RURAL INDUSTRIALISATION

AND

THE FOOD PROBLEM

A case study of Mumias Sugar Scheme

By

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This Research Paper is my original work and has not been submitted for a degree in any other University.

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This Research Paper has been submittef for examination with our approval as University Supervisors.

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C O N T E N T S

A C K N O W L E D G E M E N T S

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A B S T R A C T

Cash crop production may be supported on the grounds that it enables participating farmers to earn incomes in excess of what subsistence production provided. Furthermore, cash crop activity offers direct and indirect employment to thousands of people. By producing domestically whatever was previously imported, the government saves foreign exchange which is channelled into welfare-improving activities. However, cash crop production has several repercussions.

The introduction of cash crop activity in Mumias has meant stiff competition between sugarcane and food crops for limited land, labour, capital and financial resources. A proportionately large share of total landholding is devoted to sugarcane production while food crops and livestock are robbed of land.

Reduced output of food crops has meant an increased dependence of farmers on the local markets for food supplies, most of which originate from Bungoma district and other locations within Kakamega district. However, such food supplies might not be forthcoming since these locations have also been "invaded" by sugarcane. The situation is compounded

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CHAPTER I

INTRODUCTION

1.1 Statement of the Research Problem

The introduction of a cash crop which requires vast quantities of land into an area which previously depended upon subsistence production may come at the expense of the limited land, labour, capital and financial resources. One may therefore expect that the region concerned will have been turned into a deficit area with respect to food supplies. However, this is not necessarily the case.

The same or even greater quantities of food may still be produced after the introduction of the cash crop. This will greatly depend on the pre-existing situation with respect to resource availability and the manner in which the people in the affected region respond to producing solely for the market. The region could have been operating with large tracts of idle land so that the introduction of the cash crop does not necessarily reduce output of food products. Furthermore, cash income opportunities brought about by cash crop production may have increased people's awareness about the usefulness of land as a productive resource. In this respect, one would expect, land will be utilised more intensively so as to yield greater quantities of food products from the same or even smaller quantities of land.

Cash crop production may be supported on the grounds that it enables the participating farmers to earn incomes which are utilised in activities that help improve their standard of living. It also offers employment opportunities to thousands of individuals who are directly and/or indirectly linked to the cash crop enterprise. Further still, cash crop production saves the country a substantial amount of foreign exchange which could have been channelled into imports. The money saved can be utilised in sectors like education, health and communication, among others. However, several shortcomings of commercialised agriculture can be cited. Among these, it is documented that commercialised agriculture contributes to food deficits in the particular regions that produce solely for the market. Dependence on single cash crops is a risky undertaking when one considers vagaries of weather and price fluctuations.

There is a difference between a given quantity of food products held by a rural household in the family store at the homestead level and an equivalent value of money held in a bank. For example, the prices farmers pay for purchased food is generally higher than the implicit prices they would pay by producing their own food. In other words, producing for own consumption is cheaper than purchasing an equivalent amount of food from the market. Therefore, for a given level of income, a shift from subsistence to commercial

production reduces food consumption at the local, regional or national level.

From the above, one can expect that even if the marketing system for food products in the cash crop region operated sufficiently well to fill the food gap, the cash incomes generated from the cash crop may not be sufficient to purchase the food requirements of the participating farmers while at the same time leaving them with surplus incomes which could be re-invested in an attempt to improve their wealth standards.

A more complete evaluation of the successes or failures of an agricultural investment should therefore include an assessment of the extent to which it creates farm-level income generating activities and the proportions in which such incomes are shared between consumption and investment.

1.2 Objectives of the study

This study aims to achieve two broad objectives:-

(i) Firstly, it determines whether or not the objectives of development are being achieved through the strategy of establishing large-scale sugar factories which require vast

quantities of land to be devoted to the production of the essential raw-material input (sugarcane). This objective is achieved by analysing the extent to which agro-industrial innovation in the Kenyan sugar industry brings about a trade-off between the particular cash crop (sugarcane) and food crop production.

(ii) Secondly, it determines whether or not the cash incomes generated from the sugarcane crop enterprise do sufficiently bridge the food gap that might have arisen from the introduction of the sugar scheme. In the event of cash surpluses being created over and above the immediate subsistence requirements of the rural households involved, the study determines the expenditure patterns of the surplus cash earnings. In pursuit of this objective, the study assesses the contribution of the sugar industry to farm-level income generation and the manner in which such incomes are shared between consumption and investment for sustenance and expansion of the rural households' wealth.

1.3 Working Hypotheses

We break down the objectives of this study into the following operational hypotheses:

(i) that the introduction of Mumias Sugar scheme has turned Mumias into a food deficit area with respect to food supplies.

(ii) that the cash incomes generated from the sugarcane enterprise do sufficiently finance the food requirements of the rural households in Mumias.

(iii) that the cash incomes generated from the sugarcane crop enterprise are not sufficient to enable the rural households to maintain and/or improve their wealth position through re-investment in the sugarcane crop activity itself and other income-earning activities.

1.4 THEORETICAL FRAMEWORK AND CHOICE OF THE STUDY AREA

1.4.1 Theoretical Framework

Recent years have witnessed a marked shift towards rural development[1] in the plan strategies of a number of developing countries. The strategy of rural development has come to be formulated as a result of the general disenchantment with previous approaches to development planning at national and sectoral levels. It is defined by its concern with equity objectives of various kinds, especially the reduction of inequalities in income and employment, access to public goods and services, and alleviation of poverty.

The most fundamental factor responsible for the new orientation toward the problems of poverty has no doubt been the accumulating evidence that a large percentage of the population in developing countries has been by-passed by the economic growth that has been achieved. This in turn has led to increased awareness that poverty remains a widespread and distressingly persistent problem. Furthermore, the earlier view that rapid industrialization would soon transform the economic structure of these

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1 Uma Lele defines rural development as improving living standards of the mass of the low income population residing in the rural areas and making the process of development self-sustaining (see University of Nairobi, IDS, Discussion paper No. 213, Dec.1974).

countries and expand non-farm job opportunities rapidly enough to reduce the absolute size of the rural population has been proven wrong by the development experiences of these countries. The expectation that rapid industrialisation and structural transformation would soon spread the benefits of growth throughout the population through trickle-down process has been frustrated by the realized development trends in the developing countries.

In Kenya, the strategy of rural development is clearly reflected in the projects and policies proposed in the 1970-1974 Development Plan[2]. There are many reasons for this shift in development policy in favour of rural areas but at the heart of them has been the concern about the mounting unemployment problem and the rising inequalities in opportunities. There are many reasons why this strategy has been promoted.

It has been realised that the people and their land are Kenya's prime assets. Further still, it is evident that the development of the major towns cannot provide sufficient employment opportunities for a fast-increasing labour force. Thus, rural

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2. Republic of Kenya, Development Plan, 1970-1974. Government Printer, 1970.

development provides an avenue for fostering widespread improvements in productivity, output and employment, all of which would improve the pattern of income distribution while at the same time achieving the required expansion of food production.[3]

Johnston and Meyer rightly argue that "when a country's agricultural labour force still represents 60 to 80 per cent of the total labour force and the population of the working age is increasing rapidly, it is unrealistic to expect off-farm employment to expand at a rate sufficient to absorb more than a fraction of the annual additions to a country's work force, indeed a rather small fraction if industrial investment is as capital-intensive as has often been. The solution, therefore, lies in rural areas."[4]

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3 University of Nairobi, "Summary Report of a Workshop on a Food and Nutrition Strategy for Kenya," IDS, Occasional Paper, No. 14, 1975.

4 Johnston, B.F. and Meyer, J.A., "Nutrition, Health and Population in strategies for Rural Development", University of Nairobi, IDS, Discussion Paper, No. 238, August 1976, P.3.

An overwhelming majority of Kenyans reside in the rural areas where they are engaged in agriculture and agriculture-related activities. The development of agriculture will be of importance for several reasons. A primary objective of agricultural development is the provision of adequate food supplies at prices which are reasonably low from the point of view of the consumer while at the same time being sufficiently high to give the producers fair returns. Agriculture remains a major employer of an otherwise idle labour. This helps reduce rural-urban migration with its accompanying constraints on urban resources; for example, housing, water and security, among others.

The Kenya Government accords high priority to the development of the sugar industry. Government policy is centred on the attainment of self-sufficiency in meeting the country's demand for sugar while in the long run the Government expects to earn foreign exchange through sugar exports. As a result, the government intends to allocate substantial amounts of resources for the development of the industry. Already, a long term sugar development programme has been evolved consisting of a number of detailed

investment proposals for rehabilitation and expansion of existing sugar complexes and for the establishment of new sugar projects[5]. However, the expansion of a cash crop like sugarcane may come at the expense of food crop production.

In traditional societies, food crops are the reserve of women while men control cash crop production. Expanded cash crop production reduces the availability of land and household labour for subsistence food production and thus reduces women's control over household income. Since women have traditionally been responsible for assuring the necessary food intake of the family, and since a strong separation may exist between mens' and womens' incomes and their uses, the loss in food consumption from own production may not be matched by increased food purchases. This is because men may use cash crop incomes on improving homes, throwing prestige feasts, buying transistor radios, among others, at the expense of domestic food requirements.

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5 Ministry of Agriculture, Small-scale sugar Production in Kenya: Economics and social impact, Agroinvest, September, 1976.

The transformation from subsistence to cash crop production usually expands the choice of goods and services available in a region. This tendency, as already mentioned, could lead to a higher budget share being spent on non-foods and higher priced foods at the expense of low priced staple foods. Some factors which may contribute to increased purchases of non-foods include: Sharp price increases in local markets due to the inability of existing market system to cope with a situation of rapidly rising demand; reduced supply of basic food products; and the lumpiness of income flows from cash crop production.

Subsistence farming frequently produces a more or less constant flow of income in the form of food and some income. However, incomes from cash crop production often come in large lumps. Lumpy payments, on their part, are frequently difficult to manage, particularly by farmers who are accustomed to a subsistence way of life. If this happens, it may lead to drastic changes in spending towards the purchase of consumer durables and other non-foods at the expense of essential food purchases. For example, in a study on Mwea Irrigation Scheme in Kenya, it was found that a higher percentage of income was being spent by participating households on items like bicycles and childrens' school fees than

was being spent by farmers not participating in the scheme.[6]

So far, the assumption has been that the expected income gains from shifts toward cash crop production is actually realized. However, this may not be the case for several reasons: farm gate prices of the cash crop may be less than expected due to high transport and marketing costs; input prices may increase while the productivity of the cash crop investment may be lower than expected.

For short season crops, farmers could avoid this deficiency by moving out of cash crop production. But for perennial cash crops which have long gestation periods, suspending production can only be done at a substantial cost since the farmer would lose his crop, have to repay for the credit facilities advanced to him and forgo whatever alternative enterprice his piece of land could have been put to.

Korte, R. Health and Nutrition in Mwea Irrigation Scheme, World Bank, Washington D.C., 1981.

1.4.2 Choice of the Study Area

The Mumias Sugar Scheme has been selected as the area of study on the basis of criteria which can best be understood after a brief description of the Kenyan sugar industry.

The sugar industry is one of the agricultural activities traditionally looked at in Kenya as being capable of providing gainful employment to the country's fast-growing Population. The largest secondary effect, on employment, of setting up a sugar factory is through the backward linkage to the suppliers of sugarcane, the main raw material input which must be supplied locally, because it is bulky and highly perishable.

The sugar industry saves the country foreign exchange which could have otherwise been used for importing sugar. The central government also derives revenue by imposing various taxes on sugar produce and marketing. Buch-Hansen, on the investment in the rural agro-business, has concluded that,

"from the general discussion on agro-business or agro-industrial complexes in Third World Countries it is believed that they will create great changes in the economic and social performance for the

farmers participating in the complexes as well as for the Third World governments taking part by giving the possibility to accumulate from the revenues collected by the increased production."[7]

Sugar is presently produced in Kenya by seven large scale sugar companies namely: Mumias Sugar Company Limited in Kakamega District; Chemelil Sugar Company Limited at Chemelil in Kisumu District; Nzoia Sugar Company Limited in Bungoma District; East African Sugar Industries Limited at Muhoroni in Kisumu District; South Nyanza (SONY) Sugar Company Limited at Awendo in South Nyaza District; Miwani Sugar Mills Limited at Miwani in Kisumu District and Associated Sugar Company Limited at Ramisi in Kwale District of Coast Province. Table 1 below gives details on ownership, management, year of establishment and rated capacities of these factories.

Buch-Hansen, M; Agro-Industrial Production and Socio-economic Production in Muhoroni and Mumias - Western Kenya, Institute of Geography, socio-economic Analysis and computer science, Roskilde, Working Paper No. 15, 1980, P.5.

Table 1: Year of establishment, ownership, Management and Rated Capacities of Major Sugar Factories in Kenya

Factory	Year of Establishment	Ownership	Management	Rated Capacity (tonnes of mill white sugar per annum)
Ramisi	1920's	Madhvani Group (India)	Madhvani Group	30,000
Miwani	1922	Hindocha Family	Hindocha	60,000
Muhoroni	1966	Kenya Government	Mehta Group International (India)	60,000
Chemelil	1968	Kenya Government	Booker McConnell (London)	55,0000
Mumias	1973	Kenya Government	Booker McConnell (India)	180,000
Nzioa	1978	Kenya Government	Kenya Government	60,000
Sony	1979	Kenya Government	Mehta Group (International (India)	60,000

From Table 1 it can be observed that Mumias Sugar factory leads in rated capacity. The Kenya Government has majority shares in Mumias Sugar factory (71 per cent). From these two aspects, Mumias Sugar Factory is the biggest government investment in the sugar industry, hence, the interest and choice to study the functioning of the scheme and its economic implications.

1.5 SIGNIFICANCE OF THE STUDY

In many developing economies, cash crop production is important. However, very few studies have been undertaken relating cash crop production to observed food deficits both at the national and local levels.

In Kenya, most of the studies done on the sugar industry have focused on technical issues like capacity utilization levels, returns to scale and capital-labour substitution. The question of food deficits in sugar schemes has been mentioned only in passing. No comprehensive analysis has been undertaken to examine the extent of observed food shortages. Further more, no studies have been undertaken on whether the cash crop incomes are sufficient to fill the food gap.

