.0	1,357.5	1,458.2	(359.5)	(460.2)	309.1	(50.3)	(151.1)
82	7,265.7	5,789.0	1,476.7		1,018.9	1,423.0	1,544.6	(404.1)	(525.7)	346.2	(57.9)	(179.5)
83	7,418.3	5,910.7	1,507.6		1,040.2	1,490.8	1,636.1	(450.6)	(595.9)	376.2	(74.4)	(219.7)
84	7,574.1	6,034.7	1,539.4		1,062.2	1,561.0	1,733.4	(498.8)	(671.2)	397.2	(101.6)	(274.0)
85	7,733.1	6,161.5	1,571.6		1,084.4	1,633.5	1,836.4	(549.1)	(752.0)	411.9	(137.2)	(340.1)
86	7,895.5	6,290.8	1,604.7	30%	1,123.3	1,708.4	1,945.7	(585.1)	(822.4)	421.7	(163.4)	(400.7)
87	8,061.3	6,423.0	1,638.3		1,146.8	1,785.9	2,061.4	(639.1)	(914.6)	427.2	(211.9)	(487.4)
88	8,230.6	6,557.9	1,672.7		1,170.9	1,865.8	2,184.0	(694.9)	(1,013.1)	429.8	(265.1)	(583.3)
89	8,403.5	6,695.6	1,707.9		1,195.5	1,948.3	2,313.9	(752.8)	(1,118.4)	431.1	(321.7)	(687.3)
1990	8,579.9	6,836.2	1,743.7		1,220.6	2,033.2	2,451.5	(812.6)	(1,230.9)	431.8	(380.8)	(799.1)

1/ Estimated to continue growing at 2.1% per annum. Excludes MPP incremental production.
2/ 150 kg per capita plus 33.5% loss, seed and other use.
3/ Assuming gradual decline.
4/ From Table 2.
5/ From Table 3.

February 1973

ANNEX 2
Table 1

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Cereal Wholesale Prices on the Addis Ababa Market, 1962- 1971

Year	Teff (brown)	Wheat (white)	Barley	Sorghum	Maize
			Eth$/Quintal		
1962	25.31	19.89	14.16	14.50	13.53
1963	24.27	18.50	12.99	14.21	13.15
1964	26.25	20.52	15.50	21.15	14.24
1965	29.89	25.05	19.13	21.89	15.75
1966	29.63	23.18	15.80	24.94	18.55
1967	25.55	22.93	15.56	19.96	13.54
1968	25.94	24.04	14.40	15.26	12.42
1969	28.11	22.87	15.17	20.45	13.56
1970	37.28	31.71	22.52	28.67	21.17
1971	33.03	26.72	22.03	25.83	20.38
Av. 1962-71	28.53	23.54	16.73	20.69	15.63
			% Change from Previous Year		
1963	-4.1	-7.0	-8.3	-2.0	-2.8
1964	+8.2	+10.9	+19.3	+48.8	+8.3
1965	+13.9	+22.1	+23.4	+3.5	+10.6
1966	-0.9	-7.5	-17.4	+13.9	+17.8
1967	-13.8	-1.1	-1.5	-20.0	-27.0
1968	+1.5	+4.8	-7.5	-23.5	-8.3
1969	+8.4	-4.9	+5.3	+34.0	+9.2
1970	+32.6	+38.7	+48.5	+40.2	+56.1
1971	-11.4	-15.7	-2.2	-9.9	-3.7
1963-71	+3.8	+4.5	+6.6	+9.4	+6.7

Source: Ethiopian Grain Corporation.

February 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Monthly Wholesale Price Relatives on the Addis Ababa Market, 1962-1971

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Average
Brown teff	94	93	94	97	97	101	105	107	105	104	101	93	100
White wheat	96	96	96	97	100	100	103	104	105	105	103	93	100
Barley	94	93	95	96	97	101	102	105	109	107	96	102	100
Sorghum	87	92	92	94	97	101	101	107	109	108	107	97	100
Maize	91	92	95	96	101	103	108	113	112	102	93	87	100

Source: Ethiopian Grain Corporation

Feburary 1973

ANNEX 2
Table 6

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Estimated 1970 'Normal' Wholesale and Farmgate Prices
(Eth$/Quintal)

Commodity	1970 'Normal' Price	Wholesalers Margin	Transport Charges	Local Traders Margin	Transport	Farmgate Price
Brown Teff	27.50	5.50	2.40	0.50	0.20	18.90
White Wheat	24.00	4.80	2.40	0.50	0.20	16.10
Sorghum	19.50	3.90	2.40	0.50	0.20	12.50
Barley	15.50	3.10	2.40	0.50	0.20	9.30
Maize	14.00	2.80	2.40	0.50	0.20	8.10

February 1973

ANNEX 2
Table 8

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Estimated Marketing Costs

	------- Eth$/Quintal ----------				
Year	Transport	Local Trader (Market Center)	Transport	Wholesaler (% of Wholesale price)	Total
1970	0.20	0.50	2.40	20	3.10 + 20% of wholesale price
1975	0.10	0.10	2.40	20	2.60 + 20% of wholesale price
1980	0.10	0.10	2.40	15	2.60 + 15% of wholesale price

February 1973

ANNEX 2
Table 9

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Assumed Producer Price Development for Major Cereals
(Eth$/Quintal)

Year	Teff (Brown)	Wheat (White)	Barley	Sorghum	Maize
1971	18.30	16.10	9.30	12.50	8.10
1972	18.60	16.00	9.10	12.50	7.90
1973	18.85	16.15	9.00	12.50	8.10
1974	19.10	16.25	9.00	12.00	8.20
1975	19.10	16.25	9.00	12.00	8.10
1976	19.10	16.25	8.85	12.00	8.00
1977	19.10	16.25	8.60	11.75	7.85
1978	19.10	16.25	8.45	11.50	7.70
1979	19.10	16.25	8.30	11.25	7.50
1980	19.10	16.25	8.15	11.00	7.30
1981	18.95	16.25	8.00	10.50	7.10
1982	18.80	16.10	7.85	10.00	6.90
1983	18.65	16.00	7.70	9.50	6.70
1984	18.50	16.00	7.50	9.00	6.50
1985 ff.	18.50	16.00	7.50	8.50	6.50

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ANNEX 2
Table 10

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Parity Prices

Imported Soft Wheat

	Eth$/m ton	
Cost: fob N. America 1/		126.50
Add:		
Freight and Insurance		42.50
Cost, cif Assab		169.00
Add:		
Port charges, stevedoring	11.00	
Bagging 2/	2.00	
Cost of Bags 3/	10.00	23.00
Cost, ExAssab		192.00
Add:		
Transport to Addis	40.00	
Importers Overhead 4/	45.00	85.00
Cost, Delivered Addis		277.00
Less:		
Transport from Addis 5/	24.00	
Wholesalers margin	45.00	69.00
Value at Market Center		208.00
Less:		
Cost of Bags	10.00	
Storage	4.00	
Local Transport 6/	1.50	15.50
Equivalent Value Farm Gate		192.50

1/ Based on projected fob price of US$55.00 (US$1 = Eth$2.30)
2/ Bagged in hold, or on quay using "Atlanta" method.
3/ Sound, second hand.
4/ Basis Ethiopian Grain Center (EGC) overhead 1969/70
5/ Assuming market centers average 300 km from Addis.
6/ Basis average farmer 10 km from trade center on farm to highway road.

May 2, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Parity Prices: Maize (Exported in Bulk)
(Eth$/m ton cif)

	1975		1980	
	North Sea	Israel	North Sea	Israel
VALUE CIF 1/	138.00	144.90	154.10	161.00
Less: Freight 2/	39.10	35.00	39.10	35.00
Insurance & Commission 3/	4.14	4.35	4.62	4.83
VALUE FOB	94.76	105.55	110.38	121.17
Less: Stevedoring and P/Charges	11.00	11.00	11.00	11.00
Grain Board Fee	3.00	3.00	3.00	3.00
Fumigation	2.00	2.00	2.00	2.00
VALUE DELIVERED PORT	78.76	89.55	94.38	105.17
Less: Turnover Tax (2%)	1.57	1.79	1.89	2.10
Transport 4/	20.00	20.00	20.00	20.00
Marketing Overheads 5/	10.00	10.00	10.00	10.00
Storage 6/	4.00	4.00	4.00	4.00
VALUE AT MARKETING CENTER	43.19	53.76	58.49	69.07
Less: Local Transport	1.50	1.50	1.50	1.50
Cost of New Bags	15.00	15.00	15.00	15.00
	26.69	37.26	41.99	52.57
Add: Resale Value of Bags	10.00	10.00	10.00	10.00
VALUE: FARM GATE	36.69	47.26	51.99	62.57

1/ Based on projected fob price No 3 U.S. Yellow Corn at US$55.00 and US$62.00. (US$1 = Eth$2.30). (Source IBRD).
2/ Assumed constant at about current levels.
3/ 3% of cif value.
4/ Basis 400 km.
5/ Exporting organization, e.g. Ethiopian Grain Center (EGC).
6/ Includes all relevant costs at trade center.

Price projections from IBRD Economics Department Trade Policies and Export Projections Division Aug. 24, 1972.

May 2, 1973

ANNEX 2
Table 11

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Seed Supply

Present Production

1. There is at present no regulated seed industry in Ethiopia, nor is there seed legislation or compulsory seed certification and testing. Cereal breeding is, however, carried out at the following research stations or plant institutions in different provinces:

(a) Institute of Agriculture Research, Holetta - barley, wheat, teff;

(b) Debre Zeit Agriculture experiment station - wheat, teff, sorghum;

(c) Ethio-German agriculture experiment station, Bako - maize, sorghum, teff, wheat and barley;

(d) Paradise experiment station, Asmara - wheat, barley, sorghum, millet, teff;

(e) College of Agriculture, Alemaya - sorghum, millet, wheat, barley and teff;

(f) Chilalo Agriculture Development Unit (CADU), Kulumsa Station, Arussi - wheat, barley, maize, oilseeds and pulses;

(g) Awasa Station (Ministry of National Community Development) - pepper, wheat, oilseeds, vegetables, pulses.

2. The stations listed from (a) to (d) belong to the Institute of Agricultural Research (IAR), which also coordinates the work of the other stations.

3. The Institute publishes an annual Seed Inventory of recommended varieties which in 1972/73 lists eight improved varieties for wheat, 5 for barley, 3 for teff, 5 for maize and 2 for sorghum.

4. There is no organized system of seed distribution. The stations sell seed either through development projects such as CADU, WADU and Bako or directly to commercial farmers. Seed processing facilities are available at the Holetta, Bako and Awasa Stations, but capacity for cleaning and storage is limited to 300 to 500 ton/year. CADU is installing a seed cleaning mill at Kulumsa Station with 4 ton/hour capacity and storage for 6,000 ton.

Seed testing at provincial level is carried out at CADU's Kulumsa Station, Debre Zeit, Holetta, Bako, Alemaya and Awasa.

Government Action

5. At Government's request, FAO has prepared proposals for the organization, regulation and control of a national seed industry (FAO report No. TA 3092 of 1972). The report includes a draft seed law, and ordinances for a national list of varieties, for seed certification and for quality standards.

6. Government further ordered (with USAID assistance) a study on the detailed aspects of seed production from a consulting firm, Experience Inc. of Minneapolis, USA. Another consulting firm, Agriconsult of Malmo, Sweden, financed by SIDA, has studied the seed requirements of and possible seed supply for the Minimum Package Program in detail. Both consultants have already submitted their drafts to Government.

7. As a result of the Government's systematic approach to the problem, the basic work done by IAR and other development projects, and the existence of a considerable number of commercial farms with improved agricultural practices, the expectation is that by 1976 a regulated and controlled seed industry will have been developed in Ethiopia.

Interim Planning

8. Until then, the stations listed above will continue to produce seed for sale to farmers. The present production for sale, which can be considerably expanded, compares with Project needs as follows:

	Wheat	Teff	Hybrid Maize	Synthetic Maize
Total Production of Stations in 1972/73 (tons)	360	36	--------88---------	
Projects Seed Requirements (tons)				
1973	19	7	14	6
1974	113	8	38	24
1975	258	58	84	78
1976	471	100	154	103

The Project provides funds for EPID to take over and operate two Government farms in northern Ethiopia for seed multiplication. These farms have been selected and estimates of the cost of the equipment for production, processing and storage have been made. The estimated costs of production and marketing will be covered by the seed prices assumed under the Project. Imports of hybrid maize from Kenya will continue until local production (which has been started

successfully by the Awasa Station) meets demands. The existing facilities, together with those provided under the Project, should be sufficient to produce, process and test the Project's seed requirements for the next 4 - 5 years.

9. Commercial seed firms have expressed interest in seed multiplication. The task of developing new cereal varieties will remain with IAR for the immediate future. IAR is adequately staffed for this purpose. The Project provides funds for IAR's research in areas which are not yet fully covered by research stations, mainly in northern Ethiopia. IAR maintains close cooperation with the International Maize and Wheat Improvement Center in Mexico, as well as with the Kitale maize breeding station and Njoro wheat breeding station in Kenya. Cooperation with the newly founded international Crop Research Institute for Semi-Arid Tropics in Hydrabad, India, will be sought when this Institute begins operations.

February 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Credit and Supply of Inputs

1. Agreements have been signed between the Ministry of Agriculture and the Agricultural and Industrial Development Bank (AIDB) and its subsidiary the Agricultural Inputs and Marketing Services (AIMS) for the procurement and distribution of inputs and the provision of credit for the Minimum Package Program.

AIDB - AIMS

2. AIDB was recently appraised for an IDA credit by the Agriculture Projects and Development Finance Companies Departments. AIDB was established in November 1970, as a share company, under the Ethiopian Commercial Code with an authorized capital of Eth$100 million. Initial paid-up share capital was Eth$50,000, which was increased in May 1971, to Eth$35 million following the completion of the valuation of its loan and equity portfolio taken over from the Development Bank of Ethiopia, the Ethiopian Investment Corporation, and the Ministry of Finance. Government or its nominees are the sole shareholders. The Chairman of AIDB's Board is the Minister of Finance. Other members include the Minister of Agriculture, the Governor of the National Bank of Ethiopia and the Managing Director of AIDB.

3. The Bank has four main departments. Agriculture is the largest with two divisions, one for appraisal and the other for supervision and follow-up. The smaller Industrial Department is similarly organized. The two other departments are the Finance and Bank Department and the Evaluation and Research Department.

4. Partly through its ability to offer competitive salaries, AIDB has been able to build up in a short period a nucleus of well-qualified and enthusiastic staff, many of whom, however, have little previous investment or banking experience. AIDB's Board and the Managing Director propose to appoint internationally recruited advisers where suitably qualified and experienced Ethiopians are not available.

5. In August 1971, AIDB published a statement of policy emphasizing AIDB's intention to operate on a commercial basis, to charge interest rates adequate to meet its costs, and to provide for reserves and a profit margin, while maintaining a sound balance between the maturities of its own obligations and those of the loans it finances; its debt/equity ratio limit is set at 3:1. AIDB may make loans (including short-term), equity investments and guarantees for projects in the public and private sectors. The statement sets out policies regarding lending contributions, security requirements, interest rates, procurement and appraisal procedures. It provides AIDB with a generally satisfactory basis for project financing.

6. In general, AIDB does not provide more than 50% of the total cost of any project to be financed or take more than 30% of the equity in a company. Collateral in the range of 125-200% is normally required in the form of mortgages, but this can be substantially reduced, particularly for short-term crop financing. Maturities are conservative and within the life of the assets financed; generally, they are limited to 10 years and for farm machinery five years. AIDB normally requires procurement by international competitive bidding to the extent feasible. Although AIDB has been relatively cautious in financing long-term development, its short-term lending to direct borrowers, particularly commercial farmers, has not always been related to incremental needs.

7. Assurances were obtained during the negotiations on the Development Finance Companies (DFC) Credit to AIDB that AIDB's policies would be modified to give more emphasis to medium and long-term lending, to base short-term credit on incremental development requirements, and to bring its interest rates in line with those of the commercial banks.

8. The Decree which established AIDB provided that for the four years 1970-74 Government would allocate to it one-half of the annual profits of the National Bank of Ethiopia in the form of additional equity. This is expected to average Eth$6 million annually, although Eth$7.75 million was in fact allocated in 1970. Unlike its predecessors which had to depend on annual and unreliable budget allocations, AIDB has been assured of a substantial inflow of local currency in its early years.

9. Apart from its share capital and retained earnings, AIDB's other source of local currency is deposits, these amounted to over Eth$10 million in the provisional balance sheet as of July 7, 1972. The balance sheets as of July 1971 and (provisional) 1972 indicate:

(a) Satisfactory ratios of current assets to current liabilities:

(i) 1.40:1, 1971
(ii) 2.67:1, 1972

(b) Ratios of long-term debt and guarantees to equity which leave ample room for further borrowing:

(i) 0.50:1, 1971
(ii) 0.31:1, 1972

(c) That total assets increased from Eth$81.5 million in 1971 to Eth$94 million in 1972.

Foreign borrowings, other than from the World Bank Group, are from USAID and Kreditanstalt fur Wiederaufbau.

10. AIDB's provisional income statement for the year ended July 7, 1972 shows profits before taxes of Eth$2.2 million - equivalent to 2.5% of total assets on an annual basis. The low level of profitability (which is, however, rising) is due to the poor dividend and interest return on the portfolio taken over by AIDB on its formation.