The present study is particularly important in the light of the Kenya Government's stated policy of ensuring broad self-sufficiency in food production and also the Government's concern with promoting exports to earn foreign exchange. Increased sugarcane

production is likely to earn the country foreign exchange through the exportation of surplus sugar. However, increased sugarcane acreage is likely to influence food availability at the local level. This might work through the shifting of resources away from food production.

Projects and policies promoting a shift from subsistence mixed cropping patterns to mono-cropping, need to be carefully assessed for any possible negative effects on food availability. It is expected that the findings of this study will be of great relevance to policy formulators and planners in their task of approving the expansion of existing sugar schemes and the establishment of new sugar schemes.

CHAPTER II

SELECTED LITERATURE REVIEW

2.1 Review of General Literature

Prior to European intervention, Africans practised diversified agriculture (multi-cropping) Diversified food production had several advantages. It provided a means of controlling the spread of plant-specific pests, created a dense network of plants to hold down the growth of weeds, and allowed each crop to utilise its own specific nutrient requirements. Multicropping was also conducive to the sequential maturation of crops. This in turn spread the harvesting effort and allowed food to be available over a long period of time.

Commercialised agriculture can be traced back to colonial rule which simplified diversified production to single cash crops, often to the exclusion of staple food, and in turn sowed the seeds of famine. For example, rice farming once had been common in Gambia. The best lands were taken over by peanuts (which were grown mainly for the European market), and rice had to be imported to counter the mounting prospect of famine. Northern Ghana, once famous for its yams and other

foodstuffs, was forced to concentrate solely on cocoa. Liberia was converted into a virtual plantation subsidiary of Firestone. Food production in Dahomey and South East Nigeria was all but abandoned in favour of palm oil. Tanganyika (now Tanzania) was forced to concentrate her resources on sisal, while Uganda specialised in cotton production.[8]

The introduction of cash crop production has meant changes in land utilisation patterns since both land and labour have been switched from the production of food for home consumption. For example, in the Awash Valley of Ethiopia, Cotton and Coffee plantations were expanded into the traditional pasture areas of the nomadic tribes or in the sahel region of West Africa, where transnational corporations profitably used thousands of hectares for truck farming, cotton growing and cattle ranching at the expense of domestic grain production. In many underdeveloped countries today, a close relation has become apparent between the agricultural operations of the transnational corporations

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8 Lappe, M.F. et al, Food First, Beyond the Myth of Scarcity, Institute for Food and Development Policy, Houghton Mufflin Company, Boston, 1977.

and the imminent danger of famine.[9]

Since people living on land do not easily go against natural and adaptive drive to grow food for themselves, colonial powers had to force the production of cash crops. The first strategy was to use physical or economic force to get the local population to grow cash crops instead of food on their own plots and then turn them over to the colonizer for export. Rodney recounts that cash crops were often grown literally under threats of guns and whips. For example, the growing of cotton was a major grievance leading to the Maji-Maji rebellion in the then Tanganyika.[10]

Taxation was a preferred colonial technique to force Africans to grow cash crops. Since the tax had to be paid in cash, the peasants either had to grow crops for sale or alternatively work on the plantations. Taxation was, therefore, an effective tool to "stimulate" cash crop production and a source of revenue

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9 Jacoby, E.H. "Transnational Corporations and Third World Agriculture", Development and change, The Hague, Vol. 6., No.3, July 1975.

10 Rodney, W. How Europe Underdeveloped Africa, Bogle-L'ouverture Publications, 1972 P.171-172.

that the colonial bureaucracy needed to enforce the system. To expand their production of export crops to pay the mounting taxes, peasant producers were forced to neglect the production of food crops.

From the above, it can be argued that colonialism destroyed the cultural patterns of production and exchange by which traditional societies in Less Developed Countries (LDCs) previously had met the needs of the people. As Lappe contends,

> "the introduction of the plantation meant the divorce of agriculture from nourishment as the notion of food value was lost to the over-riding claim of "market value" in international trade. Crops such as sugar, tobacco, and coffee were selected, not on the basis of how well they fed the people, but for their high price value relative to their weight and bulk so that profit margins could be maintained even after the cost of shipping to Europe."[11]

Adamson[12] narrates how, despite the crash in the world sugar market and the emancipation of slaves, the would be ex-slaves were not allowed to take over the

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11 Lappe, M.F. et al, ibid P.81

12 Adamson, A. Sugar Without Slaves: The Political Economy of British Guiana 1838-1904, New Haven and London, Yale University Press, 1972.

plantation land and grow the food they needed. The planter-dominated government in British Guiana devised several schemes to thwart food self-sufficiency. It was feared that once the ex-slaves started growing food, it would be difficult to return them to sugar production when world market prices began to recover. In British Guiana, Adamson concludes, perhaps the most insidious tactic to "lure" the peasants away from food production was a policy of keeping the price of imported food low through the removal of tariffs and the use of subsidies. Cheap food imports destroyed the market for domestic food and thereby impoverished local food producers.

The colonial legacy of emphasising cash crop production at the expense of producing food for subsistence purposes seems to have persisted up to the present. In many Third World countries, pricing policies discriminate against the production of mass-consumed staples and encourage the production of quality and luxury food and other agricultural exports. For

example, as in many developing countries, agricultural policies in Mexico are first, food for export, second, food for industrial processing and, third, food for the population at large. While winter vegetables, straw berries, tomatoes and coffee are being produced for export, the government must import corn and beans. Similarly more basic grains are used for animal forage than are consumed by the 20 million peasants.[13]

Accordingly, in one Third World Country after another, small-scale production of staple foods for the producer and his family and for local rural, small-town, and mass-urban consumption is being displaced. Multinational agrobusinesses and other transnational enterprises are penetrating and taking over Third World agriculture to produce for the high-income domestic and export markets. The result throughout the developing countries is increasing landlessness, rural unemployment and under-employment, poverty and hunger on the land, and unemployment and misery in the mushrooming urban slums, as the rural population migrates to cities that cannot accommodate and employ them. The penetration of transnational corporation into subsistence regions of developing countries has sowed the seeds of famine.

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13 The International Herald Tribune, 9 March 1978. Quoted from Andre Gunder Frank's, Crisis: In the Third World, Heinemann, 1981 P.77.

As George observes,

"..... if the green revolution has been a social disaster, the effects we can legitimately expect from direct Western agribusiness intrusion into traditional rural societies may be nothing short of catastrophic. There is already plenty of evidence to suggest that agribusiness is capable of destroying everything it touches; local employment patterns, local food crop production, consumer tastes, even village and traditional family structures."[14]

Plantation agriculture affects peasant producers in at least two important ways: there is competition for land and other resources and peasant farmers are compelled to provide wage work on the plantation to supplement their incomes from the main pre-occupation. Competition for resources is particularly intense in countries where land is in relatively short supply. The intensity has substantially increased in recent years with the accelerated rate of population expansion. It therefore appears that opportunities for peasant production have become increasingly restricted with the

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14 George, S. How the Other Half Dies. The Real Reasons for World Hunger, Harmondsworth, England: Penguin Books 1976.

expansion of plantations on the one hand and population growth on the other.[15]

Plantations have capital specific equipment. This phenomenon has implications for agricultural resource use. Capital specificity, on its part, produces inflexibility in the manner in which factors or resources, like laboratories and managerial functions, are used. For example, firm managers who have established themselves as 'Sugar-', 'banana-' or 'tea-specialists" are unlikely to contemplate crop changes which would erode their established authority. This same kind of Psychological attachment to crops can be found among peasant farmers. Crop-specific investments expose plantation enterprises to an inherently high degree of risk and uncertainty particularly in respect of crop losses from natural and other causes like price fluctuations and weather failure.

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15 Beckford, L.G. Persistent Poverty: Underdevelopment in Plantation Economies of the Third World. Oxford University Press, 1972.

From the foregoing analysis it can be concluded that commercialised agriculture has contributed to the decline in food production capacities of different societies beginning in the colonial period and continuing to the present. Rural production relations have been transformed both in terms of the development of distinct classes and the change in relations between men and women brought about by a new sexual division of labour.

The situation at present is at polar ends with the conditions that existed in the pre-colonial period. In the latter, there was a well developed social response to the Vagaries of the climate through patterns of intercropping, the selection of drought-resistant strains and the use of crop combinations which varied with yearly fluctuations. Social adaptation to a precarious climate also extended to the level of food storage and consumption strategies. These traditional production techniques permitted grain to be stored for relatively long periods. Furthermore, the social network of reciprocity and redistribution functioned as an investment against periods of shortages.

The Kenya Government has shown great concern with the problem of food shortages. Infact, this is reflected in the National Food Policy[16] Paper. The National Food Policy (NFP) was born out of the realisation by the Government of Kenya, of the need to strike a balance between the ever increasing discrepancy between the rapidly increasing population and the stagnant, if not declining, food level. The NFP aims at giving a set of guidelines for decision making on all aspects related to food production, processing and marketing in order to ensure that Kenya is able to avoid widespread food shortages. The objectives of the NFP are:-

(a) to maintain a position of broad self-sufficiency in the main food stuffs in order to enable the nation to be fed without using scarce foreign exchange on food imports;

(b) to achieve a calculated degree of food supply for each area in the country and;

(c) to ensure that the food stuffs are distributed in such a manner that every member of the population has a nutritionally adequate diet.

The first two objectives of the NFP are relevant

16. Republic of Kenya, Sessional Paper No. 4 of 1981 on National Food Policy, Government Printer, 1981

for purposes of this study. However, these objectives need not necessarily be complementary. For example, attaining self-sufficiency in food, increasing income earning capacity of the rural population through employment-generating activities and, generating foreign exchange earnings from exports of agricultural commodities are not necessarily complementary. For instance, expanding the acreage under sugarcane, with a view to exporting surplus sugar to earn foreign exchange, may contradict the objective of maintaining a position of broad self sufficiency in the output of food crops like maize, millet, beans, cassava and sorghum, among others.

Increases in population and incomes are normally cited as major causes of high demand for food. However, food shortages in a particular region may emanate from government policies which interfere with the marketing of the various food crops. For example, policies that restrict inter-district movement of foodstuffs imply that regions which experience crop failure will definitely be affected, vis-a-vis food deficits. This is particularly so with regions prone to fluctuations in weather patterns. The policy of

restricting movement of food crops across districts should be re-evaluated since it is absurd for one region to have food stuffs rotting in stores due to over-production and lack of market while at the same time an adjacent region experiences unprecedented food shortages due to drought, crop failure or floods. The inevitable result is a resort to black marketeering in the affected food stuffs.

According to Awiti,[17] many of the fundamental causes of food supply problems are rooted in the rural areas and they include: production variability, inadequate physical access (or general infrastructure), faulty market system, poverty, consumer and producer prices administratively set at inappropriate levels, inadequate transport, storage and handling facilities etc.

The NFP, like all other policies, is a statement of what is intended to be achieved. It only suggests possible lines of action. The policy fails to say how

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17 Awiti, L.M. Food Security and Storage Policies, Workshop on Food Policy and Research Policies, University of Nairobi, IDS, June 14-17, 1982.

the laid down objectives will be achieved at the level of implementation. The argument here is that if the anticipated resource requirements and machinery are not available then NFP will not be operational. The NFP is based on what is required rather than what is possible, given the existing resources. As already mentioned the fulfilment of any of the stipulated objectives involves an opportunity cost and it is with this in mind that the sugar industry is discussed.

In a study of the Mauritius Sugar Industry, Brookfield found out that the industry was efficient, enjoyed many economies of scale and was served by a labour force well versed and skilled in the production of sugar.[18] Despite all the observed advantages that accrue to this industry, Brookfield warns that there is a reverse to the medal. To him, monoculture of sugarcane has brought Mauritius into a position in which the demands of the dominant industry inhibit the development of others.

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18 Brookfield, H.C. "Problems of Monoculture and Diversification in a sugar island: Mauritius" Economic Geography, Vol.35, 1959 P.32-38.

The sugar industry in Mauritius has led to a progressive reduction in the proportion of smallholders' land while at the same time sharpening the difference between the big and the small farmers. Monoculture of sugarcane implies limited avenues for diversification since all possible activities are either tied, as is sugar, to the export market or else are throttled by the small size and poverty of the local market. Most land has been reverted to sugarcane and what remains consists of maize in the remote South West and high rent activities such as market gardening near the towns.

Though very much related to this study, Brookfields work is deficient in two ways. First, the study was carried out at a national level. In this respect there are the usual problems involved with aggregation. No empirical analysis was done to determine the magnitude of sugarcane monoculture. Brookfield observed a progressive decline in smallholders' land but did not show the consequences of this phenomenon leave alone giving policy recommendations.

2.2 Review of Literature specific to the Kenyan Sugar Industry

Much has been written on the sugar industry in Kenya. However, this section reviews only the Literature relating sugar cane to food crop production.

In a study of the role of the sugar industry in the economy of the Lake Victoria Basin (LVB), Odada[19] examines the extent to which sugarcane production contributes to income generation and the industry's potential as a source of employment. Other aspects examined include sugar manufacturing technology, elasticity of substitution between capital and labour, and returns to scale, among others. Of relevance to this study is the authors' observation that,

> "in the areas immediately around Lake Victoria, sugarcane has to compete for land with cotton and cereals such as maize and beans while in areas away from the lake, it has to compete for land with coffee, maize and other cereals.[20]

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19 Odada, J.E.O. "The Role of Sugar in the Kenya Economy: A case study of the Lake Victoria Basin," University of Nairobi,IDS Occasional Paper, No. 34, 1979.

20 Ibid, P.234.

Odada adopted the production function approach to come up with some interesting findings and policy recommendations. For example, the study shows that small-scale farms are characterised by economies of scale. He recommends that such farms should be expanded. Such an expansion can only be facilitated by a strong price incentive which in turn would encourage increased sugarcane production in an attempt to meet the Government's objective of attaining self-sufficiency in sugar.

In the short run, the price incentive can be resorted to in an attempt to raise the output of sugarcane. However, in the long run, it might not be an easy task disposing of sugar surpluses especially given that in Kenya, domestic price for sugar exceeds that prevailing on the world market. All that this means is that sugar surpluses that accumulate in the long run can only be exported at a loss.