11. Agricultural Inputs and Marketing Services (AIMS) was established in 1972 as a share company under the Commercial Code. It is a subsidiary of AIDB, which holds over 90% of its shares. The main purposes for which the company was established are set out in its Memorandum of Association:

(a) Import, procure, market, distribute and sell agricultural inputs such as fertilizers, seeds, pesticides, herbicides and implements;

(b) Provide operational facilities to farmers and agricultural cooperatives;

(c) Provide cooperatives, agricultural development projects and individual farmers with agricultural inputs on credit; and

(d) Provide warehouse for storing cereals.

12. As of mid-1972, AIMS was still in the process of being set up. A general manager with previous experience in banking had been appointed. Some clerical staff, but no other management staff were in post. Policy guidelines were in course of preparation. It is clear that for some time to come AIMS will have to rely heavily on its parent AIDB for management support.

Agreement on Supply of Inputs

13. Under the agreement with the Ministry of Agriculture, AIDB/AIMS undertakes to procure the necessary inputs for the farmers in the minimum package areas. EPID gives an estimate of the quantities required but the final decision rests with the AIDB. AIDB/AIMS also undertakes to deliver the supplies to the marketing centers. The prices, which are set jointly by EPID and AIDB, may differ from one area to another due to variations in transport cost. The prices give full coverage of all cost and presently include a mark-up of 5% as a precaution against bad debts. At present the distribution costs of the market centers are absorbed under the EPID budget. In order to avoid a price increase when the centers are converted to co-operative societies, EPID charges a fee designed to cover distribution costs.

Credit Agreement

14. In the provision of credit EPID acts as an agent of AIDB within the MP areas and with the following restrictions:

(a) Loans can only be given in kind and for the following inputs: seed, fertilizers, herbicides, pesticides, tools, farm implements, and building materials for storage facilities.

(b) Credit is presently granted for at most 75% of the total cost of the inputs.

(c) Only farmers with holdings of 20 hectares or less qualify.

(d) Loans shall have a duration of less than one year.

(e) A written agreement shall be made and loans shall be secured by the personal guarantee of two persons of good repute in the region.

(f) Farmers will be charged a rate of 1% per month for 9 months.

(g) If 90% of the borrowers in any sub-area (model farmer area) have not repayed their loans in full within two months after the due date, no further credit operations shall be undertaken in the area. No farmer with outstanding debt will be eligible for a new loan.

The Ministry of Finance has agreed to reimburse AIDB for any amount above 5% that is overdue three months after the due date.

15. Loan applications are reviewed by extension agents with the help of model farmers who ascertain that the farmer in question lives within the sub-area. After the application has been approved and the farmer and his guarantors have signed the necessary documents, the farmer collects the supplies at the marketing center in his area. Repayments are made to the marketing center, which retains all documents (with copies at EPID headquarters). The farmers are trained in the procedures and operations of the centers, which in due course are to be converted to Cooperative Societies. The society would then deal directly with AIDB/AIMS. EPID would continue to supervise activities and provide supporting staff until the volume of business has reached sufficient magnitude for the society to employ its own staff.

16. There is little experience in Ethiopia with providing credit to small farmers against their crops. The institutional framework is lacking, and the absence of proper grading of grains would make it impracticable to administer such a system. An important task of the proposed national grain storage and marketing project would be to introduce the improvements which would make such a system possible.

Financial Impact on AIDB

17. The cash flow projection set out in Table 1 of this Annex shows the financial impact of the Minimum Package Program on AIDB/AIMS. Charges and other transactions between the two which are not relevant to the Program have been ignored.

April 30, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

AIDB/AIMS Cash Flow from the Programme

(Eth$'000)

	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91
INFLOW																		
Loans from Government for -																		
Farm inputs 1/	1,045	1,581	1,985	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Permanent Working Capital 2/	623	624	623	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cash deposits on inputs 3/	403	710	1,077	1,500	1,961	2,448	2,929	3,379	3,742	4,070	4,246	4,217	4,509	4,523	4,528	4,528	4,515	4,494
Farmers' repayments 4/		1,319	2,323	3,522	4,905	6,416	8,006	9,579	11,050	12,237	13,309	13,873	13,789	14,744	14,789	14,809	14,805	14,764
Total Inflow	2,071	4,234	6,008	5,022	6,866	8,864	10,935	12,958	14,792	16,307	17,555	18,090	18,298	19,267	19,317	19,337	19,320	19,258
OUTFLOW																		
Purchase of inputs	1,613	2,841	4,308	6,000	7,847	9,793	11,717	13,517	14,969	16,280	16,974	16,868	18,036	18,091	18,114	18,111	18,060	17,985
Loan service 5/	148	299	470	470	470	470	1,005	1,004	1,005	1,004	1,005	1,004	1,005	1,004	1,005	-	-	-
Operating expenses 6/	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1,000	1,000	1,000
Total Outflow	2,011	3,440	5,128	6,870	8,767	10,763	13,272	15,121	16,624	17,984	18,729	18,672	19,891	19,995	20,069	19,111	19,060	18,985
CASH SURPLUS 7/	60	794	880	(1,848)	(1,901)	(1,899)	(2,337)	(2,163)	(1,832)	(1,677)	(1,174)	(582)	(1,593)	(728)	(752)	226	260	273
CUMULATIVE	60	854	1,734	114	2,015	(3,914)	(6,251)	(8,414)	(10,246)	(11,923)	(13,097)	(13,679)	(15,272)	(16,000)	(16,752)	(16,526)	(16,266)	(15,993)

1/ Total cost of inputs (Annex 9, Table 1), less farmers 25% deposit.
2/ Estimated additional funds required to enable AIDB to order fertilizer without receiving all repayments due from farmers on previous credits.
3/ 25% of total costs of inputs.
4/ 9 months term at 1% per month; interest and principal repayable contemporaneously on maturity. Including charges for EPID's services (Annex 9, Table 11).
5/ Interest only for six years followed by nine equal annual instalments combining principal and interest.
6/ Estimated AIDB/AIMS administrative costs of operating the programme.
7/ Despite the annual cash surpluses shown at the end of each of the first three years, there are in fact cash shortages in certain months during each year. As these cash requirements are for ordering fertilizer, they are mainly foreign exchange requirements, hence the permanent working capital provided above.

May 8, 1973

ANNEX 4
Table 1

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Minimum Package Program

Evolution of the Concept

1. Past efforts to develop peasant farming have had a negligible effect; this has been due to lack of innovations, absence of supporting services (such as supply of inputs, credit and marketing) and lack of supervision of the extension service. It was decided in 1967 to focus development on areas of high potential and to use an integrated package approach. The first projects launched, Chilalo Agricultural Development Unit (CADU) and Wolamo Agricultural Development Unit (WADU), were of a comprehensive nature emphasizing a variety of innovations and including a wide spectrum of activities. Both projects have demonstrated methods whereby peasant farmers can be made to adopt new techniques rapidly.

2. Simultaneously with the establishment of CADU, a fertilizer project was initiated under the FAO - Freedom From Hunger Campaign. This project demonstrated convincingly that the use of fertilizer would give substantial benefits in many parts of Ethiopia if applied to cereals.

3. These comprehensive projects were too expensive to attain a broader geographical coverage in a reasonable period of time. It was thus necessary to define an initial minimum effort which would have an impact on peasant farming. The Minimum Package (MP) approach encompasses several well-coordinated activities: demonstration of locally tested innovations, supply of the recommended inputs, credit for their procurement and instruction in their use. The effort initially concentrates on certain crops (food grains) and certain innovations (fertilizer, improved seed). The approach may gradually grow more comprehensive in terms of innovations, commodities and activities. The comprehensive projects are intended to act as spearheads in this process.

Organization and Management

4. The Extension and Project Implementation Department (EPID) within the Ministry of Agriculture was established in 1971 and given the responsibility for implementing the MP as well as Comprehensive Package Projects. The Department enjoys considerable autonomy. It employs its staff on contract and has its own accounting and procurement service. It uses advanced budgeting and cost accounting methods. EPID employs in headquarters a group of specialists concerned with research, staff training, supervision, planning and evaluation.

Implementation Principles

5. A Minimum Package area has roughly 10,000 farmers. It s headed by a supervisor (university graduate) and has five extension districts, initially with one agent in each. The agent cultivates a central 1 ha field for demonstration and trial purposes and establishes about 20 local demonstrations with the selected model farmers. The latter are elected from sub-areas containing about 100 farm families each.

6. Each extension district also contains a marketing center for the distribution of inputs and the credit operations (see Annex 4). The Center is staffed by a foreman (a 10th Grader, who is given special training, presently 6 weeks). The marketing center will eventually be converted to a cooperative society.

Selection of Areas - Stage of Development

7. In order to prepare for the launching of a Minimum Package area, surveys of local farming conditions and field experiments are conducted during a period of about two years (observation stage). In the third year the innovations are demonstrated more widely, their acceptance tested and preparations for launching the MP Program undertaken (demonstration stage). The Minimum Package approach was launched in 1971 and there are now 18 Minimum Package areas, 12 Demonstration areas and 42 Observation areas (see Table 1). Thus far, all areas are situated along existing all-weather roads.

The Model MP Area

8. The Minimum Package areas vary considerably in ecological conditions, land tenure arrangements, access to market, population density, etc. Although projects for the next three years will be selected from existing Demonstration and Observation areas, there is no way of telling which areas will be selected or when they will be selected. After 1975 the Minimum Package areas will be based on Observation areas which are not yet in the Program. For the production, financial and economic projections, therefore, a Model Minimum Package area has been constructed on the basis of the average characteristics of existing areas (holding size, areas under different crops, etc.). Experience as to adoption rates and yields has been drawn from ongoing comprehensive projects and the FAO fertilizer program.

Planning and Evaluation

9. The calculations resulting from this model are essentially illustrative, they need to be updated each year on the basis of experience and actual expansion plans. For this purpose EPID compiles an annual work program as a basis for its budget proposals, followed up by cost accounting and quarterly performance reports from the Minimum Package areas. Crop sampling is also undertaken in all areas.

February 1973

ANNEX 5
Table 1

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Areas where Minimum Package Program Underway

Province	Areas 1971	Areas 1972
1. Eritrea	12 agents 1/	12 agents 1/
2. Begemdir	MP Gondar DA Woreta OA Dabat	MP Gondar Woreta DA Dabat
3. Tigre	MP Endaselassie DA Mekele OA Axum Adua Adigrat Wukro Maychew	MP Endaselassie Axum-Adua DA Mekele Adigrat OA Maychew Shiraro
4. Gojam	MP Finote Selam DA Gilgel Abay OA Dangla Injibara Debre Marcos CCS Lumame	MP Finote Selam Gilgel Abay DA Lumame-Dejen OA Debre Marcos Bichena
5. Welo	MP Haik-Woldia OA Alamata Kombolcha	MP Haik-Woldia DA Kombolcha OA Korem Kutaber
6. Wellega	MP (Bako; See Shewa) DA Digga OA Gimbi Wayo	MP (Bako; See Shewa) Digga DA Wayo OA Gimbi Dembi Dolo Sasiga Billa Herna
7. Shewa	MP Bako Tullu Bolo Shashemene TA Ambo DA Holetta Debre Berhan CCS Debre Zeit Mojo Nazreth Butajira Wolkite Chancho OA Akaki Fiche Gorfu Sendafa Mehal Meda Molale Robi	MP Bako Tullu Bolo Shashemene Ambo Holetta Nazreth DA Debre Berhan Chancho Butajira OA Indibir Sendaba Sheno Robi Molale Mehal Meda
8. Illubabor	OA Bedele Hurumu Metu Gore Gambela	DA Bedele OA Hurumu Metu Gore Gambela Tepi
9. Kefa	MP Asendabo TA Jimma OA Agaro Seku	MP Asendabo Jimma OA Agaro Mizan Teferi
10. Arussi	No activity (CADU)	
11. Hararge	MP Kersa OA Asbe Teferi Gelemso Bedessa Hirna Deder Kombolcha Jijiga	MP Kersa DA Asbe Teferi OA Bedessa Gelemso Deder Kombolcha Babile Jijiga
12. Gemu Gofa	OA Chencha Gidole Lante	DA Chencha OA Gidole Lante Bako Kelem
13. Sidamo	MP (Shashemene; See Shewa) OA Dila Kibre Mengist CCS Bodeti	MP (Shashemene; See Shewa) OA Dila Yirba Muda Agere Selam Bore CCS Bodeti
14. Bale	OA Dodola Adaba Robi	MP Adaba Robi Goro

Note: MP - Minimum package area
TA - Training area (1971 only)
DA - Demonstration area
OA - Observation area
CCS - Continued Credit Scheme (from FAO fertilizer program)

1/ Still operating on the pre-MP approach.

February 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Farmers' Participation, Adoption of Inputs and Incremental Output

	Unit	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
MFP	No.	9	18	28	38	48	58	68	78	88	88	88
Farmers participating	'000	4.7	13.6	30.0	57.7	97.3	148.1	206.4	270.1	333.7	396.7	454.7
Area fertilized	'000 ha	4.8	9.8	26.3	52.3	90.1	134.3	183.3	235.6	289.5	342.0	388.5
of which: under improved seeds	"	0.5	1.2	1.9	4.3	10.5	21.6	38.7	61.6	89.2	120.1	152.7
under improved harrows	"	-	0.5	1.0	2.6	5.2	9.0	13.4	18.3	23.6	28.9	34.2
Average area fertilized per farmer	ha	1.0	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Net incremental output: wheat	'000 m.tons	0.3	0.7	2.0	4.7	9.2	15.4	22.1	29.5	37.4	45.4	52.9
teff	"	0.8	1.6	4.2	8.2	14.4	22.0	31.0	41.3	52.4	63.8	74.6
maize	"	1.2	2.5	6.3	12.4	21.3	31.7	45.0	60.0	76.2	92.6	108.5
sorghum	"	1.0	2.1	5.4	10.3	17.1	24.7	33.9	43.8	54.0	64.0	73.1
Total	"	3.3	6.9	17.9	35.6	62.0	93.8	132.0	174.6	220.0	265.8	309.1
Farmgate value of net incremental output: wheat	Eth$'000	45	116	330	765	1,493	2,510	3,586	4,791	6,080	7,379	8,594
teff	"	149	299	785	1,561	2,745	4,208	5,929	7,886	10,007	12,182	14,144
maize	"	94	199	507	1,016	1,723	2,537	3,535	4,622	5,714	6,761	7,701
sorghum	"	129	262	669	1,237	2,057	2,960	3,983	5,036	6,077	7,045	7,676
Total	"	417	876	2,291	4,579	8,018	12,215	17,033	22,335	27,878	33,367	38,115
Reduction in storage losses		-	-	3	12	34	75	139	231	355	523	745
Total incremental value		417	876	2,294	4,591	8,052	12,290	17,172	22,566	28,233	33,890	38,860

	Unit	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992 & after
MFP areas in operation	No.	88	88	88	88	88	88	88	88	88	88	88
Farmers participating	'000	501.7	536.7	559.7	572.7	578.7	578.7	578.7	578.7	578.7	578.7	578.7
Area fertilized	'000 ha	426.0	453.0	468.0	477.0	482.0	484.0	484.0	484.0	484.0	484.0	484.0
of which: under improved seeds	"	185.8	217.4	245.4	268.2	285.3	296.6	303.4	307.2	308.9	309.6	309.8
under improved harrows	"	38.9	42.6	45.3	46.8	47.7	48.2	48.4	48.4	48.4	48.4	48.4
Average area fertilized per farmer	ha	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Net incremental output: wheat	'000 m.tons	59.3	64.5	68.2	70.7	72.3	73.2	73.6	73.8	73.9	73.9	73.9
teff	"	84.1	92.1	97.9	102.4	105.5	107.5	108.5	109.1	109.4	109.6	109.6
maize	"	122.4	133.9	142.3	148.2	152.2	154.4	155.5	156.6	156.3	156.3	156.3
sorghum	"	80.4	85.7	88.8	90.6	91.7	92.1	92.2	92.2	92.2	92.2	92.2
Total	"	346.2	376.2	397.2	411.9	421.7	427.2	429.8	431.1	431.8	432.0	432.0
Farmgate value of net incremental output: wheat	Eth'000	9,533	10,326	10,909	11,306	11,567	11,712	11,774	11,804	11,817	11,821	11,821
teff	"	15,820	17,173	18,119	18,941	19,520	19,885	20,080	20,191	20,246	20,269	20,276
maize	"	8,443	8,971	9,247	9,630	9,890	10,038	10,106	10,142	10,157	10,162	10,162
sorghum	"	8,036	8,142	7,992	7,704	7,792	7,830	7,833	7,833	7,833	7,833	7,833
Total	"	41,852	44,612	46,267	47,581	48,769	49,465	49,793	49,970	50,053	50,085	50,092
Reduction in storage losses	"	1,032	1,376	1,733	2,079	2,401	2,693	2,953	3,167	3,325	3,411	3,411
Total incremental value	"	42,884	45,988	48,000	49,660	51,170	52,158	52,746	53,137	53,378	53,496	53,503

February, 1973

ANNEX 9

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Rural Roads

Introduction

1. Farm-to-market transport is one of the principal costs to the Ethiopian farmer. Throughout large areas produce is transported by pack animals over dirt trails at very high cost; this tends to inhibit farmers from producing for the market. Where truck transport has been made possible through the provision of low standard, dry-weather roads, substantial freight cost savings have been achieved and noticeable agricultural development has taken place in the immediate vicinity.

2. The Program calls for the construction and maintenance of low-class roads to serve agricultural areas selected for minimum package development. These roads will link groups of farms with existing main roads, thus facilitating both the transport of equipment and extension services to the farms and the extraction of produce. Some roads will allow expansion around existing MP areas while others will open up entirely new areas for development.