Odada's study acknowledges only in passing the competition between cash and food crops. There is no comprehensive analysis of this trade-off despite the fact that the Lake Victoria Basin has four of the seven largest sugar factories in Kenya. It is hoped that the

the present study will fill the gap by focusing attention on Munias, the largest sugar scheme in Kenya while at the same time carrying out a much more comprehensive analysis of the cash-food-crop trade-off.

Makwata[21] carried out a study on the Mumias Sugar Scheme examining, among other things, the degree of returns to scale on outgrower cane farms, supply elasticity of sugar cane farms and, the foreign exchange impact of the sugar scheme. His attempt to determine the price elasticity of supply of sugarcane within Mumias is of paramount importance to the present study. It is useful for us to know the price elasticity of cane supply for purposes of planning expansionary or contractionary policies with respect to outgrower farm area. In turn, such policies have implications for food production at the local level.

Makwata acknowledges that the introduction of sugarcane farming on a commercial basis has interfered with the production of food crops. Most farmers have ignored growing food crops because sugarcane offers

21 Makwata, J.W. An Economic Evaluation of the Kenya Sugar Industry: the case of Mumias Sugar Scheme, Msc. Thesis, University of Nairobi, 1979.

higher returns. This is a rational move because the farmers themselves positively respond to the price incentive. However, one would expect that the farmers are equally rational as not to devote all their land holdings to sugarcane at the expense of food crops. It is our contention that a family feels more secure with food in its stores than with an equivalent amount of money in a bank.

Makwata argues that sugarcane is only a popular cash crop because of the need for cash and the absence of other distinctively more competitive cash crops. The latter reason should be treated cautiously because Kakamega district within which Mumias falls is relatively homogenous in its agro-climatic conditions. Apart from sugarcane, therefore, there are many cash crops within Kakamega which can provide quick money. For example, crops like tea, coffee, tobacco and sunflower have relatively shorter gestation periods and farmers who grew them would be assured of more frequent payments than is the case with sugarcane which takes almost two years from one harvest to another.

Schluter's[22] findings contradict those advanced by Makwata that sugarcane lacks a closely competitive cash crop. To Schluter, maize and sugarcane actively compete for land in Western Kenya. On the basis of domestic resource cost considerations, Schluter recommends that Government policy should aim at raising yields of both maize and sugarcane. In this respect, the price policy plays a significant role in the allocation of resources between these two crops.

Schluter observes that whenever maize price falls, there follows a substantial increase in the area planted under sugarcane, vice versa. In conclusion, the author feels maize has little potential as an export crop due to high transport costs. On the other hand, sugarcane has a better long term potential whose success will depend on several things: can marketed maize production rise fast enough to keep pace with growth of domestic demand so that land can be released from maize to grow more cane? The success of this task will depend on the

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22. Schuluter, M. "Policies to increase production of commodities with Export Potential to oil Exporter Markets," University of Nairobi, IDS, Working Paper No. 6, June 1984.

rate of adoption of presently available technology, growth in fertilizer use and the long term capacity of the research system to produce new high-yielding seed varieties.

The above study concentrates on price movements for only two commodities (maize and sugarcane). Western Kenya produces a wide range of crops apart from sugarcane and Maize. It is not, therefore, enough to assume that land is allocated, depending on the price incentive, between sugarcane and maize alone. Whereas maize might lack the potential as an export crop, it remains the most popular staple for millions of Kenyans. Therefore, domestic self-sufficiency in food crops, as advocated in the NFP Paper, remains an ambition to be fulfilled at the earliest convenience. Economically and politically, it might be cheaper to meet our food requirements domestically without relying on foreign countries through food imports or food aid.

Some developed countries have used food aid as a weapon for wringling political concessions. The use of food aid for diplomatic and political purposes is

widepread. Dependence on such aid to meet a large part of domestic food demands could greatly constrain the political freedom of the recipient countries. Each and every country needs to take a political stand since it is dangerous to national integrity to sacrifice this right for dependence on food aid.

A serious setback of food aid is that it can never be planned for. The food is released at the donor countries' pleasure. Furthermore, dependence on food imports or food aid to meet a large share of staple food requirements may result in changes in consumption patterns. For example, it is not uncommon to find urban consumption patterns that depend heavily on imported wheat or rice while domestically produced millet, sorghum, maize, roots and tubers provide a very large proportion of total calorie intake among rural consumers. Such dual consumption patterns are rampant in most developing countries.

In Kenya, the risks inherent in food exports were underlined by the food queus of 1980. Following a maize surplus in 1977/78, a decision was reached to export maize in early 1979. In February 1979, 19800 tons

of maize were exported.[23] By November there was an acute domestic shortage and it became apparent that there had been some misjudgement about the size of the new crop and about the availability of stocks in the country. Administrative delays in arranging for rapid food imports and distribution of food in 1980, in what amounted to a national emergency, undermined the confidence of policy makers that they could rely on food imports to alleviate domestic shortages.

In another study on Mumias Sugar Scheme, Owinyi[24] furnishes us with a legal treatise that examines the short-comings of having families evicted to pave way for the establishment of the sugar company's nucleus estate. The families' attempts to resist eviction were all in vain. Furthermore, the compensation offered to the displaced families was not sufficient for purchasing land in the immediate outgrower zones.
This was made more difficult by outgrowers who, sensing

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23 Weekly Review, "No End to the Maize Debate", Stellascope, July 4, 1980, P.5.

24 Owinyi, E.K., Mumias Sugar Project: Compulsory Acquisition of Land and its effects on the People. LLB Dissertation, University of Nairobi, 1977.

an opportunity to become rich by growing sugarcane, created an excessive demand for land. The legal process of land transfer made it more difficult for the evicted families to acquire land in the immediate outgrower zones.

Owinyi contends that sugarcane is rapidly replacing maize and cassava, thereby contributing to a large percentage of income being spent on food purchases. Being legal in orientation, this study pays lip service to the economic consequences of implanting an agro-industrial complex in Mumias. It is hoped that the present study will fill this gap by examining the factors underlying the observed food shortages in Mumias.

Barclay[25] has also undertaken a study of both the collective and individual fate of the population (in Mumias) that was forcefully evicted from their original homes to give way for the establishment of the nucleus estate. The study examines the impact of a major economic intervention on the social organization of a predominantly subsistence farming community in Mumias. The author sees

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25 Barclay, A.H. The Mumias Sugar Project: A study of Rural Development in Western Kenya. Ph.D Thesis, Columbia University, 1977.

Mumias as representing a case of intervention planned, designed and financed at the centre and implemented at the periphery in a poor and neglected area.

According to Barclay, the sponsors of Mumias sugar project regarded industrial and financial viability as the pre-eminent concern. By securing this viability they seem to have believed sincerely that they would stimulate economic growth and diversification in Mumias. Furtherstill, the sugar project was planned with reference to an objective defined at the national level, namely, the attainment of self-sufficiency in sugar production. He concludes that in the absence of a critical perspective regarding the structure of the society into which the Project is to be introduced, projections such as cost-benefit ratios and internal rate of return, among others, hold little analytical value for those students of social change.

Barclay's study is analysed from a social-anthropoligical point of view. The present study will address itself to the economic implications of Mumias sugar scheme on food availability at the local level. The setting up of a sugar scheme of Mumias magnitude cannot be assumed to have uniform consequences on the

participating farmers. The impact of the scheme will greatly depend on how much land the farmer holds, the distance of his farm from the factory, age, occupation and the number of people in his household. This study puts all these aspects into consideration in assessing the food-cash crop trade-off in Mumias.

Holtham and Hazzelwood[26] re-appraise the Mumias sugar scheme. They are critical of the scheme's sociological impact but at the same time qualify it as an over-whelming positive contribution to the country's objectives of employment generation, foreign exchange saving and income generation. The authors, in conclusion, feel that though it was too early to assess the developmental impact of Mumias Sugar Scheme, it was evident that farmers were receiving larger sums of money than they had ever seen in their lives.

The above observation was made in the seventies. The farmers may still be earning a lot of money from sugarcane, probably much more than they have seen in

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26 Holtham, G.E., Hazzelwood, A. Aid and Inequality in Kenya, London overseas Development Institute, 1970.

their lives. However, it will be of interest to us to trace the income-expenditure patterns of these farmers to determine whether the lumpy payments they get are channelled into income earning activities or merely spent lavishly. At least this is what was anticipated in the Feasibility Study undertaken by Booker Agricultural and Technical Services (B.A.T.s) on behalf of Booker McConnell. It was hoped that,

> "in general, the cultivation of sugarcane by outgrowers will provide a remunerative cash crop, improve land utilization, and relieve unemployment while participating in a scientifically managed industry will develop farmers' skills. The construction of roads for cane transport and the injection of several million shillings annually in the form of wages and cane payments, must have profound social and economic effects, not only on the farmers and their families, but on Kakamega District and Western Kenya."[27]

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27 B.A.T.s Mumias Sugar Scheme: Final Feasibility Study, 1970.

The Feasibility Study did not foresee any food shortages resulting from the introduction of commercial farming in Mumias. Instead, it was anticipated that food production would increase. The authors assert that,

> "In general, we do not believe that the development of the sugar project will result in any reduction in food production or cash crops in the area. Agricultural yields are at present relatively low and only some 48% of the land within an 8-mile radius of the factory is being cultivated. Plans for the outgrower area envisage that about half the available agricultural land is used for sugarcane. Given generally higher standards of agricultural technology and the stimulus of a large market of consumers at Mumias, there should, in practice, be an overall increase in local food production."[28]

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28 B.A.T.s, ibid, p.177.

CHAPTER III

METHODOLOGY

3.1 Source of Data

This study involves analysis of primary data which was gathered from questionnaire - based field interviews conducted in the Mumias Sugar Scheme from August 1983 to September 1984.

A list of all the registered Outgrower farmers was obtained from the Outgrowers' Department of Mumias Sugar Company and Mumias Outgrowers' Company (MOCO). From this list a random sample of 5 percent was selected covering all the regions that supply sugarcane to Mumias sugar factory.

The sample size is justified on the grounds that Sugarcane farmers have fairly similar characteristics. Even if a smaller sample was chosen it would reveal the characteristics common to the total population.

3.2 Data requirements and testing of the Hypotheses.

Hypothesis 1: The introduction of Mumias Sugar scheme has turned Mumias into a food deficit area with respect to food supplies.

The testing of this hypothesis required data on the major food crops produced and livestock kept in the period before and after the establishment of Mumias sugar scheme. We also required data on the allocation of land between Sugarcane and the main food crops.

Before testing the trade-off between sugarcane and the major food crops, it was necessary to examine land holding distribution within Mumias before and after the sugar scheme was established. The main objective in this exercise was to test the significance of the difference in landholding patterns between the periods before and after the sugar scheme was set up. If it turns out that there is no significant difference, then changes in the output of food crops can be explained in terms of less land being devoted to food crops. Alternatively, changes in food crop production can be explained vis-a-vis natural calamities like drought and floods which constrain food crop production.

We considered the major food crops to be maize, beans, finger millet, sorghum, cassava and potatoes. The farmers were asked how much of each commodity was produced annually both before and after the sugar scheme was established. 'Before' refers to that period just before the sugar factory started operating while 'after' refers to the period during which the interviews were conducted. The output of food crops before and after the sugar scheme was established was based on the farmers' mental recollections.

We were also interested in information pertaining to livestock practices among the participant farmers. In this regard farmers were asked questions about the number of grade cattle, traditional cattle, goats and sheep they kept before and after the sugar scheme was established. The main objective of this exercise, once again, was to

test for the significance of the difference in the number and types of livestock kept before and after the sugar scheme was established.

To test for the significance of the difference between two sample means, we used the formula.[29]

$$Z_c = \frac{|\bar{X}_B - \bar{X}_A|}{\sqrt{\frac{\sigma_B^2}{nB} + \frac{\sigma^2_A}{nA}}} \qquad \ldots\ldots\ldots\ldots(3.1)$$

where,

Z_c = Computed z- statistic.

$\bar{X}_B$ = arithmetic mean of output of food crops, or livestock kept before the sugar scheme was established.

$\bar{X}_A$ = arithmetic mean of output of food crops or livestock kept after the sugar scheme was established.

σ_B^2 = variance of food crops produced and livestock kept before the sugar scheme was established.

σ_A^2 = variance of food crops produced and livestock kept after the sugar scheme was established.

29. Hughes, A; Grawoig, D. Statistics: A Foundation for Analysis, Addison - Wesley Publishing Company, 1971, P. 248

n_A and n_B = sample size. n_A equals n_B since it is the same farmers who gave information on the activities before and after the sugar scheme was established.

To calculate the mean for grouped data we have

$$\mu a = \bar{x}_1 = A_1 + \left[\frac{\sum_{i=1}^{n} fidi}{\Sigma fi} \right] C \quad \ldots\ldots\ldots (3.2)$$

$$\mu b = \bar{x}_2 = A_2 + \left[\frac{\sum_{i=1}^{n} fidi}{\Sigma fi} \right] C \quad \ldots\ldots\ldots (3.3)$$

where,

A = an assumed mean which is normally used when there is an odd number of classes.

fi = Class frequency.

di = deviation of class from an assumed origin.

C = Class interval.

n = number of classes.

To calculate the variance from grouped data where class intevals are constant, we used the formula

$$\sigma^2 = C^2 \left[\frac{\sum_{i=1}^{k} fidi^2}{N} - \left(\frac{\sum_{i=1}^{k} fidi}{N} \right)^2 \right] \quad \ldots\ldots\ldots (3.4)$$

where,

C = class intervals

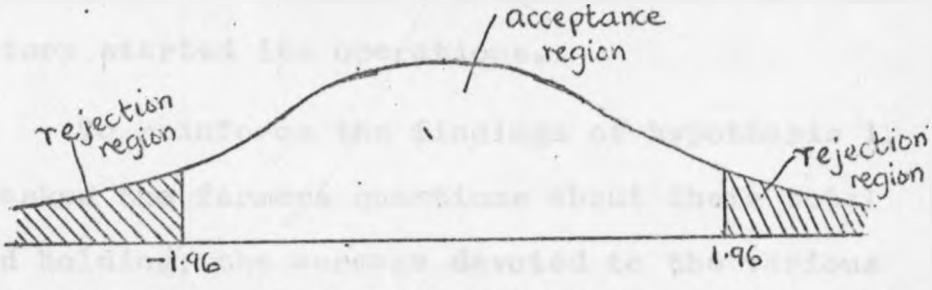
fi = class frequency

di = deviations of class from an assumed origin

N = fi = Number of valid observations.