3. MP development has normally been confined to within 5 km of an existing all-weather road. To allow for expansion of the Program from this well-established nucleus, it is estimated that each MP area will require, beginning in its fourth year of operation, about 10 km of new farm-to-highway roads annually for about five years. Thus during the Project period about 550 km of these roads would be built to serve existing MP areas. Furthermore, to ensure that the Program is not delayed for lack of suitable roads along which new MP areas can be established, penetration roads will begin to be constructed in 1975. About 110 km are programmed in that year and about 500 km in the following year; i.e., a total of 610 km during the Project period. The Project includes the construction and maintenance of these 1,160 km of roads.

Design Standards

4. The roads to be constructed are basically designed to provide good access to farming areas during the dry season, and minimum access during the wet season. 10-ton trucks are likely to be used for crop extraction, which takes place in the dry season after the harvest, and no problems of passage are expected. The roads should also be passable for extension agents using four-wheel drive vehicles in all but the wettest conditions. Because of the low traffic volumes expected, most of it in the dry season, the roads do not

need to be constructed to a high standard. It is therefore proposed that, at least initially, Project roads be built to minimum, dry-weather standard, comprising:

Clearing width	-	4.5 meters
Roadway width	-	10.0 meters
Maximum gradient	-	14%

In practice, this will mean a bulldozed or graded track following the ground profile, with the central crown of the roadway surface being raised by using material excavated from drainage ditches. Gravel, consisting of locally available material, will be provided selectively in weak areas. Particular attention will be paid to drainage, which must be good. The roads will be further improved as required, particularly through the addition of more gravel as traffic volumes increase with agricultural and other development.

Construction Technique

5. Roads of this standard do not require highly sophisticated engineering construction techniques or structures. The center line will be determined by an experienced construction engineer on the basis of his judgment of the most efficient alignment and location, and will be staked out on the ground by him. Generally, roads will be located to follow watersheds or, in the case of hilly terrain, the contour, thus reducing the need for excavation to an absolute minimum. Construction will be supervised by the construction engineer who (as stated above) will need considerable experience in constructing roads of this nature, since he will apply the proposed standards as construction progresses on the basis of his judgment. It is anticipated that no fill material will be required and that all basic work can be accomplished by bulldozers or motor-graders and hand labor. Drainage will consist of paved fords. These methods should pose no serious problems and are ideally suited to labor intensive methods of construction. The actual labor content of the construction unit will, however, vary from area to area depending on its availability.

6. As the exact location of the roads to be built is not yet known, it is not possible to assess the extent of the work required, nor to determine precise cost estimates. However, cost estimates ranging between Eth$8,000 (US$3,500) and Eth$12,000 (US$5,250) per kilometer, depending on the class of road, should serve as a reasonable basis until more information becomes available. The lower figure would apply to roads carrying light traffic and requiring little or no excavation or gravel, and the higher figure to roads in more difficult terrain or requiring more gravel because of greater traffic volumes. Maintenance costs for both types of road are estimated at Eth$500 per km annually.

Execution

7. To date, the Imperial Highway Authority (IHA) has confined itself to the construction and maintenance of roads linking major population centers, i.e., those which comprise the main highway network. Rural roads have been largely neglected. Construction and maintenance of roads serving specific agricultural projects have been undertaken on a project-to-project basis by special units established for this purpose. The Government, increasingly aware of the importance of rural roads to economic development and of the desirability of eliminating this fragmentation, has undertaken an investigation of the problem with a view to making proposals for the planning, development, maintenance and financing of all low cost roads serving agricultural areas. The results of the investigation are expected to be available early in 1973; funds are provided under the Bank Group's Fifth Highway Project (Credit 332-ET) to finance the services of expatriate experts to assist the Government in implementing the recommendation of the study.

8. The organization given responsibility for rural roads as a result of the study would eventually take over responsibility for all low cost roads, including those to be built under this Project; however, such an organization could not be operational for several years. In the meantime, construction units responsible to IHA would be established under the Project for the construction and maintenance of the Project roads. The number of units required to carry out the road program is unknown since the exact requirements in terms of length, location, terrain, traffic, etc. have not yet been identified, but provision is made for up to five units. The estimated manpower and equipment requirements for each unit are shown in Table 1 and include mobile workshops and mechanics for field maintenance and minor repairs, with major repairs to be carried out by local suppliers. The amount of equipment actually purchased for each unit would be adjusted depending on the availability of hand labor.

Rural Roads Study

9. Ethiopia is not unique in its concern for the role of rural roads in economic development; it is a problem which faces developing countries the world over. Little is known about the potential impact of such roads. Information on the supply and demand functions of the affected products is seldom available, and not enough is known about the institutional arrangements or complementary investments necessary to elicit the optimum results.

10. As part of its research effort, the Bank Group is undertaking a long-term study of the impact of agricultural feeder roads in a number of developing countries. The development of areas influenced by the construction of feeder roads is being monitored over several years with socioeconomic surveys before, during, and after road construction. The observation of how agricultural production responds to different investment patterns in transportation and agriculture will help to identify and develop criteria for rural road investments. One road selected for study under this research program is

the Agara-Chira feeder road which is to be constructed under the Fifth Highway Project. Some US$19,000 has been allocated from the Bank's research budget for the baseline surveys being carried out by the Institute of Development Research at the Haile Selassie I University in Addis Ababa. Subject to satisfactory completion of this survey in mid-1973, another US$100,000 is included in the present project to allow the Institute to follow up its work on this road and to undertake similar surveys and follow-up studies on two roads serving MP areas.

April 30, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Estimated Requirements for each Rural Road Construction Unit

I. EQUIPMENT:	No.	Type	Unit Price	Total cif Cost
			- - - -US$'000 - - - -	
	2	bulldozers (125 HP)	45.0	90.0
	1	motorgrader (125 HP)	40.0	40.0
	1	roller (6-8 ton)	14.0	14.0
	1	loader (1 m^3)	35.0	35.0
	2	concrete mixers (7/8 cap)	4.0	8.0
	3	water trailers (1,000 l)	2.5	7.5
	2	water pumps (5 cm)	1.0	2.0
	1	air compressor	5.0	5.0
	1	workshop trailer	20.0	20.0
	4	4-wheel drive vehicles	5.0	20.0
	1	fuel tanks (10,000 l)	5.0	5.0
	4	trucks (5 ton)	14.0	56.0
	2	wheeled tractors (60 HP)	10.0	20.0
	1	stone crusher	50.0	50.0
	1	low-loader*	40.0	40.0
		tents		1.0
		survey equipment		3.0
		minor tools		5.0
		spare parts		50.5
		Estimated equipment cost:		472.0

II. TECHNICAL ASSISTANCE:
1 Civil engineer
1 Plant operator/instructor

III. MANPOWER:
1 Superintendent of works (civil)
1 Superintendent of works (mechanical)
3 Mechanics
1 Electrician/welder
1 Storekeeper
2 Bulldozer operators
1 Motorgrader operator
1 Roller driver
1 Loader operator
16 Drivers/stationery machine operators
2 Masons
2 Carpenters
4 Mechanic assistants
14 Laborers
2 Chainmen

* One only, for use by all units.

May 2, 1973

ETHIOPIA

Agricultural Minimum Package Project

Function of the Evaluation Unit in the Minimum Package Program

1. The evaluation unit should perform four principal functions:

(1) Project monitoring for efficient and effective management;

(2) Identification of new activities (innovations) to be included in later phases of the Program;

(3) Identification of new MP areas; and

(4) Assessment of benefits derived from the Project.

2. To this effect, the terms of reference for the evaluation unit should take account of the following:

(1) Project Monitoring: recording progress of the main components of the Project such as: time spent on each activity, quantities of inputs distributed, volume of credit extended and record of repayments.

(2) Identification of New Activities (Innovations): feasibility studies of prospective innovations.

(3) Identifying New MP Areas: appraising prospective MP areas.

(4) Assessment of Incidence of Project Benefits: conducting baseline and follow-up surveys involving important economic, socioeconomic, and institutional variables such as the level of input use, crop yields, farm incomes, consumption patterns, family customs, work habits, education levels, land ownership and tenancy laws, health and welfare, and social activities.

February 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Summary of Project Costs by Years
(Eth$'000)

	Local Cost				Foreign Exchange				Total Cost				Foreign Exchange
	1974	1975	1976	Total	1974	1975	1976	Total	1974	1975	1976	Total	%
Farm Inputs													
Fertilizer	524	755	872	2,151	646	932	1,080	2,658	1,170	1,687	1,952	4,809	55
Seeds	58	136	273	467	36	80	146	262	94	216	419	729	36
Harrows	26	44	63	133	7	11	16	34	33	55	79	167	20
Storage	5	13	25	43	5	12	22	39	10	25	47	82	48
Miscellaneous Supplies	43	62	75	180	43	63	75	181	86	125	150	361	50
Sub-total	656	1,010	1,308	2,974	737	1,098	1,339	3,174	1,393	2,108	2,647	6,148	52
Permanent Working Capital for AIDB	450	225	166	841	550	275	204	1,029	1,000	500	370	1,870	55
Roads													
Farm-to-Highway	216	445	713	1,374	504	1,040	1,662	3,206	720	1,485	2,375	4,580	70
Penetration	-	396	1,817	2,213	-	924	4,238	5,162	-	1,320	6,055	7,375	70
	216	841	2,530	3,587	504	1,964	5,900	8,368	720	2,805	8,430	11,955	70
Rural Road Study	96	51	83	230	-	-	-	-	96	51	83	230	0
Sub-total	312	892	2,613	3,817	504	1,964	5,900	8,368	816	2,856	8,513	12,185	70
Fund for Marketing Credit	400	600	700	1,700	-	-	-	-	400	600	700	1,700	0
Extension & Support Services													
EPID													
Headquarters - investment	349	169	52	570	263	123	40	426	612	292	92	996	43
- operating	1,758	1,806	1,612	5,176	1,622	1,667	1,318	4,607	3,380	3,473	2,930	9,783	48
Obs. Area - investment	6	6	6	18	3	3	3	9	9	9	9	27	33
- operating	283	283	283	849	3	3	3	9	286	286	286	858	1
Dem. Areas - investment	46	46	46	138	91	91	91	273	137	137	137	411	66
- operating	300	300	300	900	41	41	41	123	341	341	341	1,023	12
MP Areas - investment	182	188	201	571	748	748	815	2,311	930	936	1,016	2,882	80
- operating	2,888	3,727	4,550	11,165	276	378	484	1,138	3,164	4,105	5,034	12,303	4
Subtotal - investment	583	409	305	1,297	1,105	965	949	3,019	1,688	1,374	1,254	4,316	70
Subtotal - operating	5,229	6,116	6,745	18,090	1,942	2,089	1,846	5,877	7,171	8,205	8,591	23,967	21
Coop. Dev. Dept.- investment	20	20	15	55	45	45	50	140	65	65	65	195	72
- operating	70	142	219	431	11	20	24	55	81	162	243	486	11
Sub-total	90	162	234	486	56	65	74	195	146	227	308	681	29
Project Preparation and Planning	-	-	-	-	765	765	542	2,072	765	765	542	2,072	100
Total before contingencies	7,720	9,414	12,071	29,205	5,659	7,221	10,854	23,734	13,379	16,635	22,925	52,939	45
Contingencies	647	1,174	1,961	3,782	441	899	1,823	3,163	1,088	2,073	3,784	6,945	45
TOTAL PROJECT COST	8,367	10,588	14,032	32,987	6,100	8,120	12,677	26,897	14,467	18,708	26,709	59,884	43

May 7, 1973

ANNEX 5
Table 1

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Summary of MP Program Costs 1/
(Eth$'000)

	EPID				Roads		Inputs					
	H.Q.	Obs. Areas	Dem. Areas	MP Areas	Co-op. Dev.Dept.	Farm Highway	Pene-tration	Fertilizer	Seeds	Harrows	Storage	Miscell-laneous	Total
1971	902	316	295	887	-	-	-	223	10	-	-	15	2,648
1972	1,486	295	552	1,760	-	-	-	452	20	10	-	33	4,608
1973	2,679	295	478	2,476	-	-	-	1,204	28	18	2	81	7,261
1974	3,992	295	478	4,094	146	720	-	2,374	94	33	10	167	12,403
1975	3,765	295	478	5,041	227	1,485	1,320	4,061	216	55	25	292	17,260
1976	3,022	295	478	6,050	308	2,375	6,055	6,013	419	79	47	442	25,583
1977	2,910	143	478	7,097	449	3,315	6,305	8,206	668	102	77	621	30,371
1978	2,992	-	478	8,012	531	4,305	6,555	10,545	968	117	116	822	35,441
1979	2,571	-	-	8,884	612	4,625	805	12,958	1,313	128	161	1,035	33,092
1980	2,571	-	-	9,213	753	4,950	805	15,308	1,650	137	225	1,251	36,863
1981	2,571	-	-	9,466	834	5,200	805	17,412	1,997	144	305	1,455	40,189
1982	2,571	-	-	9,637	915	5,450	805	19,068	2,254	149	406	1,629	42,844
1983	2,571	-	-	8,892	915	4,900	805	20,277	2,655	149	508	1,770	43,442
1984	2,571	-	-	8,892	915	4,300	805	20,948	2,815	149	572	1,869	43,836
1985	2,571	-	-	8,892	915	3,650	805	21,351	3,061	148	615	1,938	43,946
1986	2,571	-	-	8,892	915	2,950	805	21,574	3,184	143	642	1,984	43,660
1987	2,571	-	-	8,892	915	2,200	805	21,664	3,262	140	660	2,010	43,119
1988	2,571	-	-	8,892	915	2,200	805	21,664	3,297	137	671	2,022	43,147
1989	2,571	-	-	8,892	915	2,200	805	21,664	3,313	144	661	2,032	43,197
1990	2,571	-	-	8,892	915	2,200	805	21,664	3,330	149	636	2,032	43,194
1991	2,571	-	-	8,892	915	2,200	805	21,664	3,330	149	585	2,032	43,143
1992 & After	2,571	-	-	8,892	915	2,200	805	21,664	3,330	149	510	2,032	43,068

1/ Excluding permanent working capital for AIDB, Fund for marketing credit, and contingencies.

May 2, 1973

ANNEX 9
Table 2

ANNEX 1
Table 1

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

AMID Costs - Headquarters
(Eth$'000)

	Fiscal Year (Ending June)		IDA Financed Period																	
			1971		1972		1973		1974		1975		1976		19**		1978		19** & After	
	Unit	Unit Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Investments																				
Office Building	-	-	-	-	-	-	-	-	-	220	-	200	-	-	-	-	-	-	-	-
Office Equipment	-	-	-	-	-	21	-	24	-	69	-	12	-	12	-	12	-	12	-	15
Vehicles		10	2	14	5	50	8	80	8	80	8	80	8	80	8	80	8	80	8	80
Staff Training	-	-	-	-	-	-	-	-	-	77	-	-	-	-	-	-	-	47	-	32
Seed Multiplication	-	-	-	-	-	-	-	-	-	40	-	-	-	-	-	-	-	-	-	-
Applied Research	-	-	-	-	-	-	-	-	-	76	-	-	-	-	-	-	-	-	-	-
Soil Management	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	50	-	-	-	15
Total Investments			-	14	-	71	-	104	-	612	-	292	-	92	-	92	-	139	-	112
Operating Costs																				
Direction - Dep. Director, Eth.	Man Year	15	1	13	1	14	1	15	1	15	1	15	1	15	1	15	1	15	1	15
- Dep. Director, Expat.	"	75	1	75	1	75	1	75	1	75	1	75	1	75	1	75	1	75	1	75
Evaluation Group - Head, Eth.	"	13	-	-	-	-	1	13	1	13	1	13	1	13	1	13	1	13	1	13
- Economist, Expat.	"	70	-	-	-	-	1	70	1	70	1	70	1	70	1	70	1	70	-	-
- Economist, Eth.	"	10	-	-	-	-	1	10	1	10	1	10	1	10	1	10	1	10	1	10
Liaison Division - Head, Eth.	"	13	-	-	1	13	1	13	1	13	1	13	1	13	1	13	1	13	1	13
- Economist, Expat.	"	70	1	70	1	70	1	70	1	70	-	-	-	-	-	-	-	-	-	-
- Economist, Eth.	"	10	-	-	-	-	-	-	-	-	1	10	1	10	1	10	1	10	1	10
Common Services Division - Head, Expat.	"	75	-	-	1	75	1	75	1	75	1	75	-	-	-	-	-	-	-	-
- Assistant Head, Eth.	"	10	1	7	1	8	1	10	1	10	1	10	1	10	1	13	1	13	1	13
- Personnel Officer, Eth.	"	10	-	-	1	10	1	10	1	10	1	10	1	10	1	10	1	10	1	10
- Legal Adviser, Eth.	"	12	-	-	-	-	1	12	1	12	1	12	1	12	1	12	1	12	1	12
- Chief Accountant, Eth.	"	13	-	-	1	13	1	13	1	13	1	13	1	13	1	13	1	13	1	13
- Accountant, Expat.	"	60	-	-	1	60	1	60	1	60	1	60	1	60	1	60	1	60	-	-
- Bookkeepers and Clerks, Eth.	"	6	1	6	3	18	4	24	5	30	6	36	7	42	7	42	7	42	-	-
- Internal Auditors, Eth.	"	10	-	-	-	-	1	10	1	10	1	10	1	10	1	10	1	10	1	10
- Asst. Internal Auditors, Eth.	"	6	-	-	-	-	2	12	4	24	6	36	7	42	7	42	7	42	7	42
- Cashier, Eth.	"	5	-	-	1	5	1	5	1	5	1	5	1	5	1	5	1	5	1	5
- Procurement Officer, Eth.	"	8	2	12	2	12	1	8	1	8	1	8	1	8	1	8	1	8	1	8
- Building Superintendant, Eth.	"	8	-	-	-	-	1	8	1	8	1	8	1	8	1	8	1	8	1	8
- Store Keeper, Eth.	"	6	1	5	1	8	1	6	1	6	1	6	1	6	1	6	1	6	1	6
- Chief Secretary, Eth.	"	9	1	7	1	9	1	9	1	9	1	9	1	9	1	9	1	9	1	9
- Secretaries and Typists, Eth.	"	5	2	9	4	20	7	35	8	40	9	45	9	45	9	45	9	45	9	45
- Office Clerks, Eth.	"	3	-	-	-	-	3	9	3	9	4	12	4	12	5	15	5	15	5	15
- Mechanic, Eth.	"	6	-	-	-	-	1	6	1	6	1	6	1	6	1	6	1	6	1	6
- Drivers Eth.	"	2	4	8	6	12	8	16	10	20	10	20	10	20	10	20	10	20	10	20
- Messengers, guards, etc., Eth.	"	0.6	7	4	7	4	9	5	9	5	10	6	10	6	10	6	10	6	10	6
Extension Division - Head, Eth.	"	15	1	11	1	11	1	15	1	15	1	15	1	15	1	15	1	15	1	15
- Assistant Head, Expat.	"	70	-	-	1	70	1	70	1	70	1	70	1	70	1	70	1	70	1	70
- Assistant Head, Eth.	"	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	10	1	10
- Regional Coordinators, Eth.	"	10	-	-	5	50	6	60	7	70	8	80	9	90	10	100	11	110	12	120
- Storage Supervisors, Eth.	"	8	-	-	-	-	6	48	6	48	6	48	6	48	6	48	6	48	6	48
Agronomic Group - Head, Expat.	"	70	1	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
- Head, Eth.	"	15	-	-	1	15	1	15	1	15	1	15	1	15	1	15	1	15	1	15
- Agronomist, Expat.	"	65	2	130	2	130	2	130	2	130	1	65	-	-	-	-	-	-	-	-
- Agronomist, Eth.	"	10	4	40	2	20	3	30	4	40	5	50	5	50	5	50	5	50	5	50
Animal Husbandry Group - Head, Expat.	"	70	-	-	-	-	1	70	1	70	1	70	-	-	-	-	-	-	-	-
- Head, Eth.	"	13	-	-	-	-	1	13	1	13	1	13	1	13	1	13	1	13	1	13
- Expert, Eth.	"	10	-	-	-	-	1	10	2	20	3	30	3	30	3	30	3	30	3	30
Credit and Marketing Group - Head, Eth.	"	13	1	9	1	9	1	13	1	13	1	13	1	13	1	13	1	13	1	13
- Economist, Expat	"	65	1	65	1	65	1	65	1	65	1	65	1	65	1	65	1	65	-	-
- Economist, Eth.	"	10	2	17	3	25	5	50	6	60	7	70	7	70	7	70	7	70	7	70
Co-op Promotion Group - Head, Expat.	"	65	-	-	-	-	1	65	1	65	1	65	-	-	-	-	-	-	-	-
- Head, Eth.	"	13	-	-	-	-	1	13	1	13	1	13	1	13	1	13	1	13	1	13
- Expert, Expat.	"	60	-	-	-	-	1	60	1	60	1	60	1	60	1	60	1	60	-	-
- Expert, Eth.	"	10	-	-	-	-	1	10	2	20	4	40	4	40	4	40	4	40	4	40
Home Economics Group - Head, Eth.	"	12	-	-	1/2	6	1	12	1	12	1	12	1	12	1	12	1	12	1	12
- Home Economist, Eth.	"	9	-	-	-	-	1	9	2	18	3	27	3	27	3	27	3	27	3	27
- Home Economist Agent, Eth.	"	3	3	10	3	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Consultants - Marketing, Expat.	"	75	-	-	-	-	2	-	2	150	2	150	-	150	-	-	-	-	-	-
- Accountancy	-	-	-	-	-	-	-	-	-	120	-	120	-	-	-	-	-	-	-	-
Sub-Total Personnel Costs			-	568	-	834	-	1,357	-	1,713	-	1,684	-	1,314	-	1,177	-	1,197	-	957
Other Costs																				
Rent and Maintenance				14		28		36		10		10		10		10		10		10
Office Expenses				40		60		80		80		90		90		100		100		100
Aerial Survey Maps				3		5		10		10		10		-		-		-		-
External Audit				10		20		25		30		35		40		45		50		50
Analysis of Soil Sample				9		20		30		40		50		50		50		50		50
Publications				40		30		30		40		50		50		50		50		50
Vehicle Running		6	8	48	11	66	20	120	25	150	25	150	25	150	25	150	25	150	25	150
Travel and Per Diem				55		85		150		190		210		200		200		200		200
Staff Training				101		150		213		243		280		212		212		212		212
Seed Multiplication				-		-		37		37		37		37		37		37		37
Applied Research				-		-		200		200		200		100		100		100		100
Soil Management				-		-		77		77		77		77		77		77		77
Miscellaneous				-		120		140		480		500		500		500		500		500
Insurance				-		-		70		80		90		100		110		120		130
Sub-Total Other Costs				320		581		1,218		1,667		1,789		1,616		1,641		1,656		1,646
Total Operating Costs				388		1,415		2,575		3,380		3,473		2,930		2,818		2,853		2,603
Total Investment and Operating Costs				902		1,486		2,679		3,992		3,765		3,022		2,910		2,992		2,571
of which Foreign Exchange				406		669		1,206		1,885		1,790		1,358		1,309		1,346		1,157

April 23, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

EPID Costs - Observation Areas (1973-77)[1]
(Eth$ million)

	Unit Cost (Eth$)	Annual Expenditures		
		1971[2]	1972-76	1977
Investments				
Office equipment	300	0.013	0.002(5)	-
Horse and saddle	200	0.009	0.001(5)	-
Farm equipment	1,200	0.052	0.006(5)	-
Total Investments		0.073	0.009	-
Operating Costs				
Agent	4,800	0.168	0.192(40)	0.096(20)
Laborer	600	0.021	0.024(40)	0.012(20)
Rent office and store	480	0.015	0.019(40)	0.010(20)
Other office costs	100	-	0.004(40)	0.002(20)
Farm Supplies	375	0.011	0.011(40)	0.005(20)
Horse maintenance	200	0.009	0.008(40)	0.004(20)
Travel and per diem	520	0.010	0.021(40)	0.011(20)
Miscellaneous	170	0.009	0.007(40)	0.003(20)
Total Operating Costs		0.243	0.286	0.143
Total Investment and Operating Costs		0.316	0.295	0.143
Foreign exchange cost component[3]		0.025	0.006	0.002

1/ Observation costs of MP Areas started in 1971 and 1972 occurred in 1968-69 and 1969-70; these costs are not included here.
2/ Actual cost.
3/ 47% of farm equipment, 16% of farm supplies and 40% of "other office costs."

February 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

EPID Costs - Demonstration Areas (1972[1/]-78)

	Unit Cost Eth$	Expenditures 1971[2/]	1972	1973-78
Investments				
Office equipment	2,300	0.010	0.028(12)	0.023
Horse and saddle	200	0.003	0.002(12)	0.002
Farm equipment	1,200	0.040	0.014(12)	0.012
Vehicles	10,000	0.056	0.120(12)	0.100
Total Investments		0.108	0.164	0.137
Foreign exchange cost component 3/		0.065	0.109	0.091
Operating Costs				
Supervisor	8,000/year	0.053	0.096(12)	0.080(10)
Agent	4,800 "	0.064	0.101(24)	0.096(20)
Marketing assistant	3,000 "	-	0.036(12)	0.030(10)
Laborer	600 "	0.012	0.023(48)	0.024(40)
Rent office and store	1,440 "	0.009	0.014(12)	0.014(10)
Other office cost	500 "	-	0.006(12)	0.005(10)
Farm supplies	950 "	0.009	0.011(12)	0.010(10)
Horse maintenance	200 "	0.003	0.005(24)	0.004(20)
Vehicle operation	5,000 "	0.030	0.060(12)	0.050(10)
Travel and per diem	1,850 "	0.006	0.023(12)	0.019(10)
Miscellaneous	990 "	0.002	0.012(12)	0.010(10)
Total Operating Costs 4/		0.187	0.388	0.341
Foreign exchange cost component 5/		0.024	0.049	0.041
Total Investment and Operating Costs 4/		0.295	0.552	0.478
Foreign exchange cost component		0.089	0.158	0.132

1/ Demonstration costs of MP areas started in 1971 occurred in 1970; these costs have not been included here.
2/ Actual cost.
3/ 44% of office equipment, 47% of farm equipment, 75% of vehicles.
4/ Excluding farm input costs.
5/ 40% of office cost, 16% of farm supplies, 75% of vehicle operation.

Note: Figures in brackets show number of units in each year.

February 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

EPID Costs - MP Areas
(Eth$ million)

	Unit Cost Eth$	Foreign Exchange	Expenditure In 1971 a/	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983 and following years
Investments															
M. C. Store and Office	15,000	40%	-	-	-	0.675(45)	0.675(45)	0.750(50)	0.750(50)	0.750(50)	0.750(50)	0.750(50)	0.750(50)	0.750(50)	-
Office Equipment	5,500	52%	0.031(9)	0.050(9)	0.055(9)	0.055(9)	0.055(9)	0.055(9)	0.055(9)	0.055(9)	0.055(9)	-	-	-	-
Horse and Saddle	200	-	0.005(25)	0.005(25)	0.010(50)	0.015(75)	0.020(100)	0.025(125)	0.030(150)	0.035(175)	0.040(200)	0.045(225)	0.050(250)	0.050(250)	0.050(250)
Farm Equipment	6,800	44%	0.053(9)	0.061(9)	0.068(10)	0.068(10)	0.068(10)	0.068(10)	0.068(10)	0.068(10)	0.068(10)	-	-	-	-
Vehicles	10,000	75%	0.007(1)	0.010(1)	-	0.100(10)	0.100(10)	0.100(10)	0.200(20)	0.200(20)	0.200(20)	0.300(30)	0.300(30)	0.300(30)	0.300(30)
Home Economics	1,000	20%	-	-	0.009(9)	0.009(9)	0.010(10)	0.010(10)	0.010(10)	0.010(10)	0.010(10)	0.010(10)	0.010(10)	-	-
Seed Multiplication	750	50%	-	-	0.021(28)	0.008(10)	0.008(10)	0.008(10)	0.008(10)	0.008(10)	0.008(10)	-	-	-	-
Total Investment			0.096	0.126	0.163	0.930	0.936	1.016	1.121	1.126	1.131	1.105	1.110	1.100	0.350
Foreign exchange cost component			0.044	0.061	0.072	0.748	0.748	0.816	0.890	0.890	0.890	0.902	0.902	0.900	0.225
	Unit Cost Year	**Foreign Exchange**													
Operating Costs															
Supervisor (Exp.)	52,000	100	0.156(3)	0.208(4)	0.052(1)	-	-	-	-	-	-	-	-	-	-
Supervisor (Eth.)	8,000		0.048(6)	0.112(14)	0.216(27)	0.304(38)	0.384(48)	0.464(58)	0.544(68)	0.624(78)	0.704(88)	0.704(88)	0.704(88)	0.704(88)	0.704(88)
Supervisor (Trainee)	5,000		0.045(9)	0.075(15)	0.075(15)	0.075(15)	0.075(15)	0.075(15)	0.075(15)	0.075(15)	0.075(15)	0.025(5)	0.025(5)	0.025(5)	0.025(5)
Agent	4,800		0.192(40)	0.288(60)	0.432(90)	0.672(140)	0.912(190)	1.152(240)	1.392(290)	1.632(340)	1.824(380)	1.968(410)	2.064(430)	2.112(440)	2.112(440)
Agent Trainee	1,800(1/2 yr)		-	0.072(40)	0.108(60)	0.108(60)	0.108(60)	0.108(60)	0.108(60)	0.090(50)	0.072(40)	0.054(30)	0.036(20)	0.036(20)	0.036(20)
Asst. Agent	3,000		0.015(5)	0.090(30)	0.180(60)	0.300(100)	0.450(150)	0.600(200)	0.750(250)	0.900(300)	1.050(350)	1.200(400)	1.260(420)	1.320(440)	1.320(440)
Asst. Agent Trainee	600(1/2 yr)		-	0.024(40)	0.030(50)	0.030(50)	0.036(60)	0.036(60)	0.036(60)	0.036(60)	0.036(60)	0.036(60)	0.018(30)	0.018(30)	0.018(30)
Marketing Asst.	3,000		0.150(50)	0.270(90)	0.420(140)	0.570(190)	0.720(240)	0.870(290)	1.020(340)	1.170(390)	1.320(440)	1.320(440)	1.320(440)	1.320(440)	1.320(440)
Marketing Asst. Trainee	600(1/2 yr)		-	0.036(60)	0.036(60)	0.036(60)	0.036(60)	0.036(60)	0.036(60)	0.036(60)	0.027(45)	0.027(45)	0.027(45)	0.027(45)	0.027(45)
Home Economics Agent	4,000		-	-	0.036(9)	0.072(18)	0.112(28)	0.152(38)	0.192(48)	0.224(58)	0.272(68)	0.312(78)	0.352(88)	0.352(88)	0.352(88)
Laborer	600		0.032(54)	0.108(180)	0.168(280)	0.228(380)	0.288(480)	0.348(580)	0.408(680)	0.468(780)	0.528(880)	0.528(880)	0.528(880)	0.528(880)	0.528(880)
Rent Office and Store	2,880		0.026(9)	0.052(18)	0.081(28)	0.109(38)	0.138(48)	0.167(58)	0.196(68)	0.225(88)	0.253(88)	0.253(88)	0.253(88)	0.253(88)	0.253(88)
Other Office Cost	1,300	40	-	0.023(18)	0.036(28)	0.049(38)	0.062(48)	0.075(58)	0.088(68)	0.101(78)	0.114(88)	0.114(88)	0.114(88)	0.114(88)	0.114(88)
Farm Supplies	4,000	16	0.036(9)	0.072(18)	0.112(28)	0.152(38)	0.192(48)	0.224(58)	0.272(68)	0.312(78)	0.352(88)	0.352(88)	0.325(88)	0.352(88)	0.352(88)
Horse Maintenance	200		0.005(25)	0.010(50)	0.020(100)	0.030(150)	0.045(225)	0.060(300)	0.075(375)	0.090(450)	0.105(525)	0.120(600)	0.135(675)	0.145(725)	0.150(750)
Vehicle Operation	6,250	75	0.045(9)	0.113(18)	0.175(28)	0.238(38)	0.300(48)	0.364(58)	0.425(68)	0.488(78)	0.550(88)	0.550(88)	0.550(88)	0.550(88)	0.550(88)
Travel and per diem	4,500		0.041(9)	0.081(18)	0.126(28)	0.171(38)	0.216(48)	0.261(58)	0.306(68)	0.351(78)	0.396(88)	0.396(88)	0.396(88)	0.396(88)	0.396(88)
Home Economics Set	1,100	10	-	-	0.010(9)	0.020(18)	0.051(28)	0.042(38)	0.053(48)	0.064(58)	0.075(68)	0.086(78)	0.097(88)	0.097(88)	0.097(88)
Total Operating Costs			0.797	1.634	2.313	3.164	4.105	5.034	5.976	6.886	7.753	8.045	8.204	8.349	8.354
Foreign exchange cost component			0.200	0.324	0.226	0.276	0.378	0.484	0.591	0.697	0.803	0.852	0.899	0.946	0.946

a/ Actual Cost

April 23, 1973

ANNEX 2
Table 6

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Cooperative Development Department Costs
(Eth$'000)

	Fiscal Year	1974	1975	1976	1977	1978	1979	1980	1981	1982 and After
Motor Vehicles and Cycles 1/										
for MP Areas Established in	1971	60	-	-	60	-	-	60	-	-
	1972	-	60	-	-	60	-	-	60	-
	1973	-	-	60	-	-	60	-	-	60
	1974	-	-	-	60	-	-	60	-	-
	1975	-	-	-	-	60	-	-	60	-
	1976	-	-	-	-	-	60	-	-	60
	1977	-	-	-	-	-	-	60	-	-
	1978	-	-	-	-	-	-	-	60	-
	1979	-	-	-	-	-	-	-	-	60
		60	60	60	120	120	120	180	180	180
Office Furniture		5	5	5	5	5	5	5	5	5
Salaries 2/ - Inspectors		13	25	38	50	63	76	88	101	113
- Coop. Assistants		35	70	105	140	175	210	245	280	315
Per Diem		20	40	60	80	100	120	140	160	180
Office Running		3	7	10	14	18	21	25	28	32
Motor Vehicles and Cycles Running Cost		10	20	30	40	50	60	70	80	90
TOTAL		146	227	308	449	531	612	753	834	915
Foreign exchange cost component 3/		56	65	74	128	137	146	200	209	217

1/ Vehicles for inspectors - 3 x Eth$ 14,000 = 42,000
Motor cycles for co-op assistants - 10 x Eth$ 1,800 = 18,000
60,000

2/ Numbers of staff increasing annually up to 1982 by 3 inspectors @ Eth$ 4,200 p.a., and, by 10 co-op. assistants @ Eth$ 1,200 p.a.

3/ 75% of motor vehicle investment and operating costs, 52% of office furniture, 40% of other office costs.