With a two-tailed test and a 95-per cent level of confidence, the critical value of Z is 1.96. Thus, if the computed Z- statistic (Zc) is greater than the theoretical Z- statistic (Z_t), the hypothesis that there is a significant difference between the two means will be accepted. The acceptance and rejection regions are shown in the Figure below.

Figure 1: Acceptance and rejection regions of a normal distribution.



We assume a normal distribution because the sample chosen is greater than 30.

In testing the significance of the difference in the number of cattle, goats and sheep kept before and after the establishment of the sugar scheme, we corrected the mean number to the nearest whole number. Furthermore, the frequency distribution for grade cattle was omitted because the number of farmers who kept grade cattle both before and after the establishment of the sugar scheme was insignificant.

It will be realised from the various frequency distribution tables that the number of valid observations (n) varies. This is because not all farmers interviewed gave the required information. This is especially the case with information about the food crops grown and livestock kept before the sugar scheme was established. Some farmers could not recollect how much of the food crops was produced or how many cattle, goats or sheep they kept before the sugar scheme was introduced. As a matter of fact the interviews were conducted slightly/after the sugar factory started its operations.

/long

To reinforce the findings of hypothesis 1, we asked the farmers questions about their total land holding; the acreage devoted to the various food crops and the acreage devoted to sugarcane. Using this information, we calculated the share of total land holding that goes to the sugarcane crop enterprise. This exercise was aimed at explaining the food-deficit in terms of a trade-off between sugarcane and food crops land allocation. In other words, the food-deficit situation was analysed in terms of more land being devoted to sugarcane production and less land left for food crop production.

Hypothesis 2: The incomes generated from the sugarcane crop enterprise do sufficiently finance the food requirements of the rural households in Mumias.

The testing of hypothesis 2 required data on total revenue from the sugarcane crop enterprise. A full cycle of the sugarcane crop takes five years. In this respect, it was necessary to calculate the average annual revenue. This was done by dividing total revenue by 5. The farmer was asked to show how much of his average annual income from sugarcane was spent on food and clothing requirements. With information on average annual incomes from sugarcane and annual expenditure on food and clothing, we were able to calculate the percentage share of food and clothing in average annual income (see Table 6, Appendix 2).

Using the information in Table 6, we constructed a frequency distribution table showing the expenditure on food and clothing as a percentage of average annual income from sugarcane. This exercise was aimed at determining how far average annual incomes went in meeting the farmers' subsistence requirements of which we considered food and clothing to be of paramount importance.

There were farmers who spent in excess of their cane earnings on food and clothing. Such farmers had to look for alternative sources of income to bridge the food gap. However, we did not go into details as to how such food gaps were filled.

Hypothesis 3: The cash incomes generated from the sugarcane crop enterprise are not sufficient to enable the rural households to maintain and/or improve their wealth position through re-investment in the sugarcane crop enterprise itself and other income earning activities.

To test this hypothesis we required data on the total revenue accruing to the sugarcane activity. Using this information, we calculated the average annual revenue. We then traced the farmers' /reinvestment / of cane proceeds into major activities.

The activities we considered most important for the re-investment of cane incomes were: retaining cane proceeds in the bank as savings, spending cane incomes on the improvement of housing, ploughing back such incomes into the maintenance of sugarcane, using cane incomes to develop other crops, both cash and food crops. Other activities into which cane incomes could be re-invested include invest-

ment in commerce and industry, using cane incomes to purchase livestock, settle debts, pay bride price and purchase of land (see Table 7, Appendix 2).

To trace the re-investment of surplus incomes we first were interested in how much the farmer spent on his subsistence requirements. We considered these subsistence requirements to be food and clothing, education, and the settlement of debts. We then calculated the difference between average annual income from sugarcane and the expenditure on subsistence requirements (Table 7(a)). The main objective of this exercise was to find out the allocation of sugarcane incomes between consumption of goods and services on the one hand, and investment on the other.

CHAPTER IV:

DATA ANALYSIS.

4.1 Land holding distribution in Mumias.

Before testing the impact of Mumias Sugar Scheme vis-a-vis trade-off between sugarcane and food crop farm activities, it is important to find out whether or not the establishment of Mumias Sugar Scheme has had any impact on land holding distribution within the Mumias Outgrowers scheme. Table 2 (see Appendix 2) shows the actual land holding before and after the sugar scheme was introduced. From this table we construct frequency distribution of landholding in Mumias. The information is shown below.

Table 2(a): Frequency distribution of Landholding in Mumias before and after the Sugar Scheme was established.

Acreage	FiB	FiA
0 - 5	30	29
5.1 - 10	37	38
10.1 - 15	21	22
15.1 - 20	12	11
20.1 - 25	6	7
25.1 - 30	3	1
30.1 - 35	0	0
35.1 - 40	0	0
Over 40 acreas	4	5
$\bar{X}$LH	10.78	10.81
σ^2	77.47	82.01
n	113	113

where,

FiA = Landholding before the sugar scheme was established.

FiB = Land holding after the sugar scheme was established.

$\bar{X}$LH = Mean landholding

n = Number of valid observations.

To test for the significance of the difference between the mean landholding before and after the sugar scheme was established, we use the formula

$$Z_c = \frac{|\bar{X}_B - \bar{X}_A|}{\sqrt{\frac{\sigma_B^2}{n_B} + \frac{\sigma_A^2}{n_A}}}$$

Substituting

$$Z_c = \frac{|10.78 - 10.81|}{\sqrt{\frac{77.47}{113} + \frac{82.01}{113}}}$$

$$= 0.0253$$

We conclude that there is no significant change in land distribution patterns arising from the establishment of Mumias Sugar Scheme.

Given that familes were evicted to create room for the Mumias sugar factory and its supporting nucleus plantation, one would expect an increase in land pressure in the immediate outgrower zone as the evicted families find resettlement. A second source of land pressure in the outgrower zone would be immigrants who might have been attracted into the scheme by the new income generating activity (the sugarcane crop enterprise). However,

analysis of Table 2 (see Appendix 2) shows that this was not the case with the establishment of Mumias sugar scheme. There are several reasons to explain this phenomenon.

The Mumias sugar factory complex and its supporting nucleus plantation were established in a swampy, Marshy and sparsely populated region of Western Province. In this respect, as few as 57 farmers were dislocated from their original homes. Indeed, only 3 out of the 113 farmers who gave valid responses reported that part of their landholding was taken by the sugar complex. Furthermore, as Table 2 shows, only 10 farmers reported selling part of their land to immigrants attracted into the scheme by the new income generating activity. Therefore, such a small and insignificant number of displaced farmers cannot be expected to have caused any impact on land distribution patterns within Mumias.

It is documented (see Barclay and Owinyi for example) that the compensation offered by the government to the evicted families was well below what could enable them to acquire as much land in the immediate outgrower zone as they had surrendered to the sugar company. The price of land in the outgrower zone had shot up drastically. Since the compensation offered to the evicted families was not sufficient to enable them acquire land in the areas closest to the factory and nucleus plantation, it was only rational that these families move further away from the outgrower zone into areas where land was relatively cheaper. Thus, land distribution patterns in Mumias remained unaffected by the establishment of the

sugar scheme.

4.2 Trade-off between sugarcane and food crop production.

Hypothesis 1: The introduction of Mumias Sugar Scheme has turned Mumias into a food deficit area with respect to food supplies.

Table 3 (see Appendix 2) shows the annual output of the major food crops produced in Mumias before and after the establishment of the sugar scheme. From Table 3, we construct frequency distribution tables for the various food crops. We then/for the significance of the difference in mean output of the respective food crops before and after the sugar scheme was established.

/test

MAIZE:

Table 3(a): Frequency distribution of the output of Maize before and after the establishment of Mumias Sugar Scheme

Output (Kgs)	MOBES	MOAES
0 - 500	25	61
501 - 1000	44	21
1001 - 1500	11	10
1501 - 2000	11	9
2001 - 2500	2	2
2501 - 3000	1	0
3001 - 3500	0	1
3501 - 4000	2	0
4001 - 4500	3	0
4501 - 5000	0	0
over 5000 Kgs.	3	1
XMO	1132.85	686.6
σ^2	1265575	546175
	102	105

where,

MOBES = Maize output before establishment of sugar scheme.

MOAES = Maize output after establishment of sugar scheme.

$\bar{X}MO$ = Mean output of Maize

σ^2 = Variance

n = number of farmers who produced maize.

Using the above information, we test for the significance of the difference in mean output of maize before and after the sugar scheme was established.

$$Z_c = \frac{|1132.85 - 688.6|}{\sqrt{\frac{1265575}{102} + \frac{546175}{105}}}$$

$$= 3.3478$$

N.B. nA≠nB since 3 farmers could not remember their output of Maize before the scheme was established.

We conclude that there is a significant difference in the output of Maize before and after the sugar scheme was established. The mean output of maize ($\bar{X}MO$) has declined in the period after the sugar scheme was established. The mean output drops from 1132.85 Kgs. to 688.6 Kgs.

Table 3(b): Frequency distribution of the output of beans before and after the establishment of Mumias Sugar Scheme

Output Kgs.	BOBES	BOAES
0 - 250	30	37
251 - 500	21	18
501 - 750	2	5
751 - 1000	0	0
1001 - 1250	0	1
1251 - 1500	0	1
1501 - 1750	0	0
1751 - 2000	1	0
Over 2000 Kgs.	1	1
$\bar{X}$BO	293.68	304.07
σ^2	116250	109981.25
n	55	63

where

BOBES = output of beans before the establishment of Mumias Sugar Scheme.

BOAES = output of beans after the establishment of Mumias Sugar Scheme.

$\bar{X}$BO = Mean output of beans.

σ^2 = Variance.

n = Number of farmers who grew beans.

N.B. $nA \neq nB$ Since some farmers could not remember how much they produced.

Using the above information to test for the significance of the difference in the output of beans before and after Mumias sugar scheme was established, we have

$$Z_c = \frac{\left|293.68 - 304.07\right|}{\sqrt{\frac{116250}{55} + \frac{109981.25}{63}}}$$

$$= 0.1672$$

We conclude that there is no significant difference in the output of beans both before and after the sugar scheme was established.

Table 3(c): Frequency distribution of the Output of Finger Millet, Sorghum, Cassava and Potatoes before and after the establishment of Mumias Sugar Scheme.

Output (Kgs.)	Finger Millet		Sorghum		Cassava		Potatoes	
	Before	After	Before	After	Before	After	Before	Afte
0 - 500	60	31	31	28	28	29	11	11
501 - 1000	8	4	8	1	10	1	0	2
1001 - 1500	0	0	2	1	3	1	0	1
1501 - 2000	1	0	0	0	4	0	0	0
Over 2000 Kgs.	1	0	1	0	2	1	0	0
$\bar{X}$	300.5	307.65	441	300.5	633.5	359.9	250.5	393.
σ^2	1075	25300	154200	39175	332050	152100	0	8672
n	70	35	42	30	47	32	11	14

Using the above information to test the significance of the difference in the output of the food crops indicated we have

FINGER MILLET:

$$Z_c = \frac{|300.5 - 307.65|}{\sqrt{\frac{1075}{70} + \frac{25300}{35}}}$$

$$= 0.2633$$

We conclude that there is a significant difference in the output of Finger Millet before and after the establishment of the Sugar Scheme.

SORGHUM:

$$Z_c = \frac{|441 - 300.5|}{\sqrt{\frac{154200}{42} + \frac{39175}{30}}}$$

$$= 1.9915$$

We conclude that there is a significant difference in the output of Sorghum before and after the establishment of the sugar scheme. The mean output in the latter period has dropped to 300.5 Kgs. from 441 Kgs.

CASSAVA:

$$Z_c = \frac{|6335 - 359.9|}{\sqrt{\frac{332050}{47} + \frac{152100}{32}}}$$

$$= 2.52$$

We conclude that there is a significant difference in the output of cassava before and after the establishment of the sugar scheme. The mean output in the period after the establishment of the scheme is 359.9 kgs., having dropped from 633.5 kgs.

POTATOES

$$Z_c = \frac{|250.5 - 393.4|}{\sqrt{\frac{0}{11} + \frac{86725}{14}}}$$

$$= 1.82$$

We conclude that there is no significant difference in the ouput of potatoes before and after the establishment of Mumias Sugar Scheme.

Table 4 (see Appendix 2) shows the Livestock kept in Mumias both before and after the sugar scheme was established. From this table we construct a frequency distribution table as shown below.

Table 4 (a): Frequency distribution of Livestock kept in Mumias before and after the establishment of the sugar scheme

Type / Number	Traditional Cattle		Sheep		Goats	
	Before	After	Before	After	Before	After
0 - 5						
0 - 5	46	52	38	24	36	29
6 - 10	27	19	11	4	18	4
11 - 15	3	1	3	1	2	0
16 - 20	7	3	0	0	0	0
21 - 25	2	1	0	0	0	0
26 - 30	2	0	0	0	1	0
Over 30	5	1	0	0	0	0
$\bar{X}LS$	9	6	5	4	6	4
σ^2	68.2	27.98	8.39	5.83	16.8	2.7
n	92	77	52	29	57	33

Using the above information we calculate the significance of the difference between the two means.

TRADITIONAL CATTLE:

$$Z_c = \frac{|9 - 6|}{\sqrt{\frac{68.2}{92} + \frac{27.98}{77}}}$$

$$= 2.85$$

We conclude that there is a significant difference in the number of traditional cattle kept before and after the sugar scheme was established. The mean number of traditional cattle kept in the latter period has dropped to 6 from 9.

SHEEP $$Z_c = \frac{|5-4|}{\sqrt{\frac{8.39}{52} + \frac{5.83}{29}}}$$

$$= 1.66$$

We conclude that there is no significant difference in the number of sheep kept before and after the Mumias Sugar Scheme was established.