February 1973

ANNEX 9
Table 7

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Cost of Farm-to-Highway Roads

Year of Construction	Km of Roads in MP Areas Becoming Operational in			Construction Program (km)	Maintenance Program (km)	Costs (Eth$'000)				
	1971	1972	1973-79			Construction	Maintenance	Total	Foreign Exchange Cost	Cost Used in Econ. Analysis
1974	90	-	-	90	-	720	-	720	504	540
1975	90	90	-	180	90	1,440	45	1,485	1,040	1,114
1976	90	90	100	280	270	2,240	135	2,375	1,662	1,781
1977	90	90	200	380	550	3,040	275	3,315	2,320	2,486
1978	90	90	300	480	930	3,840	465	4,305	3,013	3,229
1979	-	90	400	490	1,410	3,920	705	4,625	3,237	3,469
1980	-	-	500	500	1,900	4,000	950	4,950	3,465	3,712
1981	-	-	500	500	2,400	4,000	1,200	5,200	3,640	3,900
1982	-	-	500	500	2,900	4,000	1,450	5,450	3,815	4,088
1983	-	-	400	400	3,400	3,200	1,700	4,900	3,430	3,675
1984	-	-	300	300	3,800	2,400	1,900	4,300	3,010	3,225
1985	-	-	200	200	4,100	1,600	2,050	3,650	2,555	2,738
1986	-	-	100	100	4,300	800	2,150	2,950	2,065	2,212
1987 and after	-	-	-	-	4,400	-	2,200	2,200	1,540	1,650

Note: Construction assumed to start in 4th year of operation of MP area, at a rate of 10 km/year/area.
Construction cost Eth$8,000/km, maintenance Eth$500 km (See Annex 7).
Foreign exchange cost assumed to be 70% of total cost.
Cost used in economic analysis represents 75% of total cost:
15% unskilled labor, shadow priced at 0
1% taxes
remainder attributable to benefits outside project.

February, 1973.

ANNEX 9
Table 8

ETHIOPIA

AGRICULTURAL MINUMUM PACKAGE PROJECT

Cost of Penetration Roads
(Eth$'000)

Penetration Roads for MP Areas Becoming Operational in:	1971	1972	1973	1974	1975	1976	1977	1978	1979	
Penetration Roads to be Constructed in:	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979 and following
Roads to be constructed (km)	-	-	-	-	-	110	500	500	500	-
Roads to be maintained (km)	-	-	-	-	-	-	110	610	1,100	1,610
Cost of construction 1/	-	-	-	-	-	1,320	6,000	6,000	6,000	-
Cost of maintenance 2/	-	-	-	-	-	-	55	305	555	805
Cost of construction and maintenance	-	-	-	-	-	1,320	6,055	6,305	6,555	805
Foreign exchange cost component 3/	-	-	-	-	-	924	4,239	4,414	4,588	564
Cost used in economic analysis 4/	-	-	-	-	-	792	3,633	3,783	3,933	483

1/ Eth$12,000/km.

2/ Eth$500/km/year.

3/ 70% of total cost

4/ Cost used in economic analysis represents 60% of total cost: 15% of unskilled labor, shadow priced at 0;
1% taxes;
remainder attributable to benefits outside project.

February, 1973

ANNEX 9
Table 9

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Cost and Quantities of Inputs - Fertilizers

	Quantity[1] (m.tons)		Cost[2] cif Assab or Djibouti			Cash Cost to Farmers			Costs Used for Economic Analysis		
	DAP	Urea	DAP	Urea	Total	DAP	Urea	Total	DAP	Urea	Total
			Eth$'000								
1971	480	120	104	19	123	185	38	223	149	30	179
1972	980	240	212	37	249	377	75	452	304	60	364
1973	2,630	610	568	95	663	1,013	191	1,204	815	153	968
1974	5,230	1,150	1,130	179	1,309	2,014	360	2,374	1,621	288	1,909
1975	9,010	1,890	1,946	295	2,241	3,469	592	4,061	2,793	473	3,266
1976	13,430	2,690	2,901	420	3,321	5,171	842	6,013	4,163	673	4,836
1977	18,330	3,670	3,959	573	4,532	7,057	1,149	8,206	5,682	918	6,600
1978	23,560	4,710	5,089	735	5,824	9,071	1,474	10,545	7,304	1,178	8,482
1979	28,950	5,790	6,253	903	7,156	11,146	1,812	12,958	8,975	1,448	10,423
1980	34,200	6,840	7,387	1,067	8,454	13,167	2,141	15,308	10,602	1,710	12,312
1981	38,900	7,780	8,402	1,214	9,616	14,977	2,435	17,412	12,059	1,945	14,004
1982	42,600	8,520	9,202	1,329	10,531	16,401	2,667	19,068	13,206	2,130	15,336
1983	45,300	9,060	9,785	1,413	11,198	17,441	2,836	20,277	14,043	2,265	16,308
1984	46,800	9,360	10,109	1,460	11,569	18,018	2,930	20,948	14,508	2,340	16,848
1985	47,700	9,540	10,303	1,488	11,791	18,365	2,986	21,351	14,787	2,385	17,172
1986	48,200	9,640	10,411	1,504	11,915	18,557	3,017	21,574	14,942	2,410	17,352
1987 and following years	48,400	9,680	10,454	1,510	11,964	18,634	3,030	21,664	15,004	2,420	17,424

1/ Based on 1 qt/ha of all grains for DAP and 0.5 qt/ha for maize and sorghum.
2/ For prices used, see Table 11.

May 2, 1973

ANNEX 9
Table 10

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Build-up of Fertilizer Prices 1/
(Eth$/ton)

	DAP	UREA
Cif Assab or Djibouti	216 (=US$94)	156 (=US$68)
Bagging	25	25
Transport to Addis	40	40
AIDB overhead	5	5
AIDB financial charges	25	19
AIDB bad debt charge	18	13
Turnover tax	7	6
Transport to MP Area	24	24
EPID margin	25	25
Cash price to farmer	385	313
Interest paid by farmer	35	27
Total price to farmer	420	340
Price used in cost/benefit analysis	310	250

1/ Based on information available August 1972.

May 2, 1973

ANNEX 9
Table 12

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Costs and Quantities of Inputs - Improved Seeds

	Quantity[1] (Metric Tons)				Eth$ million		
	Wheat	Teff	Hybrid Maize	Synth. Maize	Cash Cost to Farmers[2]	Cost in Economic Analysis[3]	Cost cif Assab or Djibouti (only hybrid maize)[4]
1971	11	10	1	1	0.010	0.006	0.001
1972	22	3	8	8	0.020	0.015	0.008
1973	19	7	14	6	0.028	0.020	0.013
1974	113	8	38	24	0.094	0.070	0.036
1975	258	58	84	39	0.228	0.148	0.080
1976	481	100	154	78	0.419	0.304	0.146
1977	754	165	253	103	0.668	0.488	0.240
1978	1,057	246	375	145	0.968	0.710	0.356
1979	1,391	348	518	188	1.313	0.863	0.492
1980	1,672	439	674	233	1.650	1.226	0.640
1981	1,952	534	840	268	1.997	1.494	0.798
1982	2,241	630	1,004	310	2.254	1.764	0.954
1983	2,460	726	1,156	340	2.655	2.004	1.098
1984	2,374	791	1,286	366	2.815	2.153	1.222
1985	2,677	836	1,387	371	3.061	2.334	1.318
1986	2,749	863	1,457	382	3.184	2.433	1.384
1987	2,782	890	1,502	387	3.262	2.497	1.427
1988	2,790	894	1,527	392	3.297	2.527	1.451
1989	2,795	896	1,540	385	3.313	2.541	1.463
1990 and following yrs	2,800	900	1,550	390	3.330	2.555	1.473

1/ Based on seeding rates:
- Wheat, 1.25 ql/ha, renewed every 4 yrs
- Teff, 0.25 " " " " "
- Synth. maize, 0.4 " " " " "
- Hybrid maize, 0.4 " " annually

2/ Wheat Eth$350/ton
Teff Eth$500/ton
Hyb.Maize Eth$1,150/ton
Synth. " Eth$300/ton

3/ Wheat Eth$190/ton
Teff Eth$310/ton
Hybrid maize Eth$1,070/ton
Synth. maize Eth$220/ton

4/ Eth$950/ton

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ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Costs and Quantities of Inputs - Improved Harrows

	Number of Farmers Purchasing for First Time 1/	Number of Farmers Replacing Harrow 2/	Total No. of Harrows Bought	----Eth$ Million---- Cost 3/	Foreign Exchange 4/
1971			240	0.010	0.002
1972	240		440	0.018	0.004
1973	440		820	0.033	0.007
1974	820		1,380	0.055	0.011
1975	1,380		1,980	0.079	0.016
1976	1,980		2,540	0.102	0.020
1977	2,540		2,920	0.117	0.024
1978	2,920		3,190	0.128	0.025
1979	3,190	240	3,420	0.137	0.027
1980	3,180	440	3,590	0.144	0.029
1981	3,150	820	3,720	0.149	0.030
1982	2,900	1,380	3,730	0.149	0.030
1983	2,350	1,980	3,730	0.149	0.030
1984	1,750	2,540	3,690	0.148	0.030
1985	1,150	2,920	3,570	0.143	0.029
1986	650	3,190	3,490	0.140	0.028
1987	300	3,420	3,420	0.137	0.027
1988	-	3,590	3,590	0.144	0.029
1989	-	3,720	3,720	0.149	0.030
1990 and following	-				

1/ Assumed at 5% of farmers who began using fertilizer in previous year.

2/ Replacement after 8 years of use

3/ Eth$40/unit

4/ 20% of cost.

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ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Costs and Quantities of Inputs - On-Farm Storage

	Number of units constructed	Cost of Construction (Eth$17.50/ unit)	Insecticides (Eth$1 p.a. per existing unit)	Maintenance (Eth$2 p.a. per existing unit)	Total Cost	Foreign Exchange (Insecticides and 50% of construction cost)
		Eth$ million				
1971	-	-	-	-	-	-
1972	-	-	-	-	-	-
1973	130	0.002	-	-	0.002	0.001
1974	450	0.008	0.001	0.001	0.010	0.005
1975	1,135	0.020	0.002	0.003	0.025	0.012
1976	2,030	0.036	0.004	0.007	0.047	0.022
1977	3,185	0.056	0.007	0.014	0.077	0.035
1978	4,630	0.081	0.012	0.023	0.116	0.052
1979	6,190	0.108	0.018	0.035	0.161	0.072
1980	8,410	0.147	0.026	0.052	0.225	0.100
1981	11,090	0.194	0.037	0.074	0.305	0.134
1982	14,360	0.251	0.052	0.103	0.406	0.177
1983	17,210	0.301	0.069	0.138	0.508	0.219
1984	17,820	0.312	0.087	0.173	0.572	0.243
1985	17,300	0.303	0.104	0.208	0.615	0.255
1986	16,100	0.282	0.120	0.240	0.642	0.261
1987	14,600	0.256	0.135	0.269	0.660	0.263
1988	13,000	0.228	0.148	0.295	0.671	0.262
1989	10,700	0.187	0.158	0.316	0.661	0.251
1990	7,900	0.138	0.166	0.332	0.636	0.235
1991	4,300	0.075	0.170	0.340	0.585	0.207
1992 and following years	-	-	0.170	0.340	0.510	0.170

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ANNEX 8
Table 1

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Costs of Inputs - Miscellaneous
(Eth$ million)

	Total Cost 1/	Foreign Exchange Cost (50%)
1971	0.015	0.008
1972	0.033	0.016
1973	0.081	0.040
1974	0.167	0.083
1975	0.292	0.146
1976	0.442	0.221
1977	0.621	0.310
1978	0.822	0.411
1979	1.035	0.517
1980	1.251	0.625
1981	1.455	0.728
1982	1.629	0.815
1983	1.770	0.885
1984	1.869	0.935
1985	1.938	0.969
1986	1.984	0.992
1987	2.010	1.005
1988	2.022	1.011
1989	2.032	1.016
1990 and following years	2.032	1.016

1/ Eth$4/ton of gross incremental output of grain, includes pesticides, bagging, and small tools. Excludes other inputs and labor

May 2, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Estimated Schedule of Disbursements of IDA Credit
(US$'000)

FY	End of Quarter	Estimated Amount Disbursed during Quarter	Cumulative Disbursement at End of Quarter
1974/75	2	700	700
	3	1,000	1,700
	4	1,300	3,000
1975/76	1	1,400	4,400
	2	1,600	6,000
	3	1,800	7,800
	4	1,800	9,600
1976/77	1	1,800	11,400
	2	2,100	13,500
	3	2,100	15,600
	4	2,100	17,700
1977/78	1	2,000	19,700
	2	800	20,500
	3	500	21,000

April 30, 1973

Yields

5. Estimates of cereal yields in the highlands are not supported by reliable statistics and include a considerable margin of error. Estimates of incremental yields due to fertilizer and improved seeds are based on four years of FAO's countrywide fertilizer demonstration program, on field trials carried out by the IAR, and on EPID's two-year countrywide demonstrations program. Incremental yields due to use of harrow are based on findings in the CADU project. Table 7 illustrates the yields, and Table 8 the comparative advantages of different innovations.

Fertilizer

6. Recommendations are one ql/ha diammonium-phosphate (DAP, 18%N 46% P_2O_5) for wheat, teff, sorghum, and maize and additional 0.5ql/ha urea (45%N) for sorghum and maize. Fertilizer for barley is not generally recommended, as prices and yields make it economic only in high potential areas. Estimates of farmers' costs including 12% interest for nine months are Eth$42/ql DAP and Eth$36/ql urea. These recommendations are below the economic optimum under good husbandry, and more advanced farmers will receive credit for higher rates. EPID's demonstrations program and IAR trials will produce more detailed recommendations for different areas. Participating farmers are expected to fertilize all cereals except barley in the second to fourth year of participation. 65% of the total farmers in MP areas are projected to use fertilizer after nine years. In well organized MP areas, even more farmers will participate. This adoption rate assumes that part of the landlord community will, to their own advantage, share fertilizer costs with tenants.

Seeds

7. Improved varieties of wheat, maize, barley and teff (but not sorghum) have been established in the country. Although hybrid maize is already produced in the country and imports from Kenya are readily available, model calculations assume that only half of all farmers will achieve a standard of husbandry that will justify use of hybrid maize; the rest will use synthetics. No benefits are included from improved barley seeds as they do not show their full potential unless fertilized. Farm models assume use of improved seeds on total wheat, maize, and teff area. Economic analysis assumes farmers use improved wheat and maize seed one year after using fertilizer, and teff seeds two years after using fertilizer. A gradual build up of area so seeded is expected over four years, from 20% to 80% of area fertilized. Farmers will purchase new seed every four years (except hybrid maize, which will be purchased annually); incremental yields estimates take into account declining yield potential. The slow increase in seed consumption is geared to the buildup of seed production in the country. Farmers' costs, including 12% interest for nine months, are estimated at Eth$35/ql for wheat, Eth$50/ql for teff, Eth$115/ql for hybrid and Eth$30/ql for synthetic maize. Seed rates are: wheat 1.25/ql/ha, teff 0.25ql/ha, maize 0.4ql/ha.

Harrow and Plough

8. A spike-tooth harrow and a mouldboard plough are being produced in the country on the basis of designs initiated by the CADU project. The plough (Eth$60) does not improve yields, but speeds up soil preparations considerably. This is important at the start of the planting season, when work oxen are in poor condition. Although credit will be extended for plows, farm models and economic calculations include neither costs nor benefits. The harrow (Eth$40) improves seed bed preparation and seed covering and raises yields of wheat, sorghum and barley. It is expected that five percent of the fertilized area will benefit from its use. Farm models include harrow use on total wheat, sorghum and barley area. Annual costs are 20% of purchase price if used on at least 1 ha; smaller farmers would have to share one implement.

Farm Storage

9. It is estimated that farm storage losses for grains range from 20% in drier areas to 50% in more humid areas, with a national average of probably 25%. Trials show that properly designed and easy to erect farm stores, together with pesticides, can reduce losses to 1%/year. Unskilled persons following simple instructions should be able to reduce storage losses to 5%/year. Cement-lined storage pits (Eth$10/ton) and lined weldmesh bins (Eth$13/ton) have been developed and tested in WADU project.

10. Investment cost of weldmesh bins, including transportation, supervision and interest of 12% for nine months and excluding farm labor, would be Eth$17.50/ton, recurrent cost would be Eth$1/ton/year for pesticides and Eth$4/ton/year for maintenance, depreciation and interest. 1/ With storage of home consumption and seed requirements of about 1 ton, and reduction of storage losses from 25% to 10%, savings would be Eth$14/year at 1985 grain prices. Farm models and economic analysis assume farm storage for home consumption and seed requirements only. EPID would provide farmers with the store design, construction material, and advice during construction. Thirty percent of participating farmers are expected to build stores in 10 years.

Cost of Production

11. Production costs on traditional farms include seeds, tools, bags, cost of draft power and labor, as well as taxes. The 1 ha farmer would probably not keep enough cattle to raise and replace a pair of work oxen, while the 3 ha farmer could not cultivate his land with family labor alone. Average family size has been assumed at 5.3 persons, who could cultivate 2.5 - 3 ha under crops. The production costs of the 3 ha farm include hired labor, while the 1 ha farmer is expected to pay for hired work oxen by hiring out surplus family labor.

12. Incremental production and related costs include: costs and credit charges of fertilizer, seeds, harrow and stores; cost of bags and pest control

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1/ Of which Eth$2 is for maintenance.

which might become necessary on a wider scale with higher yields; additional hired labor for a 3 ha farm; and increased taxes.

Home Consumption

13. The 5.3 persons per family will consume as much as 4.1 adults. Models assume consumption of 160 kg/person, which would require storage of 210 kg/person, allowing for a 25% loss. In addition, farm families will consume all livestock products.

Farmers Net Cash Income

14. Table 8 shows the development of farmers' net cash income with different innovations in different years. Returns from areas planted with other crops are assumed to be the same as for unfertilized cereals. Falling grain prices will cause farmers' cash position to deteriorate and will gradually force them to use innovations to keep their standard of living. By 1985 farmers' net cash income would fall between 47% and 24% on a 1 ha farm and by about 25% on a 3 ha farm.

15. The 1 ha farm tends to produce only the subsistence needs of a family and yield no cash income. Use of fertilizer would provide a modest cash income, and with improved seeds would raise it by between 50% and 260%; harrow and improved storage would add a further 30% each. On a 3 ha farm, fertilizer would raise income by 30%; seeds would add a further 20%; and improved stores a further 6%. Model calculations do not include the possible benefits from:

(a) Increased cropped area, because fertilizer would diminish the need to keep fallow in crop rotations;

(b) Fruits and vegetables producing better returns than unimproved cereals;

(c) Residual effects of fertilizer (50% of cropped area) on barley and non-cereals; and

(d) Storage of grain for sale.

April 30, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Area Under Crops, and Number of Holdings
by Province 1/

PROVINCE	Total Area (ha'000)	Number of Holdings	Area Under Crops		
			Total (ha)	Size of Holdings (ha)	% of Total Area
Tigre	6,025	252,600	281,919	1.12	5
Begemdir	8,025	189,500	250,183	1.32	3
Gojam	6,225	245,370	282,008	1.15	5
Welo	9,350	404,600	375,751	0.93	4
Wellega	7,725	191,300	218,902	1.14	3
Shewa	8,200	670,700	1,124,379	1.68	14
Hararge	26,125	263,160	297,994	1.13	1
Kefa	5,350	224,050	200,087	0.89	4
Illubabor	5,350	111,850	75,724	0.68	1
Gemu Gofa	3,950	114,300	58,202	0.51	1
Sidamo	11,175	375,945	194,625	0.52	2
Total	97,500	3,043,375	3,359,774	1.10	3

1/ 11 Provinces out of 14.

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ANNEX 12
Table 1

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AGRICULTURAL MINIMUM PACKAGE PROJECT

Frequency Distribution of Holdings by Size
(Percentage)

Size Group ha	0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-3.0	3.0-4.0	4.0-5.0	5.0	Total
PROVINCE									
Tigre	45	23	16	5	6	4	1	-	100
Begemdir	40	30	13	9	5	3	-	-	100
Gojam	27	27	18	12	10	2	1	3	100
Welo	55	25	11	3	4	2	-	-	100
Wellega	29	36	14	10	7	2	1	1	100
Shewa	23	23	15	12	14	5	5	3	100
Hararge	45	31	11	5	5	1	1	1	100
Kefa	41	35	12	7	4	1	-	-	100
Illubabor	32	37	14	7	3	2	-	5	100
Gemu Gofa	73	19	4	2	2	-	-	-	100
Sidamo	73	18	5	2	1	-	-	1	100
Average 1/	42	26	12	7	7	3	2	1	100

1/ Weighted average using No. of holdings in Table 1 as weights.

Source: Central Statistical Office - National Sample Survey Reports 1966-1968

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ANNEX 11
Table 2

ANNEX 11
Table 3

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Participating Farmers and Cropped Area/Farm

Year of MP Area 1/		1	2	3	4	5	6	7	8	9	
Farmers Participating 2/											
Incremental		80	120	500	1,100	1,200	1,200	1,000	700	600	
Cummulative		80	200	700	1,800	3,000	4,200	5,200	5,900	6,500	
Area per Farmer 3/	ha	5.0	4.5	3.0	1.7	1.3	1.0	0.8	0.7	0.6	Average 1.34
Area Under Cereals - 75%	ha	3.8	3.4	2.3	1.3	1.0	0.8	0.6	0.5	0.5	

1/ Year 1 - Demonstration Year.
2/ Out of estimated 10,000 farmers in one MP Area.
3/ Estimated average cropped area per participating farmer by year of his participation. Large farmers are expected to adopt innovations first.

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AGRICULTURAL MINIMUM PACKAGE PROJECT

Build up of Area Fertilized per Farmer
(ha)

Table 4

Year of MP Area	1	2	3	4	5	6	7	8	9	10
Year in Which Farmer Joins MP Program										
1	0.8	1.6	2.4	3.0	3.0	3.0	3.0	3.0	3.0	3.0
2		0.8	1.6	2.4	2.7	2.7	2.7	2.7	2.7	2.7
3			0.8	1.6	1.8	1.8	1.8	1.8	1.8	1.8
4				0.4	0.8	1.0	1.0	1.0	1.0	1.0
5					0.4	0.8	0.8	0.8	0.8	0.8
6						0.4	0.7	0.8	0.8	0.8
7							0.2	0.5	0.5	0.5
8								0.2	0.5	0.5
9									0.2	0.5

Build up of Area Fertilized in One MP Area
(ha)

Table 5

Year of MP Area	1	2	3	4	5	6	7	8	9	10
Number of Farmers Joining MP Program	Contribution per Group of Participants									
80	60	130	190	240	240	240	240	240	240	240
120		100	190	290	320	320	320	320	320	320
500			400	800	900	900	900	900	900	900
1,100				440	880	1,100	1,100	1,100	1,100	1,100
1,200					480	960	960	960	960	960
1,200						480	840	840	840	840
1,000							200	500	500	500
700								140	350	350
600									120	300
Total 6,500	60	230	780	1,770	2,820	4,000	4,560	5,000	5,330	5,510
Rounded	60	230	800	1,800	2,800	4,000	4,600	5,000	5,300	5,500

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AGRICULTURAL MINIMUM PACKAGE PROJECT

ANNEX 11
Table 9

Projections of Yields, Costs and Revenues per Hectare.

At Full Development

		1974 Prices					1985 Prices				
		Without Innovations	With Innovations				Without Innovation	With Innovations			
			Fertilizer	Impr. Seed	Harrow	Total Innovation		Fertilizer	Impr. Seeds	Harrow	Total Innovation
Wheat											
Yield Cumulative	ql/ha	9.0	13.8	16.8	19.6	19.6	9.00	13.8	16.8	19.6	19.6
Incremental	ql/ha	-	4.8	3.0	2.8	10.6	-	4.8	3.0	2.8	10.6
Farmgate Price	Eth$/ql	16.25	16.25	16.25	16.25	16.25	16.00	16.00	16.00	16.00	16.00
Value of Production	Eth$/ha	146.30	-	-	-	-	144.00	-	-	-	-
Value of Incremental Prod.	Eth$/ha	-	78.00	48.80	45.50	172.30	-	76.80	48.00	44.80	169.60
Incremental Costs of Prod.[1/]	Eth$/ha	-	44.00	8.00	9.00	61.00	-	44.00	8.00	9.00	61.00
Incremental Net Revenue	Eth$/ha	-	34.00	40.80	36.50	111.30	-	32.80	40.00	35.80	108.60
Return on Eth$100 Invested	Eth$	-	178	610	505	282	-	175	600	698	278
Teff											
Yield Cumulative	ql/ha	7.0	11.8	14.8	-	14.8	7.0	11.8	14.8	-	14.8
Incremental	ql/ha	-	4.8	3.0	-	7.8		4.8	3.0	-	7.8
Farmgate Price	Eth$/ql	19.10	19.10	19.10	-	19.10	18.50	18.50	18.50	-	18.50
Value of Production	Eth$/ha	133.70	-	-	-	-	129.50	-	-	-	-
Value of Incremental Prod.	Eth$/ha	-	91.70	57.30	-	149.00	-	88.80	55.50	-	144.30
Incremental Costs of Prod.[1/]	Eth$/ha	-	49.00	4.00	-	48.00	-	44.00	4.00	-	48.00
Incremental Net Revenue	Eth$/ha	-	47.70	53.30	-	101.00	-	44.80	51.50	-	96.30
Return on Eth$100 Invested	Eth$	-	208	1430	-	310	-	202	1390	-	300
Maize											
Yield Cumulative	ql/ha	15.0	26.0	36.0	-	36.0	15.0	26.0	36.0	-	36.0
Incremental	ql/ha	-	11.0	10.0	-	21.00		11.0	10.0	-	21.00
Farmgate Price	Eth$/ql	8.20	8.20	8.20	-	8.20	6.50	6.50	6.50	-	6.50
Value of Production	Eth$/ha	123.00	-	-	-	-	97.50	-	-	-	-
Value of Incremental Prod.	Eth$/ha	-	90.20	82.00	-	172.20	-	71.50	65.00	-	136.50
Incremental Costs of Prod[1/]	Eth$/ha	-	64.00	29.00	-	93.00	-	64.00	29.00	-	93.00
Incremental Net Revenue	Eth$/ha	-	26.20	53.00	-	79.20	-	7.50	36.00	-	43.50
Return on Eth$100 Invested	Eth$	-	140	283	-	185	-	112	224	-	146
Sorghum											
Yield Cumulative	ql/ha	12.0	22.0	-	26.8	26.8	12.0	22.0	-	26.8	26.8
Incremental	ql/ha	-	10.0	-	4.8	14.8		10.0	-	4.8	14.8
Farmgate Price	Eth$/ql	12.00	12.00	-	12.00	12.00	8.50	8.50	-	8.50	8.50
Value of Production	Eth$/ha	144.00	-	-	-	-	102.00	-	-	-	-
Value of Incremental Prod.	Eth$/ha	-	120.00	-	57.60	177.60	-	85.00	-	40.80	125.80
Incremental Costs of Prod[1/]	Eth$/ha	-	64.00	-	10.00	74.00	-	64.00	-	10.00	74.00
Incremental Net Revenue	Eth$/ha	-	56.00	-	47.60	103.60	-	21.00	-	30.80	51.80
Return on Eth$100 Invested	Eth$	-	188	-	576	240	-	113	-	408	170
Barley											
Yield Cumulative	ql/ha	10.0	-	-	12.8	12.8	10.0	-	-	12.8	12.8
Incremental	ql/ha	-	-	-	2.8	2.8	-	-	-	2.8	2.8
Farmgate Price	Eth$/ql	9.00	-	-	9.00	9.00	7.50	-	-	7.50	7.50
Value of Production	Eth$/ha	90.00	-	-	-	-	75.00	-	-	-	-
Value of Incremental Prod.	Eth$/ha	-	-	-	25.20	25.20	-	-	-	21.00	21.00
Incremental Costs of Prod.[1/]	Eth$/ha	-	-	-	9.00	9.00	-	-	-	9.00	9.00
Incremental Net Revenue	Eth$/ha	-	-	-	16.20	16.20	-	-	-	12.00	12.00
Return on Eth$100 Invested	Eth$	-	-	-	280	280	-	-	-	234	234

1/ Excluding incremental labor cost, and incremental taxes. Including interests on input loans and cost of bags, plant protection and miscellaneous of Eth$ 0.4/ql. Cost/ha of harrow assumed as 20% of purchase price of Eth$ .40.

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Farm Models

		-------Without Innovations-------				--------With Fertilizer----------				With Fertilizer & Improved Seed				With Fertilizer, Improved Seed & Harrow			
		1ha Cropped		3ha Cropped		1ha Cropped		3ha Cropped		1ha Cropped		3ha Cropped		1ha Cropped		3ha Cropped	
		1974	1985	1974	1985	1974	1985	1974	1985	1974	1985	1974	1985	1974	1985	1974	1985
Area Cropped	ha	1.00	1.00	3.00	3.00	1.00	1.00	3.00	3.00	1.00	1.00	3.00	3.00	1.00	1.00	3.00	3.00
Area under cereals	ha	0.70	0.70	2.10	2.10	0.75	0.75	2.25	2.25	0.75	0.75	2.25	2.25	0.75	0.75	2.25	2.25
in % of cropped area	%	70	70	70	70	75	75	75	75	75	75	75	75	75	75	75	75
Wheat Area	ha	0.07	0.14	0.21	0.42	0.08	0.15	0.23	0.45	0.08	0.15	0.23	0.45	0.08	0.15	0.23	0.45
in % of cereal area	%	10	20	10	20	10	20	10	20	10	20	10	20	10	20	10	20
Production 1/	Kg	63	126	189	378	110	210	320	620	130	250	390	760	160	290	450	880
Revenue	Eth$	10.20	20.20	30.70	60.50	2.70	4.90	7.80	14.80	6.00	10.90	17.20	32.80	8.90	16.30	25.60	48.90
Teff Area	ha	0.21	0.21	0.63	0.63	0.22	0.22	0.67	0.67	0.22	0.22	0.67	0.67	0.22	0.22	0.67	0.67
in % of cereal area	%	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Production 1/	Kg	147	147	441	441	260	260	790	790	330	330	990	990	330	330	990	990
Revenue	Eth$	28.10	27.30	84.40	81.90	10.50	9.90	32.00	30.00	22.20	21.20	67.70	64.50	22.20	21.20	67.70	64.50
Maize Area	ha	0.14	0.10	0.42	0.31	0.15	0.11	0.45	0.34	0.15	0.11	0.45	0.34	0.15	0.11	0.45	0.34
in % of cereal area	%	20	15	20	15	20	15	20	15	20	15	20	15	20	15	20	15
Production 1/	Kg	210	150	630	465	390	290	1,170	880	540	400	1,620	1,220	540	400	1,620	1,220
Revenue	Eth$	17.20	9.80	51.70	30.40	3.90	0.80	11.70	2.60	11.90	4.80	35.60	14.80	11.90	4.80	35.60	14.80
Sorghum Area	ha	0.14	0.11	0.42	0.32	0.15	0.12	0.45	0.34	0.15	0.12	0.45	0.34	0.15	0.12	0.45	0.34
in % of cereal area	%	20	15	20	15	20	15	20	15	20	15	20	15	20	15	20	15
Production 1/	Kg	168	132	504	384	330	260	990	750	330	260	990	750	400	320	1,200	910
Revenue	Eth$	20.20	11.20	60.50	32.60	8.40	2.50	25.20	7.10	8.40	2.50	25.20	7.10	15.50	6.20	46.60	17.60
Barley Area	ha	0.14	0.14	0.42	0.42	0.15	0.15	0.45	0.45	0.15	0.15	0.45	0.45	0.15	0.15	0.45	0.45
in % of cereal area	%	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Production 1/	Kg	140	140	420	420	140	140	420	420	140	140	420	420	190	190	580	580
Revenue	Eth$	12.60	10.50	37.80	31.50	-	-	-	-	-	-	-	-	2.40	1.80	7.30	5.40
Value of cereal Production 1/	Eth$	88.-	79.-	265.-	237.-	-	-	-	-	-	-	-	-	-	-	-	-
Net Value of Incremental Production 2/	Eth$	-	-	-	-	26.-	18.-	78.-	55.-	49.-	39.-	146.-	119.-	61.-	50.-	183.-	151.-
Value of Total Crop Production 3/	Eth$	126.-	113.-	380.-	340.-	-	-	-	-	-	-	-	-	-	-	-	-
Incremental Taxes	Eth$											12.-	12.-			12.-	12.-
Incremental Hired Labor	Eth$	-	-	-	-	-	-	26.-	23.-	-	-	40.-	37.-	-	-	46.-	44.-
Net Value of Total Crop Production 4/	Eth$	116.-	102.-	268.-	228.-	-	-	-	-	-	-	-	-	-	-	-	-
Home Consumption 5/	Eth$	114.-	108.-	114.-	108.-	114.-	108.-	114.-	108.-	114.-	108.-	114.-	108.-	114.-	108.-	114.-	108.-
Net Cash(Deficit)	Eth$	2.-	(5.-)	154.-	120.-	28.-	13.-	206.-	152 -	51.-	34.-	248.-	190.-	63 6/	45 6/	279.-	215.-
Storage Net Savings	Eth$	15.-	14.-	15.-	14.-	15.-	14.-	15.-	14.-	15.-	14.-	15.-	14.-	15.-	14.-	15.-	14.-
Net Cash with Improve Storage	Eth$	17.-	9.-	169.-	134.-	43.-	27.-	221.-	166.-	66.-	48.-	263.-	204.-	78.-	59.-	294.-	229.-
Total Cereal Production	kg	728	695	2,184	2,088	1,230	1,160	3,690	3,460	1,470	1,380	4,410	4,140	1,620	1,530	4,840	4,580

1/ Rounded
2/ After Incremental Cost of Production (Fertilizer, Seeds, Harrow, Bags, Plant Protection), after interests on imput loans, before incremental cost of labor.
3/ Assuming that Value of Production of Area under pulses, oilseeds, fruits, vegetables or fodder crops equals that of unimproved cereals.
4/ After Taxes, cost of bags, hired labor. Assuming that hire of oxen by 1ha farm be compensated by hiring out family labor.
5/ 160 kg cereals/adult, 4.1 adults/family;allowing for 25% storage losses
6/ Assuming that harrow be used on 1ha; three farmers to share harrow. Otherwise cost of 1ha farm increases by Eth$5/year.