GOATS $$Z_c = \frac{|6-4|}{\sqrt{\frac{16.8}{57} + \frac{2.7}{33}}}$$

$$= 3.26$$

We conclude that there is a significant difference in the number of goats kept before and after the Mumias Sugar Scheme was established. The mean number of goats kept in the latter period has dropped.

We have examined data on land holding distribution, food crop production and livestock kept before and after the establishment of Mumias Sugar Scheme. It has been

established that there is no significant change in land distribution arising from the establishment of Mumias Sugar Scheme.

Examination of the data relating to food crop production both before and after the Sugar Scheme was introduced reveals that the output of maize, sorghum and cassava has fallen while that of beans and potatoes has not changed significantly with the establishment of the Sugar Scheme.

Declines in food production can be attributed to several factors. Among these are adverse weather conditions, floods, reduced use of organic and inorganic fertilizers, and lesser and lesser land being devoted to food crop production. As far as Mumias is concerned, records do not indicate that the region has been prone to adverse weather conditions. Furthermore, most of the food crops do not need large amounts of organic or inorganic fertilizers. For example, the good soils in Mumias do not warrant any significant application of fertiliser in the production of say finger millet, sorghum, potatoes and beans, among others.

It has already been indicated that land distribution patterns have been unaffected by the sugar scheme. In this

respect, any changes in the output of food crops have to be explained in terms of changes in crop-mix at the farm level. In other words, the observed decline in the output of food crops is due to a larger proportion of land being devoted to sugarcane production thereby denying food crops land. Table 5 (see Appendix 2) shows the allocation of land between sugarcane and food crops within Mumias Sugar Scheme. From this table, we construct a frequency distribution table of the percentage share of sugarcane crop enterprise in total land holding.

Table 5 (a) % Share of Sugarcane in total landholding

%	Frequency
0-10	5
10.1-20	15
20.1-30	15
30.1-40	18
40.1-50	17
50.1-60	5
60.1-70	6
70.1-80	9
80.1-90	2
90.1-100	2
Total	94

From the above table, it can be observed that 59 out of 94 valid observations had more than 30 per cent of their total land holding devoted to sugarcane production. Furthermore, 24 farmers had more than 50 percent of total landholding devoted to sugarcane production.

The above frequency distribution should be treated with caution since it underestimates the true picture. In most traditional societies where the extended family system is still a norm, houses and other physical structures normally claim a good share of total land holding. Thus, the construction of houses in a homestead robs food crops and sugarcane of land. Furthermore there is a possibility of farmers, having over-estimated the acreage under food crops. A farmer who intercrops maize and beans, for example, on a one acre plot is likely to indicate that he has one acre under maize and another acre under beans. We can, therefore, be easily led into believing that such a farmer has two acres under food crops when infact he has only one acre.

Devoting much of the land to the sugarcane crop enterprise at the expense of food crop production has relegated Mumias region to that status of having to

depend on the generosity of neighbours for her food requirements. The internal shortage of food crops has set off a roaring trade between Mumias and the neighbouring food producing district, Bungoma.[30] However, the dependence on neighbours for food requirements may have serious repercussions on a food-deficient region like Mumias.

Bungoma district and some locations within Kakamega district are the main sources of food supplies to Mumias. This trend is not likely to continue because these areas have also been "invaded" by sugarcane. We have in mind the sugar factory at Nzoia, in Bungoma district, and the now defunct White Sugar factory at Kabras in Kakamega district. Already there are proposals for the establishment of a sugar factory in Busia district.

The invasion of Bungoma and Kakamega districts by sugarcane means that the problem of food shortages in Mumias will be exarcebated. On its part, food shortage vis-a-vis quantity and quality is responsible for Malnutrition and Malnourishment respectively. A low level of nutrition affects the quality of labour by causing non-fatal dieseases, disability and mental

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30 Mulaa, J. "The politics of a changing society: Mumias" Review of African Political Economy, No.20, 1981 pp 92-93.

definciency all of which are responsible for a high degree of absenteeism, low quality of work and slowness.

A study by UNICEF has established that Siaya, Kisii Kakamega, South Nyanza and Busia, all districts located in Nyanza and Western Province, have a high incidence of Malnutrition. These districts also rank high in having large numbers of stunted children and high rates of sickness. Furthermore, the mortality rates are among the highest in the country.[31]

We have established that land distribution patterns have remained relatively unchanged with the introduction of Mumias Sugar Scheme. In this regard, changes in food crop production have been explained solely in terms of more land being allocated to the main cash crop enterprise, sugarcane. The proportionately large percentage of land devoted to sugarcane production has robbed food crops and livestock of land.

4.3) The Food gap and incomes generated from sugarcane

Hypothesis 2: The incomes generated from the sugarcane crop enterprise do sufficiently finance the food requirements of the rural households in Mumias.

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31 UNICEF, Third Rural Child Nutrition Survey 1982. Central Bureau of Statistics, Dec. 1983.

Table 6 (see Appendix 2) shows the expenditure of incomes from sugarcane on food and clothing. From the table, we construct a frequency distribution table showing the expenditure on food and clothing as a percentage of average annual revenue from sugarcane.

Table 6 (a): Frequency distribution of the expenditure on food and clothing as a percentage of average annual revenue from sugarcane

%	Frequency
0-10	5
10.1-20	7
20.1-30	7
30.1-40	2
40.1-50	9
50.1-60	4
60.1-70	4
70.1-80	3
80.1-90	6
90.1-100	2
Over 100%	29
Total	78

It can be observed from the table above that out of the 78 farmers who indicated having spent their cane incomes on food and clothing, 59 (or 76 percent of the total) farmers spent more than 30 percent of cane incomes on food and clothing. 29 farmers spent more than the average annual incomes on food and clothing. These figures are under-estimations because not all farmers record their purchases of food and clothing.

In Mumias, sugarcane represents the main source of income for thousands of families. The crop takes almost two years to mature, with payments coming about six months later. During all this time the farmer is expected to meet most of his basic requirements of which food and clothing are the most crucial.

From Table 6 (Appendix 2) the calculated average annual income from sugarcane is Kshs.3780. On the other hand, the average expenditure of proceeds from sugarcane on food and clothing is Kshs.2933. Both these averages give insight into the magnitude of sufficiency or insufficiency of cane incomes in meeting the farmers' basic needs. From column 2 of Table 6, we observe that 72 out of 109 farmers (or 66 percent) earned less than the calculated average annual income. On the expenditure side, column 3 reveals that 30 out of 78 farmers spent more than the calculated average

expenditure on food and clothing.

In cases where the food requirements are in excess of the average annual incomes, farmers are forced to look for alternative sources of income to bridge the food gap. Such sources would include, for example, petty trading or part-time employment. Borrowing to fill the food gap is a common practise among the sugarcane farmers. By the time the farmer has settled his debts, he usually is left with money that cannot enable him to feed and clothe himself, educate his children, purchase live-stock and so on. Non-availability of other income-earning activities aggravates the farmers desperate position.

4.4) Investment of surpluses generated from sugarcane

Hypothesis 3: The cash incomes generated from the sugarcane crop enterprise are not sufficient to enable the rural households to maintain and/or improve their wealth position through re-investment in the sugarcane crop enterprise itself and other income earning activities:

Table 7 (see Appendix 2) Shows how sugarcane incomes were re-invested. From this table we derive a a table showing surplus incomes from sugarcane

This is calculated as the difference between average annual income and expenditure on subsistence requirements. This information is shown in the table below:

TABLE 7(a): AVERAGE ANNUAL INCOME FROM SUGARCANE LESS SUBSISTENCE REQUIREMENTS

(K.SHS.)

CODE	Average Annual Revenue	Expenditure on Subsistence	Net
001	4,482.80	1,000.00	3,482.80
002	6,013.00	16,000.00	(9,987.00)
003	9,403.45	10,500.00	(1,096.55)
004	905.05	2,428.00	(1,522.95)
005	1,260.00	1,670.00	(410.00)
006	1,519.50	-	1,519.50
007	341.20	2,000.15	(1,658.95)
008	10,676.20	18,000.00	(7,323.80)
009	722.00	3,100.00	(2,378.00)
010	372.85	1,600.00	(1,227.15)
011	5,744.65	6,000.00	(255.35)
012	1,620.10	2,900.00	(1,279.90)
013	1,075.20	1,000.00	75.20
014	1,895.35	2,600.00	(704.65)
015	3,382.30	3,950.00	(567.70)

NB ( ) Means negative

016	3,717.60	1,000.75	2,716.85
017	5,806.60	1,800.00	4,006.60
018	672.95	725.00	(52.05)
019	4,099.10	5,500.00	(1,400.90)
020	624.05	2,200.00	(1,575.95)
021	732.20	1,170.00	(437.80)
022	1,463.20	600.00	863.20
023	1,533.30	300.00	1,233.30
024	5,753.10	2,800.00	2,953.10
025	-	-	-
026	4,412.55	4,100.00	312.55
027	5,287.35	11,350.15	(6,062.80)
028	868.80	3,000,00	(2,131.20)
029	9,472.30	23,055.50	(13,583.20)
030	2,582.00	1,200.00	1,382.00
031	3,758.10	2,420.00	1,338.10
032	5,046.65	1,500.00	3,546.65
033	2,492.05	600.00	1,892.85

034	41.70	958.00	(916.30)
035	3,505.80	1,100.00	2,405.80
036	2,527.05	10,000.00	(7,472.95)
037	3,162.70	1,950.00	1,212.70
038	5,320.00	13,300.00	(7,980.00)
039	756.60	4,240.00	(3,483.40)
040.	638.40	1,034.00	(395.60)
041	638.40	566.90	71.50
042	16,565.35	9,474.00	7,091.35
043	11,980.65	-	11,980.65
044	7,899.60	13,889.00	(5,999.40)
045	4,728.00	11,000.00	(6,272.00)
046	7,606.50	11,100.00	(3,493.50)
047	465.05	2,000.00	(1,534.95
048	2,469.60	3,395.00	(925.40)
049	2,032.30	8,000.00	(5,967.70)
050	14,500.30	25,000.00	(10,499.70)
051	4,189.50	5,800.00	(1,610.50)

052	1,146.50	-	1,146.50
053	7,232.20	8,100.00	(867.80)
054	937.90	4,000.00	(3,062.10)
055	6,891.75	3,600.00	3,291.75
056	3,628.80	9,353.00	(5,724.20)
057	12,075.60	16,750.00	(4,674.40)
058	822.65	5,000.00	(4,177.35)
059	-	-	-
060	459.75	8,240.00	(7,780.25)
061	3,720.10	4,000.00	(279.90)
062	1,932.70	640.00	1,292.70
063	3,151.20	5,800.00	(2,648.80
064	8,110.25	25,000.00	(16,889.75)
065	1,102.85	8,000.00	(6,897.15)
066	2,815.70	-	2,815.70
067	3,706.45	5,575.00	(1,868.55)
068	4,698.90	7,800.00	(3,101.10)
069	2,213.20	1,967.00	246.20

070	2,174.20	13,000.00	(10,825.80)
071	6,420.50	17,450.00	(11,029.50)
072	1,028.20	4,440.00	(3,411.80)
073	2,478.70	4,000.00	(1,521.30)
074	7,430.45	-	7,430.45
075	221.15	17,700.00	(17,478.85)
076	6,618.75	-	6,618.75
077	869.10	1,468.00	(598.90)
078	2,201.85	3,000.00	(798.15)
079	4,578.65	56,840.00	(52,261.35)
080	3,142.50	500.00	2,642.50
081	14,312.80	7,000.00	7,312.80
082	358.00	1,700,00	(1,342.00)
083	15,371.80	386.00	14,985.80
084	19,749.00	2,000.00	17,749.00
085	447.15	-	447.15
086	3,699.20	4,600.00	(900.00)
087	3,012.25	760.00	2,252.25

088	932.85	3,328.30	(2,395.45)
089	1,906.80	1,300.00	606.80
090	1,962.50	3,150.00	(1,187.50)
091	165.00	-	165.00
092	1,355.30	813.20	542.10
093	2,798.55	-	2,798.55
094	5,652.95	-	5,652.95
095	1,257.45	12,000.00	(10,742.55)
096	-	-	-
097	5,614.20	6,000.00	(385.00)
098	-	-	-
099	1,148.50	2,750.00	(1,601.50)
100	4,610.75	5,680.00	(1,069.25)
101	-	-	-
102	1,498.90	13,200.00	(11,701.10)
103	-	-	-
104	3,706	23,500.00	(19,793.50)
105	1,690.25	12,000.00	(10,309.75)

106	2,121.60	988.00	1,133.60
107	648.20	2,100.00	(1,451.80)
108	1,480.20	7,900.00	(6,419.80)
109	1,480.30	6,100.00	(4,619.70)
110	1,409.50	1,500.00	(90.50)
111	3,717.60	1,000.00	2,717.60
112	986.00	-	986.00
113	1,571.70	8,800.00	(7,228.30)
114	5,400.00	-	5,400.00
115	3,382.30	2,800.00	(582.30)

From table 7(a) it can be noticed that out of 109 farmers who earned income from sugarcane, as many as 69 farmers (representing about 64 percent of the total number interviewed) received incomes which were insufficient for their subsistence requirements. We suspect this number would be greater if we incorporate the income saved in the bank (see Table 7, Appendix 2). Though we did not ask the farmers how long such incomes stayed in the bank, the expectation is that given the numerous subsistence requirements of the farmer, such monies would be withdrawn to finance immediate subsistence needs.

Having met their immediate subsistence requirements, it is evident from table 7(a) that a majority of the farmers are not left with incomes sufficient enough for investment in income generating activities. This explains why sectors such as industry and commerce are starved of investment funds. Instead, a significant proportion of cane incomes is channelled into consumption (food and clothing, settlement of debts and education, among others). Infact the settlement of debts is significant because sugarcane incomes are earned after every thirty months. During this time the farmer incurs debts to fulfil his day to day needs. The sugarcane

farmer is thus caught up in a 'debt trap'.

When a big fraction of sugarcane incomes goes to satisfy immediate consumption, investment is denied funds. The farmer cannot thus be able to increase his wealth position since investment generating activities such as commerce and industry, business or purchase of land are all starved of funds. The farmer is therefore relegated to a position where he grows sugarcane from whose income he meets his immediate subsistence requirements.