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Farmers Annual Net Cash Income 1/

Area Under Crops		1 ha		as % of	3 ha		as % of
Year		1974	1985	1974	1974	1985	1974
Without Innovations	Eth$	2	(5) 2/		154	120	78%
With Improved Storage	Eth$	17	9	53%	169	134	79%
Increment due to Storage 3/	%				10%	11%	
With Fertilizer	Eth$	28	13	47%	206	159	74%
Increment due to Fertilizer	%				34%	27%	
With Fertilizer, and Imp. Storage	Eth$	43	27	63%	221	166	75%
Increment due to Storage	%	53%	108%		7%	9%	
Incremental to W/O Innovations 3/	%				44%	38%	
With Fertilizer and Seeds	Eth$	51	34	67%	248	190	77%
Increment due to Seeds	%	82%	260%		20%	25%	
Incremental to W/O Innovations 3/	%				61%	58%	
With Fertilizer, Seeds, and Improved Storage	Eth$	66	48	73%	263	204	78%
Increment due to Storage	%	29%	41%		6%	7%	
Incremental to W/O Innovations 3/	%				71%	70%	
With Fertilizer, Seeds and Harrow	Eth$	63	45	71%	279	215	76%
Increment due to Harrow	%	24%	32%		13%	13%	
Incremental to W/O Innovations 3/	%				81%	79%	
With Fertilizer, Seeds, Harrow and Improved Storage	Eth$	78	59	76%	294	229	78%
Increment due to Storage	%	24%	31%		5%	6%	
Incremental to W/O Innovations 3/	%				91%	91%	

1/ Owner-Operator Income after home consumption and debt service on credit for innovations. Tenants income would be between half and two-thirds of that, if landlord shares in costs of inputs.

2/ Deficit to be covered by hiring out family labor or by decreasing home consumption by 5%

3/ Incremental percentage relates to income without innovations as found in line 1. Net Cash Income of 1 ha W/O Innovation too small to express increments in percent.

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ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Budgetary Implications

1. The implications of the Minimum Package Program for Government budget are four-fold:

(a) Taxes and other recurrent revenues from farm inputs and other Project costs, as well as taxes on increased output and agricultural income tax will increase government revenues, as will income from that part of the IDA credit on-lent to AIDB Bank;

(b) External inflows will arise from the IDA credit, as well as from SIDA assistance - the probability and the amount of other external assistance are as yet unknown;

(c) The recurrent costs of the extension and support services in MP areas, and the maintenance of penetration and farm to market roads will have to be met by increased Government spending after the end of the Project period;

(d) The planned expansion 1/ of the Program and the present anticipated external finance mean that a large part of the Program will require investments after the period of IDA financing and may have to rely entirely on Government financing.

2. Recurrent Revenues

These arise from several sources:

(a) Taxes on farm inputs and other Project costs: a turnover tax of 2%, a transaction tax of 5% on locally manufactured goods and an income tax and education tax element estimated at 3%;

1/ The FY 1974-76 slice of the program financed by IDA implies the establishment of 88 MP areas by 1979. See main text.

(b) Agricultural income tax: the marginal tax rate is about 1% for the lowest income brackets and 6% for the highest.1/ The mission has assumed that 3% of the incremental net farm benefit will be collected as tax;

(c) Taxes on consumer goods: on the basis of the prevailing tax incidence on various consumer goods, a marginal tax rate of 2% has been applied to net incremental farm earnings;

(d) On-lending of IDA funds: Government will receive interest and principal on loans made to finance its handling of inputs (fertilizer). The terms of on-lending to AIDB bank are expected to be 7-1/4% interest, repayment over 15 years.

3. The revenues from these various sources amount to Eth$2.5 million in 1980 and Eth$4.6 million by 1990.

4. Recurrent Expenditure

The following categories are to be distinguished:

(a) The recurrent expenditure for EPID headquarters and extension staff and the Cooperative Development Department relate mainly to salaries, but include also other costs except for clear-cut investments such as buildings;

(b) Maintenance of the road network to be constructed under the Program will build rapidly during the later years;

(c) The debt service on the IDA credit;

(d) Financing of the increment in the revolving fund for fertilizers.

1/ Marginal Tax Rates of Agricultural Income Tax

Medium Taxable Income	Tax	Increase Medium Income	Increase Tax	Marginal Tax Rate
150	1.50	150	1.50	1.0%
390	6.00	240	4.50	1.9%
540	18.00	150	12.00	8.0%
660	24.00	120	6.00	5.0%
840	33.00	180	9.00	5.0%
1,080	45.00	240	12.00	5.0%
1,350	60.00	270	15.00	5.6%
1,650	75.00	300	15.00	5.0%
1,850	90.00	300	15.00	5.0%
2,250	108.00	300	18.00	6.0%

5. These categories of recurrent claims on Government budget will amount to Eth$16.2 million in 1980 and Eth$15.9 million in 1990.

6. In principle, it would be desirable that recurrent Government income and expenditure would be in reasonable balance. The nature of the proposed Project is however such that there is a large discrepancy between income and expenditure. This will mean a heavy pressure on Government budget, but is considered to be within Government's capacity to handle.

7. Government will probably be looking for additional external finance for the period after disbursement of the IDA credit and the SIDA assistance, not only for partial financing of the revenue gap, but also to finance the investments in, or attributable to, MP areas for which the foundations are laid during the IDA financed period. These investments (buildings and roads) amount to some Eth$50 million for the period 1977-86. At this stage it is uncertain how much, if any, will be financed by external aid. Discussions appear to be under way between Ethiopia and the People's Republic of China for road construction, and also between Ethiopia and the UK.

8. Table 1 shows the Government's projected cash flow for 1974-1992. Several of the elements of this flow are subject to change, and will need to be up-dated in the course of the Project.

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AGRICULTURAL MINIMUM PACKAGE PROJECT

Government Cash Flow
(Eth$'000)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
SOURCES OF FUNDS																			
Taxes from - Project Costs	340	490	740	890	1,040	970	1,090	1,180	1,320	1,340	1,370	1,370	1,360	1,340	1,340	1,340	1,340	1,340	1,340
- Project Benefits	22	46	120	241	423	645	901	1,185	1,482	1,779	2,040	2,251	2,414	2,520	2,607	2,686	2,738	2,769	2,794
IDA Credit	9,974	13,598	19,836	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SIDA	2,000	2,000	500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AIDB Loan Services	148	299	470	470	470	470	1,005	1,004	1,005	1,004	1,005	1,004	1,005	1,004	1,005	1,004	-	-	-
TOTAL SOURCES	12,484	16,433	21,666	1,601	1,933	2,085	2,996	3,369	3,807	4,123	4,415	4,625	4,779	4,864	4,952	5,030	4,078	4,109	4,134
APPLICATION OF FUNDS																			
Programme Cost (excl. farm inputs)	12,799	16,503	24,101	20,697	22,873	17,497	18,292	18,876	19,915	18,083	17,483	16,833	16,133	15,383	15,383	15,383	15,383	15,383	15,383
Loan to AIDB	1,668	2,205	2,608	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IDA Credit Service	75	177	326	326	326	326	326	326	326	542	541	539	538	536	534	533	531	530	528
AIDB's Cash Deficit 1/	-	-	-	1,848	3,749	1,899	2,337	2,163	1,832	1,677	1,174	582	1,593	728	752	-	-	-	-
TOTAL APPLICATIONS	14,542	18,885	27,035	22,871	26,948	19,722	20,955	21,365	22,073	20,302	19,198	17,954	18,264	16,647	16,669	15,916	15,914	15,913	15,911
NET INFLOW/(OUTFOW)	(2,058)	(2,452)	(5,369)	(21,270)	(25,015)	(17,637)	(17,959)	(17,996)	(18,266)	(16,179)	(14,783)	(13,329)	(13,485)	(11,783)	(11,717)	(10,886)	(11,836)	(11,804)	(11,781)

1/ It is assumed that Government will finance AIDB's cash deficits arising from the programme (see Annex 4, Table 1).

April 30, 1973.

ANNEX 21
TABLE 1

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Foreign Exchange Implications

1. Foreign exchange costs of the Minimum Package Program would rise rapidly from about Eth$5 million in 1974 to a stable level of about Eth$20 million per year from 1982 onwards. Supply and demand projections for the more desirable food grains (wheat and teff) show a growing shortfall which will only partially be met by the incremental MP production. If it is assumed that the total incremental output from the Program would replace grain imports, the foreign exchange value would rise from Eth$4 million in 1974 to about Eth$40 million per year after 1985 (Table 1). However, in view of the strained balance of payment situation, it is by no means certain that government would allow the full extent of the local grain deficit to be met by imports.

2. It would be more realistic to assume that one half of Ethiopia's estimated cereal deficiency would be imported. Table 2 shows the foreign exchange implications assuming that this is purchased both with, and without the Program. In the peak year (1980) of the Program, Ethiopia would save Eth$4 million in foreign exchange; by 1990 the saving would be Eth$27 million.

May 4, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Foreign Exchange Costs and Export Value of Output
(Eth$'000)

	EPID					Roads 5/				Foreign Exchange 7/		
	H.Q. 1/	Obs. Areas 2/	Dem. Areas 3/	MP. Areas 3/	Co-op. Dev.Dept. 4/	Farm Highway	Pene-tration	Inputs 6/	Total Costs	Value of Output	Balance	Balance (US$'000)
1971	406	25	154	211	-	-	-	132	928	334	(594)	(287)
1972	669	6	267	300	-	-	-	275	1,517	701	(816)	(394)
1973	1,206	6	223	167	-	-	-	721	2,323	1,835	(488)	(236)
1974	1,885	6	223	1,025	56	504	-	1,440	5,139	3,673	(1,466)	(708)
1975	1,790	6	223	1,126	65	1,039	924	2,490	7,663	6,442	(1,221)	(589)
1976	1,358	6	223	1,299	74	1,648	4,238	3,716	12,562	9,832	(2,730)	(1,318)
1977	1,309	2	223	1,481	128	2,320	4,413	5,137	15,013	13,738	(1,275)	(615)
1978	1,346	-	223	1,587	137	3,013	4,588	6,684	17,578	18,053	475	229
1979	1,157	-	-	1,693	146	3,237	563	8,263	15,059	22,586	7,527	3,633
1980	1,157	-	-	1,754	200	3,465	563	9,846	16,985	27,112	10,127	4,888
1981	1,157	-	-	1,801	209	3,640	563	11,305	18,675	31,088	12,413	5,991
1982	1,157	-	-	1,846	217	3,815	563	12,507	20,105	34,307	14,202	6,854
1983	1,157	-	-	1,171	217	3,430	563	13,430	19,968	36,790	16,822	8,119
1984	1,157	-	-	1,171	217	3,010	563	13,999	20,117	38,400	18,283	8,824
1985	1,157	-	-	1,171	217	2,555	563	14,363	20,026	38,928	18,902	9,123
1986	1,157	-	-	1,171	217	2,065	563	14,582	19,755	40,936	21,181	10,222
1987	1,157	-	-	1,171	217	1,540	563	14,778	19,426	41,726	22,300	10,762
1988	1,157	-	-	1,171	217	1,540	563	14,806	19,454	42,197	22,743	10,976
1989	1,157	-	-	1,171	217	1,540	563	14,814	19,462	42,510	23,048	11,124
1990	1,157	-	-	1,171	217	1,540	563	14,809	19,457	42,702	23,245	11,219

1/ 43% of investment and 45% of operating costs.
2/ 47% of farm equipment, 16% of farm supplies and 40% of "other office costs".
3/ 44% office equipment, 47% of farm equipment, 75% of vehicles, investment and operating costs, 40% of "other office costs", 16% of house maintenance.
4/ 75% of motor vehicle investment and operating cost, 52% of office furniture, 40% of "other office costs".
5/ 70% of all costs.
6/ See Annex 9, Table 11-15.
7/ 80% of farmgate value as prices for imported grain are lower than local grain. In 1970, agricultural imports were Eth$ 42 million, representing 10% of total imports. Imports of cereal production were about Eth$ 10 million in 1970.

April 30, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Program Foreign Exchange Implications

Assuming One-Half of Cereal Deficiency Imported

Year	Without Program: Cereal Deficiency[1] ('000 tons)	Without Program: Cereal Deficiency[1] (Eth$'000)[2]	Without Program: Projected Cereal Imports (Eth$'000)	With Program: MPP Incremental Production ('000 tons)	With Program: MPP Incremental Production (Eth$'000)	With Program: Projected Cereal Imports[3]	Foreign Exchange Costs: MP Program	Foreign Exchange Costs: MP Program and grain Imports	Savings in Foreign Exchange from Project[3]
							(Eth$'000)		
1971[4]	37.4	4,525	1,493	3.3	417	1,076	928	2,004	(511)
1975	161.4	19,659	9,829	62.0	8,052	1,777	7,663	9,440	389
1980	331.1	39,004	19,502	265.8	33,890	-	16,985	16,985	2,517
1985	549.1	61,774	30,887	411.9	49,660	-	20,026	20,026	10,861
1990	812.6	91,417	45,708	431.8	53,378	-	19,457	19,457	26,251

1/ As defined in Annex 2, Table 4.

2/ Cereal deficiency is assumed to be 50% wheat, 50% maize, at farmgate prices.

3/ Shows net foreign exchange costs or savings as a result of the Program.

4/ Actual.

May 8, 1973

ANNEX 13
Table 2

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Economic Rate of Return

1. The figures used to calculate the economic rate of return are set out in the attached Table.

2. The assumptions and adjustments made in calculating economic costs were as follows:

(a) EPID Headquarter Costs - excluded from the economic cost are:

(i) applied research, animal husbandry group and home economic group - these relate to future innovations of which no account is taken in the benefits;

(ii) 10% of the balance remaining after deducting (i), for the time and costs incurred on other projects (CADU, WADU) for which EPID has responsibility;

(iii) permanent working capital for AIDB;

(iv) the fund for marketing credit - as no benefits are included and in view of the experimental nature of the component;

(v) taxes, taken as 2% of the remaining balance.

(b) EPID Observation and Demonstration Areas - a deduction of about 2% has been made for taxes.

(c) In view of the high rate of unemployment throughout the Project area, the cost to the economy of unskilled labor for road construction and maintenance will be zero in terms of foregone production. Consequently, a shadow wage rate of zero has been used. The same applies to incremental farm labor, family and hired, on participating farms.

(d) EPID MP Areas - excluded from the economic cost are:

(i) the cost of home economics services (benefits also excluded);

(ii) cost of extension services in MP areas would be reduced in year seven by 20% and from year nine onwards by 40% -by which time initial innovations would have been introduced. After this date extension staff would be concerned with new innovations not part of the Project;

(iii) 2%, for taxes, of the costs after deducting (i) and (ii) above.

(e) Cooperative Development Department - 2%, for taxes, has been deducted from the total cost.

(f) Farm-to-Highway and Penetration Roads - reductions of 25% and 40% respectively have been made, representing:

(i) unskilled labor shadow priced at zero - 15% of total cost;

(ii) taxes - 1% of total cost;

(iii) benefits outside Project - 9% or 24% of total cost respectively.

(g) Fertilizer prices per ton (DAP Eth$310, Urea Eth$250) represent international cif and local distribution costs but exclude taxes, charges, interest, bad debt and EPID services.

(h) Improved Seeds - reductions of 20% to 30% have been made in respect of the estimated tax and financing elements.

(i) Improved Harrows - the costs of these are not material (about 1/2 of 1% of the total cost of inputs) and, therefore, no adjustment has been made.

(j) On-farm Storage - a round figure deduction averaging a little under 5% has been made in respect of taxes.

(k) Miscellaneous - these costs include pesticides, bagging and small tools; an adjustment of about 5% has been made in respect of taxes.

(l) Incremental Stocks of Fertilizer - it is assumed that inventories will equal 15% of the fertilizer purchased in any year.

3. Project benefits were derived from incremental production including savings from improved on-farm storage, valued at the farm gate prices shown in Annex 2, Table 9.

4. With these assumptions, the Project's economic rate of return is estimated at 15%. An increase of 20% in the cost of inputs would lower the return to 10%; an increase of 10% in benefits would raise it to 20%; a combination of these two factors would give an economic return of 16%.

May 7, 1973

ETHIOPIA

AGRICULTURAL MINIMUM PACKAGE PROJECT

Economic Rate of Return Calculation

(Eth$'000)

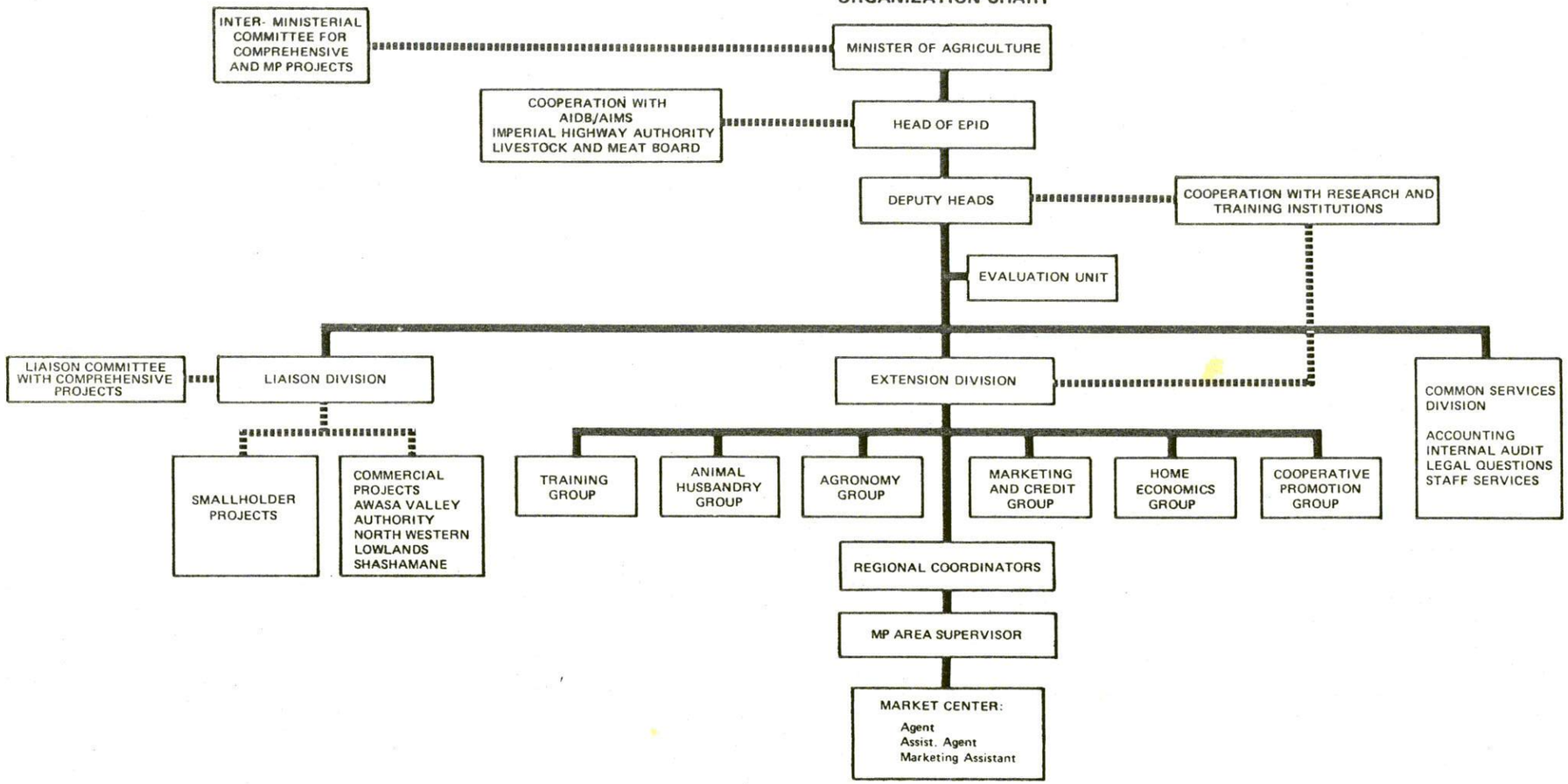
	Costs											
	EPID				Coop.	Roads			Incremental Stocks of	Total		Net
	HQ	Obs. Areas	Dem. Areas	MP Areas	Dev. Dep.	Farm-Highway	Penetration	Inputs	Fertilizer	Costs	Benefits	Benefits
1971	-	306	280	870	-	-	-	200	27	2,470	417	(2,053)
1972	-	285	522	1,727	-	-	-	422	28	4,281	876	(3,405)
1973	-	285	458	2,367	-	-	-	1,089	90	6,374	2,294	(4,080)
1974	3,178	285	458	3,917	146	540	-	2,189	141	10,854	4,591	(6,263)
1975	3,046	285	458	4,994	227	1,114	792	3,776	204	14,896	8,052	(6,844)
1976	2,540	285	458	5,732	308	1,766	3,633	5,688	235	20,645	12,290	(8,355)
1977	2,441	143	458	6,578	439	2,486	3,783	7,868	265	24,461	17,172	(7,289)
1978	2,514	-	458	7,267	520	3,227	3,933	10,217	282	28,418	22,566	(5,852)
1979	2,142	-	-	7,705	601	3,469	483	12,570	291	27,261	28,233	(972)
1980	2,142	-	-	7,519	743	3,712	483	15,091	284	29,974	33,890	3,916
1981	2,142	-	-	7,359	824	3,900	483	17,332	254	32,294	38,860	6,566
1982	2,142	-	-	7,153	895	4,068	483	19,194	199	34,134	42,884	8,750
1983	2,142	-	-	6,432	895	3,650	483	20,639	146	34,387	45,988	11,601
1984	2,142	-	-	6,094	895	3,225	483	21,481	81	34,401	48,000	13,599
1985	2,142	-	-	5,756	895	2,738	483	22,077	49	34,140	49,660	15,520
1986	2,142	-	-	5,512	895	2,212	483	22,424	27	33,695	51,170	17,475
1987	2,142	-	-	4,896	895	1,650	483	22,611	11	32,688	52,158	22,440
1988	2,142	-	-	4,896	895	1,650	483	22,661	-	32,727	52,746	20,019
1989	2,142	-	-	4,896	895	1,650	483	22,682	-	32,748	53,137	20,389
1990	2,142	-	-	4,896	895	1,650	483	22,686	-	32,752	53,378	20,626
1991	2,142	-	-	4,896	895	1,650	483	22,635	-	32,701	53,496	20,795
1992	2,142	-	-	4,896	895	1,650	483	22,560	-	32,626	53,503	20,877
1993-95	2,142	-	-	4,896	895	1,650	483	22,560	-	32,626	53,503	20,877

Economic rate of return = 14.90% over 25 years

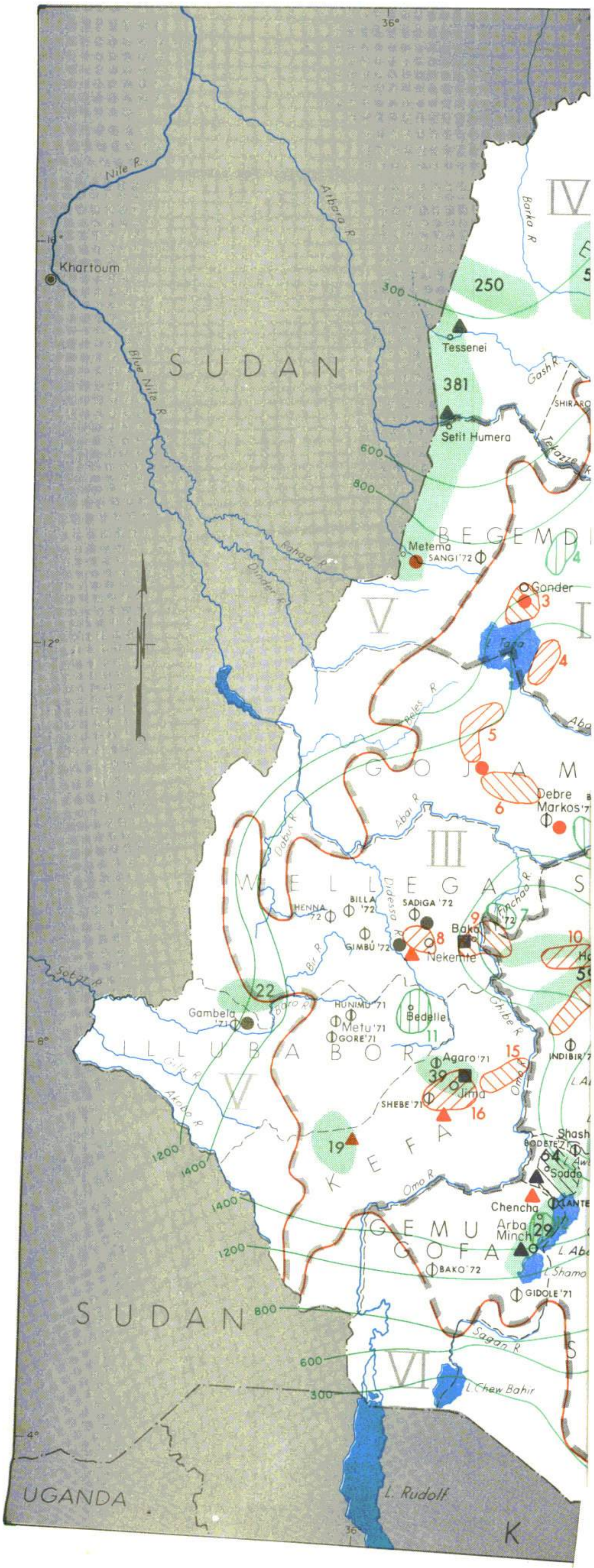
April 30, 1973

ANNEX 14
Table 1

ETHIOPIA
AGRICULTURAL MINIMUM PACKAGE PROJECT
EXTENSION AND PROJECT IMPLEMENTATION DEPARTMENT (EPID), MINISTRY OF AGRICULTURE
ORGANIZATION CHART



World Bank – 7378 (R)



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Blue Nile R.
Barka R.
Tessenei
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381
300
Gash R.
Setit Humera
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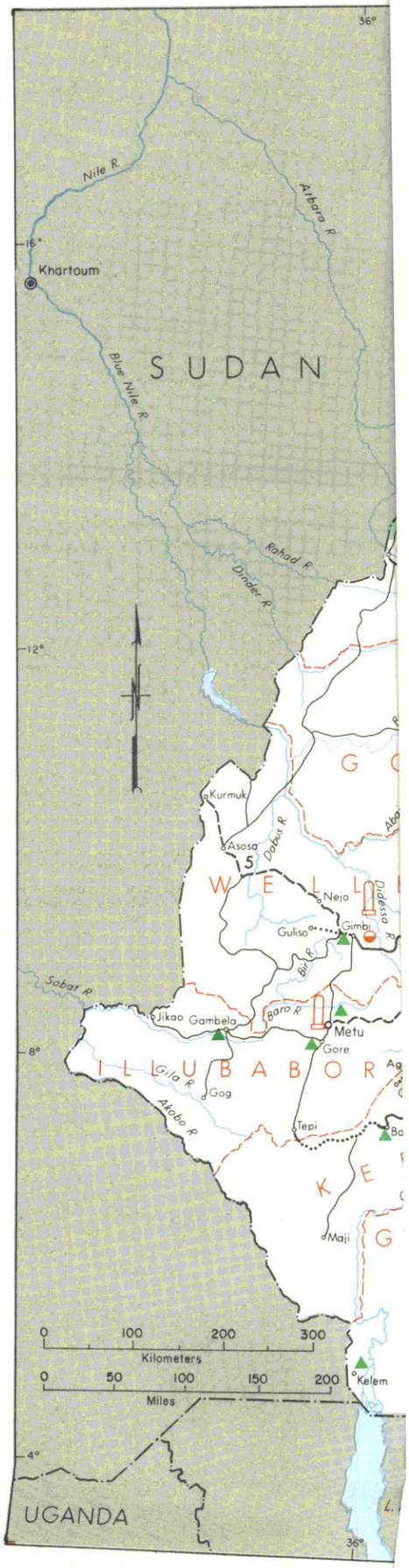
800
Metema
SANGI '72
Rahad R.
Dinder R.
Gonder
L. Tana
Beles R.
GOJAM
Debre Markos '71
Abai R.
III
WELLEGA
HENNA '72
BILLA '72
SADIGA '72
GIMBU '72
Didessa R.
Bako
Nekemte
Gambela '71
22
HUNIMO '71
Metu '71
GORE '71
Bedelle
ILLUBABOR
Agaro '71
Jima
SHEBE '71
Ghibe R.
INDIBIR '71
KEFA
19
Omo R.
Chencha
Arba Minch
GEMU GOFA
BAKO '72
GIDOLE '71
L. Shamo
Sagan R.
L. Chew Bahir
1200
1400
SUDAN
UGANDA
L. Rudolf
IV
V
VI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Atbara R.
16°
Khartoum
SUDAN
Blue Nile R.
Rahad R.
Dinder R.
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Asosa
Dabus R.
Nejo
Didessa R.
Guliso
Gimbi
Bir R.
Sobat R.
Jikao
Gambela
Baro R.
Metu
Gore
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Gilo R.
Gog
Akobo R.
Tepi
Maji
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UGANDA
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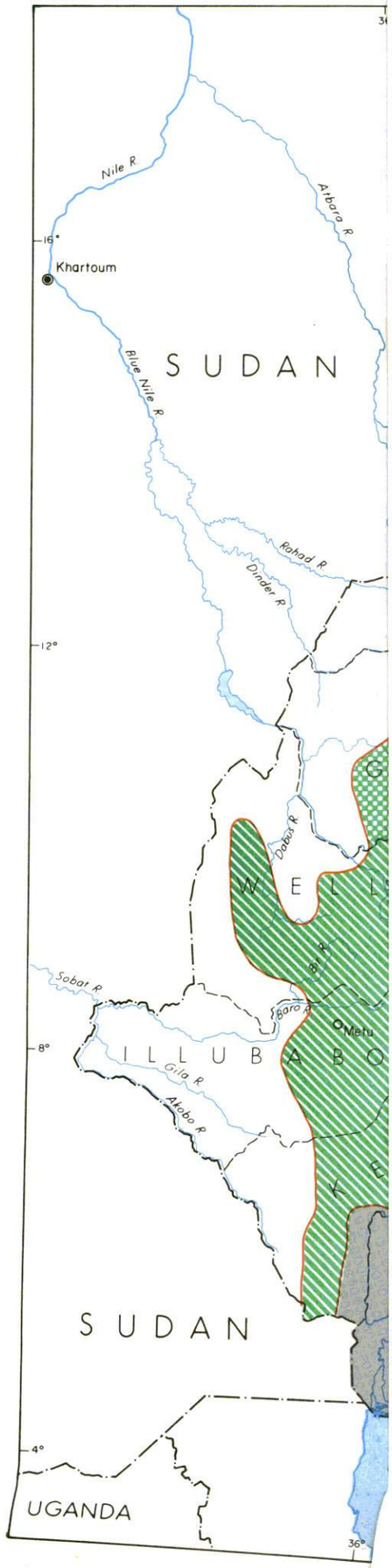
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Blue Nile R.
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Baro R.
Meru
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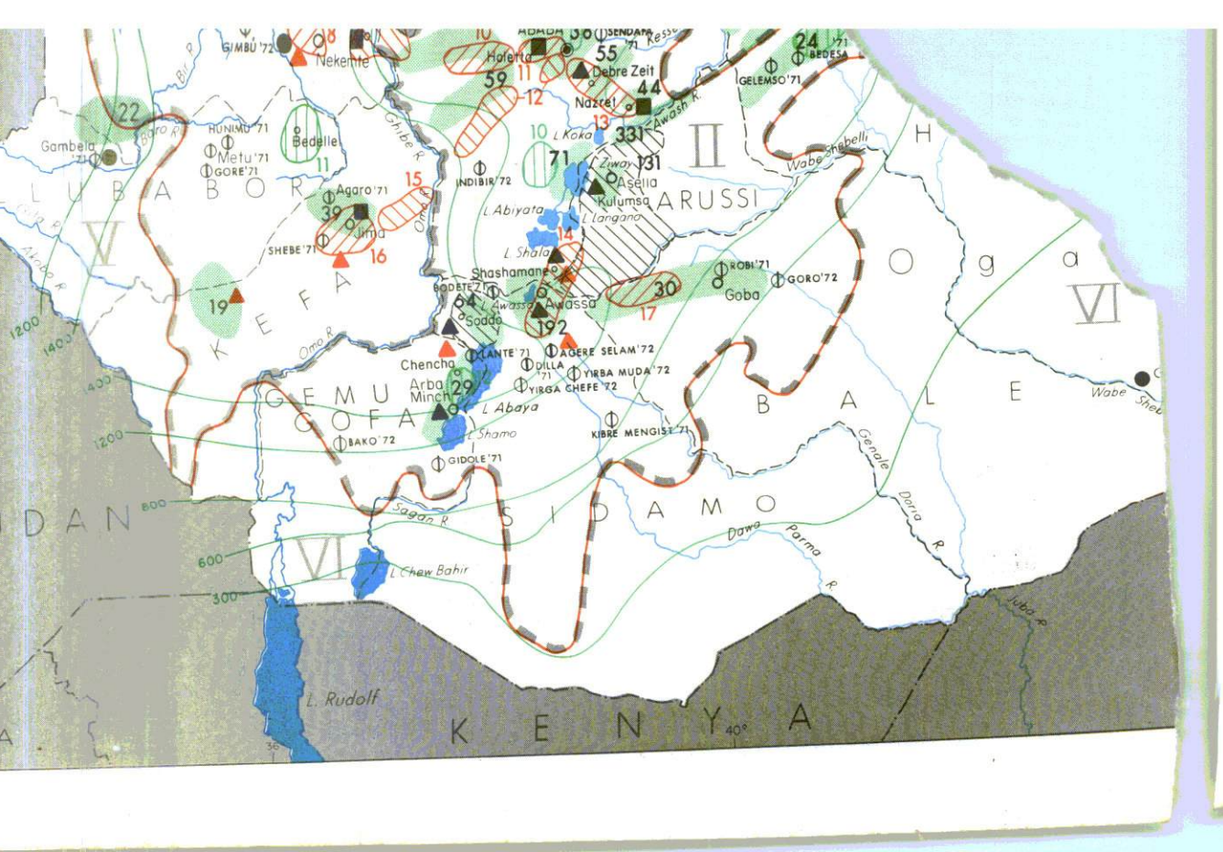
ILLUBABO
Gila R.
Akobo R.
SUDAN
4°
UGANDA
36°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Kulumsa
Awassa
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Sodo
Jimma
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Bedelle
Gambela
Goba
ROBI '71
GORO '72
BEDESA
GELEMSO '71
INDIBIR '72
SHEBE '71
BAKO '72
GIDOLE '71
KIBRE MENGIST '71
YIRGA CHEFE '72
YIRBA MUDA '72
AGERE SELAM '72
DILLA
ILANTE '71
L Koka
L Ziway
L Abiyata
L Langano
L Shala
L Awassa
L Abaya
L Shamo
L Chew Bahir
L. Rudolf
Awash R.
Wabe Shebelli
Genale
Dawa
Parma R.
Juba R.
Sagan R.
Omo R.
Gibe R.
Baro R.
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