CHAPTER V

CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 CONCLUSIONS

This study has two broad objectives. Firstly; it determines whether or not the objectives of development are being achieved through the strategy of establishing large-scale sugar factories which require vast quantities of land to be devoted to the production of the essential raw material (sugarcane).

Secondly, this study determines whether or not the cash incomes generated from the sugarcane crop activity sufficiently bridge the food gap that might have arisen from the establishment of Mumias sugar scheme. Incase of any cash surpluses created over and above the farmers' immediate subsistence requirements, the study traces the reinvestment of such surpluses. The study focuses its attention on the contribution of the sugar industry to income generation at the farm level and the manner in which such incomes are distributed between consumption and investment.

The results of this study indicate that land distribution patterns have been unaffected by the

establishment of Mumias Sugar Scheme. This is because the sugar scheme was set up in a swampy, marshy and sparsely populated region where land was idle most of the time. Few people were displaced from their original homes to pave way for the factory complex and nucleus plantation. The compensation offered to those who were displaced was relatively low. In this respect, they could not purchase land in the immediate outgrower zones. Instead, these displaced families looked for alternative land way out of the outgrower scheme where land was relatively cheap.

Mumias Sugar Scheme has not been prone to serious drought or rain failure. Therefore, any fluctuations in food crop production have to be explained in terms of changes in crop mix. It has been established that sugarcane claims a proportionately large share of total land holding. Food crops and livestock are therefore robbed of land.

To qualify as a sugarcane outgrower farmer, an individual needs to have a minimum of 6 acres. Furthermore, his land should be fertile, well-drained, free from stones, and convenient for the operations of sugar company tractors. Most farmers in Mumias own less than

ten acres of land. Therefore, once a farmer has contracted as a sugarcane outgrower, he usually has limited land for food crop and livestock activities. The little land that is set aside for these activities is relatively less fertile.

Reduced output of food crops increases the dependence of farmers on the market for food supplies. Such supplies originate from neighbouring districts and locations. However, most of these neighbouring locations have been invaded by sugarcane. As a consequence, food supplies to Mumias will be drastically reduced. If the trend continues then Mumias will continue to be a food-deficit region unless remedial action is taken.

We have so far assumed that the farmers have sufficient incomes with which to purchase food. Insufficient incomes from sugarcane have repercussions on food purchases and consumption. Lump sum payments are not very helpful especially in cases where the man has complete control over cane incomes. The tendency would be to purchase items that do not directly contribute to improving the family's welfare vis-a-vis nutrition. Cases of malnutrition and malnourishment

among children are not uncommon within Mumias Sugar Scheme.

In its fifth Development Plan, the Kenya government acknowledges that Malnutrition and malnourishment pose a big danger to the welfare of the citizen. It attributes the problem of nutritional deficiency to poverty, insufficiency in food production and food habits, weaknesses in marketing, and a lack of understanding of the different food items.[32]

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32 Republic of Kenya, Development Plan 1984-1988, Government Printer, 1984. P.33

5.2 Policy Recommendations

It has been established that food shortages are a direct consequence of the implantation of the Mumias Sugar Scheme. The shortages arise from a proportionately less allocation of land to food crops while sugarcane claims a proportionately large share of total land holding.

The sugar company provides input such as fertilizers, chemicals, tractor services, labour for weeding and so on. All these inputs and services are geared towards the development of sugarcane. The cost of inputs and services is then deducted from the farmers' gross earnings. We believe that the sugar company would be contributing a lot towards improving the farmers' welfare by extending such credit facilites to cover food crops.

The sugar company could, for example, provide fertilizers and chemicals for the production of maize and beans. The sugar company tractors could be mobilized to plough farmers' plots; while its extension staff advised farmers on the best crop and animal husbandry practises. In the production of crops such as Maize or beans, timeliness on the part of the farmer is very important if he is to be assured of a good harvest. This implies that

fertilizers have to be applied within the required time, the crop has to be harvested immediately it is ready and so on. However, lack of finance constraints the farmers' ability to purchase fertilizers within the required time or hire labour to assist in planting, weeding or harvesting. Since it takes almost thirty months for the farmer to earn some income from sugarcane, we feel the sugar company is duty bound to supply farmers with the necessary inputs and services for the development of food crops and livestock. The cost of such imputs and services would then be deducted from cane proceeds.

Cash crop production may be supported on the grounds that it enables the participating farmers to earn high incomes which can then be channelled into other income-generating activities. However, it is documented that incomes from sugarcane are not sufficient to improve the wealth position of a majority of sugarcane farmers.

Low incomes from sugarcane are attributed to a price which is so low as not to provide enough incentive and/or to the high costs incurred in the production of sugarcane. To achieve the production targets set, the government needs to have a carefully formulated pricing policy for sugarcane. The acheivement and sustenance of self-sufficiency in the production of sugar in Kenya will, to

a large extent, depend on how the sugarcane farmers view the relative profitability of sugarcane in relation to the other feasible crop enterprises.

The production costs of sugarcane are so high that they do not leave the farmer with sufficient incomes for improving his welfare. In Mumias both the sugar company and the outgrowers company (MOCO) impose levies on the farmers' produce. Charges such as transport and administrative levies, are based on tonnage. Administrative charges are those costs the farmer pays as a result of getting advise from extension staff of the outgrowers department. So the more the output, the higher will be the administrative levy, since it is based on the tonnes of cane produced. This is a very irrational assumption because those farmers who are hard working and produce more cane are penalised more than the less innovative ones yet the latter might have benefited from more visits than the more hard working farmers. The administrative levy should be based on the number/times the extension staff /of visits the farmer and not on the farmers' output of sugarcane.

Transport charges are based on how far the farmers' plot is from the factory. The sugar company has classified farmers' plots into zones. Zone 1 includes those areas upto

10 km from the factory. Zone 2, 3 and 4 refers to the area 11-16 km, 17-24 km, and 25-32 km respectively from the factory. Those farmers furthest away from the factory pay a higher rate per kilometre. Transport charges are based on the state of the roads. As far as transportation of sugarcane is concerned, farmers are price takers. We believe that improvement and maintenance of general infrastructure within the Mumias sugar scheme will greatly contribute to reducing transportation costs while at the same time improving the farmers income from sugarcane crop activity. Transport rates should be appropriate with the service rendered.

Both the outgrowers department of Mumias Sugar Company and Mumias Outgrowers Company (MOCO) were established to cater for the needs of sugarcane farmers within the sugar scheme. However, both of them seem to be duplicating roles. A duplication of roles means that the farmer pays twice for the same services rendered. We feel the Mumias outgrowers' Company should be strengthened while at the same time the outgrowers department has a lesser role to play in the ougrowers scheme. The latter could concentrate its attention on the sugar company's nucleus plantation.

The outgrowers' company was set up by the farmers themselves. It was aimed at supplying inputs and extending credit facilities to the outgrower farmers. It is the farmers' mouthpiece when it comes to negotiating with the sugar company. We feel the outgrowers company should be strengthened to supply inputs and services at more reasonable rates. If the farmers are organized by the outgrowers company into formal groups, bureaucratic delays as exemplified by Mumias outgrowers department would be minimised and farmers would get inputs and extension services in time.

We feel the farmers have a right in deciding how best to run their plots. It is only through the outgrower company that the farmers opinions will be expressed impartially. At present the sugar company has no consideration of what the farmers preferences are. For example, once a farmer has contracted as an outgrower, the company moves in immediately with its tractors to survey and plough the land. As a rational individual, the farmer should be allowed the freedon of choosing between a tractor and ox-plough to prepare his land. Whatever choice he makes will depend on his financial ability. Also when it comes to transporting sugarcane, the farmer needs more

freedom in choosing how to transport his produce to the factory.

In conclusion, the combination of a pricing policy which gives the greatest incentive to sugarcane production and production cost structure that minimises the farmers expenditure will go a long way towards improving the farmers income position. It is only after such incentives are forthcoming that the stipulated production targets can be realised.

APPENDIX I (QUESTIONNAIRE)

1. Name of outgrower _____

2. Were you born in this location? Yes _____

   No _____

   (tick the relevant answer)

3. How much land did you have before the sugar scheme was introduced in this region? _____ acres.

4. How much land did you sell to the Mumias Sugar

5. How much land did you sell to immigrants? _____ acres.

6. How much land do you presently hold? _____ acres.

7. What food crops did you produce and market before the sugar scheme was established?

Food Crop	Acreage	Quantity Produced	Quantity Marketed	Price	Approximate revenue p.a.
Maize					
Cassava					
Finger Millet					
Sorghum					
Potatoes					
Beans					
Peas					
Vegetables					
Others					
TOTAL REVENUE (K.SHS.)					

8. What commercial crops did you produce and market before the establishment of the sugar scheme?

Commercial crop	Acreage	Quantity Produced	Quantity Marketed	Price	Approximate REVENUE P.a.
Sugarcane					
Bananas					
Simsim					
Ground nuts					
Fruits					
Tea					
Cotton					
Coffee					
Sunflower					
Others					
TOTAL REVENUE (K.SHS.)					

9. Which livestock were you rearing and how much surplus milk were you selling before the sugar scheme was established in Mumias?

Livestock	Number	Quantity of milk sold p.a. (Litres)	Approximate Revenue p.a.
Grade Cattle			
Traditional Cattle			
Sheep			
Goats			
Pigs			
Others			
TOTAL REVENUE (K.SHS.)			

10. What business(es), if any, did you have before the establishment of Mumias Sugar Scheme?

Type of Business	Estimated Annual Income
Hotel	
Shop Keeping	
Trade in Livestock	
Carpentry	
Pottery	
Bicycle repair	
Tin Smith	
Others	
TOTAL REVENUE (K.SHS.)	

11. At present, what food crops do you produce and market?

Food Crop	Acreage	Quantity Produced	Quantity Marketed	Price	Appr. Annual Revenue
Maize					
Cassava					
Finger Millet					
Sorghum					
Potatoes					
Beans					
Peas					
Vegetables					
Others					
TOTAL REVENUE (K.SHS.)					

12. What commercial crops do you produce and market at present?

Commercial crop	Acreage	Quantity Produced	Quantity Marketed	Price	Approximate Annual Revenue
Sugarcane					
Bananas					
Simsim					
Groundnuts					
Fruits					
Tea					
Cotton					
Coffee					
Sunflower					
Others					
TOTAL REVENUE (K.SHS.)					

13. Which livestock are you keeping and how much surplus milk are you presently selling?

Livestock	Number	Quantity of milk sold p.a. (litres)	Approximate annual Revenue.
Grade Cattle			
Traditional Cattle			
Sheep			
Goats			
Pigs			
TOTAL REVENUE (KShs)			

14. What business(es) are you presently having?

Type of business	Estimated annual income
Hotel Shopkeeping Trade in Livestock Carpentry Pottery Bicycle Repair Tin Smith Others	
TOTAL REVENUE (KShs)	

15. (a) How many members of your family are employed by the sugar factory on a permanent basis? _____

(b) How many members of your family are employed by the sugar factory on a temporary basis? _____

16. Give the following information about your sugarcane plant crop.

(a) Date of establishment _____

(b) Distance from the factory _____ km.

(c) Acreage _____.

(d)

Production Costs	Expenditure (KShs)
Land preparation Inputs (i.e. seedcane, fertilizers etc) Planting, Gap-filling, weeding Harvesting and marketing Other charges (i.e. interest, capital levy, Outgrower Company charges etc)	

(e) Farmer's net income position.

Area Harvested (Acres)	Tonnes Harvested	Price Shs/ Ton	Value of Harvest	Total Expenditure	Net Income (KShs

17. Give the following information about your first ratoon crop.

(a)

Production Costs	Expenditure
Land Preparation Inputs (seedcane, fertilizers) Planting, Gap-filling, weeding Harvesting and marketing Other charges	
TOTAL EXPENDITURE (KShs)	

(b) Net income position of the farmer

Area harvested (Acres)	Tonnes Harvested	Price Shs/ Ton	Value of Harvest (KShs)	Total Expenditure (KShs)	Net Income Position. (KShs)

18. Give the following information about your second ratoon crop

(a)

Production Costs	Expenditure
Land Preparation	
Inputs (seedcane, fertilizers)	
Planting, Gap filling, weeding	
Harvesting and marketing	
Other charges	
TOTAL EXPENDITURE	

(b) Net income position

Area Harvested (Acres	Tonnes Harvested	Price Shs/ Ton	Value of Harvest (Kshs)	Total Expenditure	Net Income to the farmer (KShs)

19. Give the following information about the other ratoon crops subsequent to the second ratoon.

(a)

Production Costs	Expenditure (KShs)
Land preparation Inputs (seedcane, fertilizers) Planting, Gap filling, weeding Harvesting and marketing Other Charges	
TOTAL EXPENDITURE (KShs)	

(b) Net income position of the farmer

Area Harvested (Acres)	Tonnes Harvested	Price Shs/ Ton	Value of harvest (KShs)	Total Expenditure	Net Income to the farmer (KShs)

20. How did you spend the money obtained from the various cane harvests indicated in Questions 16-19?

Net income to the farmer KShs. _____

Type of Expenditure	Amount (KShs)	% of Total Net Income
Savings in the bank		
Improvement of housing		
Cane maintenance		
Development of other crops		
Investment in commerce		
Investment in industry		
Purchase of livestock		
Expenditure on education		
Expenditure on food & clothing		
Payment of Dowry		
Settlement of debts		
Purchase of land		
Other miscellaneous expenses.		

APPENDIX 2

Tables 2,3,4,5,6,7

TABLE 2:

TLBES	=	TOTAL LAND BEFORE ESTABLISHMENT OF SCHEME
LSTSC	=	LAND SOLD TO SUGAR COMPANY
LSTIM	=	LAND SOLD TO IMMIGRANTS
ABWOS	=	AREA BOUGHT WITHIN OUTGROWER SCHEME
AHBOG	=	AREA HELD BY OUTGROWER AT PRESENT

TABLE 2:

LAND HOLDING IN MUMIAS BEFORE AND AFTER SUGAR SCHEME WAS ESTABLISHED

CODE	TLBES.	LSTSC	LSTIM	ABWOS	AHBOG
001	15.0	-	9.0	-	16.0
002	5.0	-	-	2.0	7.0
003	10.0	-	-	2.0	12.0
004	11.0	-	-	3.0	14.0
005	5.0	-	-	-	5.0
006	12.0	-	-	-	3.6
007	6.0	-	-	-	6.0
008	21.0	-	-	-	21.0
009	7.0	-	-	-	7.0
010	12.0	-	-	-	12.0
011	4.0	-	-	-	4.0
012	3.7	-	-	-	3.7
013	10.0	-	-	-	4.0
014	3.0	11.0	-	-	14.0
015	74.0	-	-	12.0	86.0
016	14.0	-	-	-	14.5

017	16.0	-	-	-	16.0
018	8.0	-	-	-	8.0
019	4.0	-	-	-	4.0
020	16.0	-	-	-	16.0
021	4.0	-	-	-	4.0
022	4.0	-	-	-	4.0
023	2.0	-	-	-	2.0
024	3.0	-	-	-	3.0
025	-	-	-	-	-
026	27.5	-	4.0	-	23.5
027	12.0	-	-	-	12.0
028	2.5	-	-	-	2.5
029	23.0	-	-	-	23.0
030	11.0	-	1.0	-	10.0
031	3.5	-	-	-	3.5
032	6.0	-	-	4.0	10.0
033	22.0	-	-	-	22.0
034	9.5	-	-	-	9.5
035	4.0	-	-	-	4.0
036	9.0	-	-	4.5	13.5

037	14.0	-	-	-	14.0
038	7.0	-	2.0	-	5.0
039	10.0	-	-	-	10.0
040	7.0	-	-	-	7.0T
041	16.0	-	5.0	-	11.0
042	10.0	7.0	-	-	3.0
043	20.0	-	-	-	20.0
044	9.5	-	2.0	-	7.5
045	22.0	-	7.9	-	14.0
046	12.0	-	-	-	12.0
047	16.0	-	9.0	-	7.0
048	4.0	-	-	-	4.0
049	22.0	-	-	-	22.0
050	8.0	-	-	-	8.0
051	4.0	-	-	-	4.0
052	12.0	-	-	-	12.0
053	8.0	-	-	-	8.0
054	7.0	-	-	-	7.0
055	9.0	-	-	-	9.0
056	15.0	-	-	-	15.0

057	13.0	-	-	8.0	21.0
058	100.0	-	-	-	100.0
059	20.0	-	-	40.0	60.0
060	6.0	-	-	6.0	12.0
061	10.0	-	-	-	10.0
062	7.5	-	-	-	7.5
063	4.0	-	-	-	4.0
064	8.0	-	-	-	8.0
065	8.0	-	-	-	8.0
066	4.0	-	-	-	4.0
067	17.0	-	-	-	17.0
068	9.0	-	-	-	9.0
069	3.5	-	-	-	3.5
070	30.0	-	10.0	-	20.0
071	3.0	-	-	-	3.0
072	3.0	-	-	-	3.0
073	8.0	-	-	-	8.0
074	8.0	-	-	-	8.0
075	14.0	-	-	-	14.0
076	6.0	-	-	-	6.0

077	22.0	-	-	-	22.0
078	7.0	-	-	-	7.0
079	18.25	-	-	-	18.25
080	6.0	-	-	-	6.0
081	9.0	-	-	-	9.0
082	5.0	-	-	-	5.0
083	49.0	-	-	-	49.0
084	2.5	-	-	-	2.5
085	5.0	-	-	-	5.5
086	20.0	-	-	-	18.0
087	12.0	-	-	-	12.0
088	4.0	-	-	4.0	8.0
089	20.0	20	-	8.0	8.0
090	10.0	-	-	6.0	16.0
091	3.0	-	-	-	3.0
092	6.0	-	-	-	6.0
093	4.5	-	-	-	4.5
094	8.8	-	-	-	8.8
095	20.0	-	-	-	20.0
096	3.0	-	-	-	3.0
097	10.0	-	-	-	10.0

098	30.0	-	-	-	30.0
099	5.0	-	-	-	5.0
100	15.0	-	-	-	15.0
101	20.0	-	-	-	20.0
102	7.0	-	-	-	7.0
103	15.0	-	-	-	15.0
104	11.0	-	-	-	11.0
105	12.5	-	1.0	-	11.50
106	10.0	-	-	-	10.0
107	11.0	-	-	-	11.0
108	11.0	-	-	-	11.0
109	3.5	-	-	-	3.5
110	6.0	-	-	-	6.0
111	14.5	-	-	-	14.5
112	-	-	-	2.0	2.0
113	5.0	-	-	-	5.5
114	5.0	-	-	-	5.0
115	74.0	-	-	12.0	86.0

TABLE 3:

FOOD CROPS PRODUCED BEFORE AND AFTER THE ESTABLISHMENT OF MUMIAS SUGAR SCHEME

KEY:

MOBES = Maize output before establishment of Scheme

MOAES = Maize output after establishment of Scheme

BOBES = Beans Output before establishment of Scheme

BOAES = Beans output after establishment of Scheme

FMOBS = Finger Miller output before establishment of Scheme

FMOAS = Finger Millet output after establishment of Scheme

SOBES = Sorghum output before establishment of Scheme

SOAES = Sorghum output after establishment of Scheme

COBES = Cassava output before establhsiment of Scheme

COAES = Cassava output after establishment of Scheme

POBES = Potatoes output before establishment of Scheme

POAES = Potatoes output after establishment of Scheme

TAPLE 3:

FOOD CROPS PRODUCED BEFORE AND AFTER THE ESTABLISHMENT OF MUMIAS SUGAR SCHEME (KGS)

CODE	MOBES	MOAES	BOBES	BOAES	EMOBS	EMOAS	SOBES	SOAES	COBES	COAES	POBES	POAES
001	640	450	-	300	450	-	-	-	-	-	-	-
002	720	360	-	-	270	-	360	270	900	-	-	-
003	270	270	-	-	270	90	-	-	1800	-	-	-
004	-	225	-	30	-	-	270	-	-	-	-	360
005	-	-	90	-	270	900	-	-	270	-	-	270
006	1080	180	-	-	-	-	-	270	900	135	-	-
007	650	630	-	180	270	90	-	-	-	-	-	-
008	3600	3150	450	270	900	360	900	180	1800	-	-	-
009	729	-	-	-	180	-	90	-	-	-	-	-
010	1800	13600	270	630	-	-	-	-	-	-	-	-
011	180	-	-	-	-	-	360	-	-	-	-	-
012	1350	270	-	-	1800	540	270	-	-	-	-	90
013	630	720	-	-	540	540	-	-	-	-	-	270
014	-	1170	-	90	360	-	-	450	900	450	-	-
015	900	135	-	-	-	270	900	-	-	-	-	-
016	1620	450	-	-	180	-	270	-	-	-	-	-
017	360	90	180	-	180	180	180	-	180	-	-	-

018	270	270	90	90	-	135	-	180	-	-	-	-
019	270	90	-	-	135	90	-	-	-	-	-	-
020	900	270	180	-	-	-	360	90	540	-	-	-
021	360	90	30	30	-	-	-	45	-	-	-	-
022	720	-	360	450	180	-	-	-	360	-	-	-
023	900	450	30	-	270	-	-	-	-	-	-	-
024	900	180	270	-	-	-	-	-	-	--	-	-
025	-	-	-	-	-	-	-	-	-	-	-	-
026	1800	1350	360	90	-	90	1350	-	450	270	270	90
027	540	180	90	-	360	450	-	270	1080	450	180	-
028	1440	450	450	360	-	450	360	-	-	-	-	-
029	90	-	-	-	80	-	-	-	90	-	-	-
030	360	-	-	-	-	-	-	-	-	-	-	-
031	1350	810	360	-	270	-	-	-	360	-	180	-
032	7200	4500	-	1350	-	900	-	1350	-	1350	-	900
033	1080	540	90	180	180	45	90	90	180	-	-	-
034	450	180	180	180	-	-	-	-	-	-	-	-
035	-	-	-	-	180	-	180	-	-	-	-	-
036	900	180	360	90	-	180	540	-	-	-	-	-
037	-	-	-	90	360	270	-	-	360	-	-	-
038	360	90	180	270	270	-	360	180	270	-	-	-
039	900	450	-	540	90	-	360	-	180	180	-	-

TABLE 3:

FOOD CROPS PRODUCED BEFORE AND AFTER THE ESTABLISHMENT OF MUMIAS SUGAR SCHEME (KGS)

CODE	MCBES	MCAES	BCBES	BCAES	FWCBS	FWCAS	SCBES	SCAES	COBES	COAES	POBES	POAES
040	900	180	-	-	90	-	90	-	-	-	-	-
041	900	270	180	-	90	-	90	45	180	-	-	-
042	90	135	-	-	-	-	--	-	45	-	-	-
043	1800	1080	270	90	450	-	-	-	270	-	-	-
044	540	315	90	30	-	-	-	-	-	-	-	-
045	900	540	-	45	180	-	540	-	-	-	-	-
046	540	1080	90	-	360	-	-	270	1080	450	180	-
047	360	450	-	270	-	-	-	-	-	-	-	-
048	1800	1350	360	-	180	-	180	450	45	30	270	15
049	5400	1800	540	90	360	-	--	-	-	-	-	-
050	1080	1620	360	270	360	-	-	-	-	-	-	-
051	900	90	-	45	-	-	450	-	-	90	-	-
052	900	900	360	180	270	-	180	-	-	-	-	-
053	4500	1080	180	180	180	-	-	-	-	-	-	270
054	990	540	50	180	270	-	-	-	540	-	540	-
055	990	270	450	-	450	-	-	-	-	-	-	-
056	1350	-	-	360	450	-	-	-	-	-	-	-
057	1620	1170	-	-	450	-	460	180	-	-	-	-

058	5400	270	270	450	-	-	360	90	180	60	-	270
059	1800	-	-	-	-	-	-	-	-	-	-	-
060	720	1350	90	1080	360	-	-	-	270	-	270	1440
061	2250	900	450	-	450	-	900	270	-	-	-	-
062	1360	720	180	60	540	180	-	-	1620	360	270	-
063	900	90	-	45	720	45	450	-	-	90	-	-
064	1080	1620	360	-	180	-	-	-	-	-	-	-
065	270	180	-	45	180	90	-	-	450	90	-	-
066	495	360	90	-	180	90	-	-	-	90	-	-
067	400	180	-	540	-	-	180	-	2700	2250	-	-
068	360	360	-	-	270	180	-	-	-	-	-	-
069	180	45	-	-	180	15	90	-	-	-	-	-
070	1800	270	-	90	360	-	900	-	540	-	-	-
071	900	450	360	450	-	-	540	-	540	-	-	-
072	-	90	-	450	-	-	-	-	-	-	-	-
073	900	540	-	-	-	-	-	270	-	180	-	-
074	450	90	-	30	270	45	-	-	270	30	-	-
075	60	25	-	-	-	-	-	-	-	-	-	-
076	900	1980	180	360	540	-	-	-	-	-	-	-
077	1800	900	540	-	720	-	-	-	40	-	-	-

078	270	180.	-	90	90	90	360	180	-	-	-	-
079	2250	2250	90	2700	900	-	-	-	1080	-	-	-
080	270	270	15	-	-	-	-	-	45	-	45	-
081	900	90	90	540	-	-	180	450	-	-	-	-
082	3600	-	1800	-	900	-	-	-	-	-	-	-
083	900	720	320	180	320	-	90	-	180	40	-	-
084	270	225	45	45	135	-	-	45	360	-	-	-
085	180	270	45	720	135	90	-	-	450	180	-	675
086	2700	450	2250	-	900	-	-	-	-	45	-	-
087	900	540	450	-	-	90	-	-	-	-	-	-
088	1800	1 0	-	270	450	-	360	45	-	-	-	-
089	1350	180	-	45	-	-	2 70	-	-	-	-	-
090	4050	1350	-	18	360	-	1080	630	2880	540	-	-
091	270	45	90	90	-	-	-	-	-	-	-	-
092	-	630	-	45	-	-	-	-	-	-	-	-
093	1080	360	-	90	180	45	450	-	360	45	-	-
094	540	360	180	-	270	90	180	-	360	-	90	180
095	4500	1440	180	135	-	-	-	-	90	90	180	90
096	720	180	180	45	-	-	180	-	-	75	-	-
097	540	90	-	-	-	45	-	45	-	-	-	-

098	1000	1800	-	-	-	-	-	-	-	-	-	-
099	720	1350	-	180	180	-	540	270	-	-	-	-
100	-	1800	-	-	4500	180	4500	-	1800	-	-	-
101	-	90	-	-	-	-	-	-	-	-	-	-
102	540	540	-	90	180	-	-	-	900	360	-	-
103	540	270	540	90	-	-	270	270	720	-	-	-
104	-	270	-	-	360	-	180	-	180	180	-	90
105	540	270	-	-	-	-	-	-	-	-	-	-
106	630	540	270	270	180	180	90	90	-	-	-	-
107	630	900	-	360	-	-	450	-	-	-	-	-
108	720	540	90	360	540	-	270	180	900	-	-	-
109	900	270	-	-	360	-	540	180	-	-	-	-
110	270	-	180	45	-	-	180	-	-	-	-	-
111	1680	450	-	-	180	-	270	-	-	-	-	-
112	540	900	-	360	-	-	-	-	180	-	-	-
113	-	-	-	-	-	-	-	-	-	-	-	-
114	-	1980	-	270	-	270	-	-	-	-	-	-
115	900	135	-	-	270	170	900	450	-	-	-	-

Table 4: Livestock kept before and after the establishment of Mumias Sugar Scheme

NGCBS = Number of Grade Cattle before est. of scheme

NGCAS = Number of Grade Cattle after est. of scheme

NTCBS = Number of Traditional Cattle before est. of scheme

NTCAS = Number of Traditional Cattle after est. of scheme

NSBES = Number of Sheep before establishment of scheme

NSAES = Number of Sheet after establishment of scheme

NGBES = Number of goats before establishment of scheme

NGAES = Number of goats after establishment of scheme

Table 4: LIVESTOCK KEPT BEFORE AND AFTER THE ESTABLISHMENT OF MUMIAS SUGAR SCHEME

CODE	NGCBS	NGCAS	NTCBS	NTCAS	NSBES	NSAES	NGBES	NGAES
001	-	-	6	2	2 2	-	2	-
002	-	-	4	1	6	3	4	-
003	-	-	8	4	2	-	-	-
004	-	-	36	-	10	-	5	-
005	-	-	-	-	5	-	10	-
006	-	-	4	2	3	-	4	4
007	-	-	6	-	-	-	3	-
008	-	-	30	20	5	-	10	4
009	-	-	9	-	6	-	2	-

010	-	-	8	7	-	-	-	-
011	-	-	5	-	3	-	2	-
012	-	-	10	2	-	-	9	1
013	-	-	7	2	5	-	6	-
014	4	-	48	8	-	2	-	-
015	-	-	10	4	-	2	-	-
016	-	-	3	3	4	-	3	-
017	-	-	-	6	-	-	-	-
018	-	-	4	2	-	-	2	-
019	-	-	-	1	-	-	-	-
020	-	-	-	1	-	-	-	2

021	-	-	-	-	-	-	5	-
022	-	-	2	6	2	-	-	-
023	-	-	4	-	-	-	-	-
024	-	-	-	2	-	-	-	-
025	-	-	-	-	-	-	-	-
026	-	-	3	3	-	1	-	2
027	-	-	3	2	2	1	4	4
028	-	-	4	3	5	3	4	1
029	-	-	8	2	-	2	4	2
030	-	-	5	-	-	-	-	-
031	-	-	5	-	-	-	-	-
032	-	-	20	6	15	-	10	4
033	-	-	3	3	3	5	5	-

034	-	-	-	-	-	-	-	-
035	-	-	6	-	-	-	-	-
037	-	-	7	-	-	-	-	-
038	-	-	9	-	2	-	7	5
039	-	-	4	4	-	1	-	-
040	-	-	-	1	-	-	-	-
041	-	-	3	5	-	-	-	-
042	-	-	6	-	-	-	-	-
043	-	-	4	8	-	-	-	-
044	1	-	2	-	-	-	1	-
045	-	-	20	5	5	-	-	-
046	-	-	3	2	2	3	4	4
047	-	-	5	-	4	-	3	1

048	-	-	4	3	3	-	2	-
049	-	-	7	2	3	3	-	-
050	-	-	3	5	-	-	-	-
051	-	-	20	5	10	-	12	3
052	-	-	50	34	10	2	30	-
053	-	-	2	7	2	2	-	2
054	-	-	11	3	7	1	5	1
055	-	-	80	5	-	-	10	6
056	-	-	7	4	-	-	-	-
057	-	-	7	1	6	-	-	-
058	-	-	10	12	3	-	4	-
059	-	-	8	3	2	4	-	-
060	-	4	2	2	-	-	10	-

061	-	-	7	2	5	1	6	2
062	-	-	4	3	-	2	-	-
063	-	-	20	5	10	-	12	3
064	-	-	3	9	-	-	-	-
065	-	-	-	1	-	-	-	3
066	-	-	1	-	2	-	-	-
067	-	-	3	2	-	-	-	-
068	-	-	4	4	-	-	-	-
069	-	-	1	2	-	-	2	-
070	-	-	25	-	15	-	8	-
071	-	-	12	2	3	-	2	-
072	-	-	2	1	-	-	-	-
073	-	-	3	6	3	-	2	3
074	2	-	-	-	-	-	-	-

075	-	-	20	18	14	7	5	1
076	-	-	3	5	-	-	5	5
077	-	-	20	10	8	6	8	8
078	-	-	2	-	1	-	2	-
079	-	-	6	10	4	6	2	-
080	-	-	2	1	-	-	-	-
081	-	-	-	2	-	2	-	-
082	-	-	8	-	6	-	3	-
083	-	-	6	6	4	1	2	3
084	-	-	-	-	-	-	4	-
085	-	-	6	6	2	-	-	-
086	-	-	-	-	-	-	-	-
087	-	-	40	6	3	2	4	3
088	-	-	-	-	-	-	-	-

089	-	-	6	-	-	-	-	-
090	-	-	12	4	3	2	2	2
091	-	-	2	2	-	-	-	-
092	-	6	-	-	-	-	-	1
093	-	-	4	2	-	-	6	2
094	-	-	4	8	-	-	6	8
095	-	-	20	20	5	6	-	-
096	-	-	2	2	1	1	-	-
097	-	1	-	5	-	-	-	-
098	-	-	30	24	-	-	-	-
099	-	-	2	4	4	2	6	3
100	-	-	4	10	-	1	3	-
101	-	-	-	-	-	-	-	-
102	-	1	7	-	-	-	5	-
103	-	-	-	-	-	-	-	-

104	-	-	-	-	-	-	-	-
105	-	-	10	-	-	-	6	-
106	-	-	12	-	1	-	8	-
107	-	-	1	-	3	-	2	-
108	-	-	-	-	-	-	6	1
109	-	-	3	1	2	3	-	-
110	-	-	22	-	8	-	6	-
111	-	-	3	-	4	-	3	-
112	-	-	5	7	-	18	-	7
113	-	-	-	6	-	3	-	4
114	-	-	-	-	-	-	-	-
115	-	4	10	2	-	-	-	-

KEY

Table 5: Allocation of land between sugarcane and food crops (acres)

AHBOG Area held by outgrower

AUSUC Area under sugarcane

LUMFC Land under major food crops

Table 5: ALLOCATION OF LAND BETWEEN SUGARCANE AND FOO CROPS (Acres)

CODE	AHBOG	AUSUC	Maize	Beans	Finger Millet	Sorghum	Cassava	Potatoes	LUMFC	$\frac{AUSUC}{AHBOG}$ X 100%
001	16	5.7	2.0	2.0	-	-	-	-	4.0	35.63
002	7	5.5	0.5	-	-	0.5	0.3	-	1.3	78.57
003	12	-	0.5	-	0.3	-	0.3	-	1.1	-
004	14	1.5	0.5	-	-	-	-	-	0.5	10.71
005	5	3.0	0.5	-	0.5	-	1.0	1.0	3.0	60.00
006	3.6	-	1.5	-	-	0.4	-	-	1.9	-
007	6	-	1.0	0.5	0.5	-	-	-	2.0	-
008	21	5.6	4.0	1.0	2.0	-	-	-	7.0	26.61
009	7	2.9	2.0	-	-	-	-	-	2.0	41.43
010	12	4.0	7.0	2.0	-	-	-	0.5	9.5	33.33
011	4	4.0	-	-	-	-	1.7	-	1.7	100.00
012	3.7	4.0	1.7	-	1.6	-	0.5	0.5	4.3	-

013	4	2.5	1.0	-	1.5	-	-	0.3	2.8	62.5
014	14	2.0	1.0	0.5	-	2.0	2.0	-	5.5	14.29
015	86	11.0	2.0	-	3.0	0.5	0.5	0.7	4.0	12.79
016	14.5	11.7	1.5	-	-	-	-	-	1.5	80.76
017	16	4.4	0.5	0.5	0.5	-	0.5	-	2.0	27.50
018	8	3.0	1.0	0.5	1.0	1.0	-	-	3.5	37.50
019	4	1.9	0.3	-	0.3	-	0.3	0.3	1.2	48.50
020	16	16.0	2.0	-	-	9.0	0.5	-	11.5	100.00
021	4	3.2	0.5	0.5	-	0.3	-	-	1.3	79.75
022	4	-	0.5	0.5	-	-	-	-	1.0	- -
023	2	1.5	0.5	-	-	-	-	-	0.5	75.00
024	3	1.5	-	-	-	-	-	-	-	50.00
025	-	2.0	-	-	-	-	-	-	-	-

026	23.5	-	2.0	2.5	0.5	-	0.5	0.5	6.0	-
027	12	-	1.0	-	0.5	0.2	0.5	-	2.2	-
028	2.5	3.9	1.0	1.0	1.0	1.0	1.0	-	5.0	-
029	23	1.5	0.5	-	-	-	-	-	0.5	6.5
030	10	5.0	1.0	0.3	0.3	-	0.3	-	1.9	50.00
031	3.1	4.0	0.5	-	1.5	-	-	-	2.0	-
032	10	2.5	1.5	1.5	0.5	1.5	0.5	0.5	6.0	25.00
033	22	4.2	1.0	0.5	-	0.5	0.1	-	2.1	19.09
034	9.5	3.0	2.0	1.0	0.5	-	0.5	-	4.0	31.58
035	4	0.9	0.5	-	0.5	-	-	-	1.0	22.50
036	13.5	2.4	2.5	1.0	0.2	-	0.1	-	3.8	17.78
037	14	2.6	0.2	0.2	-	-	0.2	-	.6	18.57
038	5	2.5	1.0	1.0	-	1.0	1.0	-	4.0	50.00

039	10	3.2	1.0	1.0	-	-	5.0	-	2.5	32.00
040	7	0.5	0.5	-	-	-	-	-	0.5	7.14
041	11	3.8	1.0	-	-	0.5	0.3	0.3	2.1	34.55
042	3	3.3	1.0	1.0	-	-	-	-	1.0	-
043	20	10.0	1.0	-	-	-	-	-	1.0	50.00
044	7.5	5.5	0.5	0.5	-	-	-	-	1.0	73.33
045	14	4.0	0.5	0.5	0.3	-	-	-	1.3	28.57
046	12	3.9	1.0	-	-	0.2	0.5	-	1.7	32.50
047	7	2.5	1.0	1.0	-	-	-	-	2.0	36.29
048	4	2.5	1.0	-	-	1.5	0.3	0.3	3.1	62.50
049	22	3.9	2.0	0.5	0.5	-	-	-	3.0	17.73
050	8	5.5	2.0	1.0	-	-	-	-	3.0	68.75
051	4	3.0	2.0	2.0	-	-	-	-	4.0	75.00

052	12	4.0	3.0	3.0	-	-	-	-	6.0		33.33
053	8	1.2	2.0	2.0	-	-	-	0.2	4.0		14.88
054	7	3.4	1.0	1.0	-	-	-	-	2.0		48.57
055	9	3.2	1.0	-	-	-	-	0.5	1.0		35.56
056	15	5.0	-	1.0	-	-	-	0.3	1.0		33.33
057	21.0	-	3.5	-	3.5	0.5	-	0.3	7.8		-
058	100.0	27.13	3.0	0.3	-	1.0	0.5	0.5	2.3		27.13
059	60.0	-	1.0	-	-	-	-	-	1.0		-
060	12.0	2.0	1.0	1.0	0.5	-	-	0.3	2.8		16.67
061	10.0	2.8	5.0	-	-	0.5	0.5	0.2	6.2		28.00
062	7.5	3.5	2.0	0.5	0.5	-	0.5	-	3.5		46.67
063	4.0	3.0	2.0	2.0	2.0	-	2.0	-	8.0		75.00
064	8.0	5.5	2.0	-	-	-	-	-	2.0		68.75

065	8.0	2.0	1.0	0.5	0.5	-	0.5	-	2.5	25.00
066	4.0	2.0	1.0	-	0.5	-	0.5	-	2.0	50.00
067	17.0	2.6	0.75	0.75	-	-	0.5	-	2.0	15.29
068	9.0	2.0	2.0	-	1.0	-	0.5	-	3.5	22.22
069	3.5	2.7	-	-	-	-	-	-	-	77.14
070	20.0	1.25	0.5	0.5	-	-	-	-	1.0	6.25
071	3.0	3.0	5.0	2.0	-	-	-	-	7.0	100.00
072	3.0	3.6	0.5	0.5	-	-	-	-	1.0	-
073	8.0	3.0	1.0	-	-	1.0	1.0	-	3.0	37.50
074	8.0	6.6	0.5	0.5	0.5	-	0.3	-	1.8	82.50
075	14.0	11.2	3.0	-	-	-	-	-	3.0	80.00
076	6.0	2.9	2.5	2.5	-	-	-	-	5.0	48.32
077	22.0	-	2.0	3.6	-	-	-	-	5.6	-

078	7.0	3.0	1.0	1.0	0.5	0.5	-	-	3.0	42.86
079	18.25	11.75	1.0	1.0	-	-	-	-	2.0	64.38
080	6.0	3.0	1.5	-	-	-	0.3	-	1.8	50.00
081	9.0	6.02	2.0	2.0	-	1.0	-	-	5.0	66.89
082	5.0	-	-	-	-	-	-	-	-	-
083	49.0	6.0	1.0	2.0	-	-	1.0	-	4.0	12.24
084	2.5	2.8	0.75	0.75	-	0.3	0.3	-	2.1	-
085	5.5	3.3	0.5	-	0.3	-	0.5	0.4	1.7	60.00
086	18.0	2.5	1.0	0.5	-	-	0.5	-	2.0	13.89
087	12.0	4.3	2.0	-	2.0	-	-	-	4.0	35.83
088	8.0	2.4	1.0	-	-	0.5	-	-	1.5	30.00
089	8.0	3.07	1.0	1.0	-	-	-	0.5	2.5	38.38
090	16.0	2.9	1.0	1.0	-	0.5	0.3	-	2.8	18.13

091	3.0	-	0.5	0.3	-	-	-	0.3	1.1	-
092	6.0	3.0	1.0	1.5	-	-	-	-	2.5	50.00
093	4.5	2.4	0.5	0.3	0.3	-	0.3	-	1.4	53.33
094	8.8	6.7	0.25	0.3	0.3	-	-	0.3	1.15	76.14
095	20.0	10.0	3.0	-	-	-	0.3	0.3	3.6	50.00
096	3.0	4.5	0.5	0.5	-	-	0.3	-	1.3	-
097	10.0	0.5	0.5	0.5	0.5	0.5	-	-	2.0	5.00
098	30.0	6.5	2.0	-	-	-	-	-	2.0	21.67
099	5.0	3.7	0.5	-	-	0.5	-	-	1.0	74.00
100	15.0	3.0	2.0	3.0	0.5	-	-	-	5.5	20.00
101	20.0	1.4	0.2	-	-	-	-	0.1	0.3	7.00
102	7.0	3.0	1.0	-	-	-	0.5	-	1.5	42.86
103	15.0	5.8	0.5	0.1	-	0.2	0.1	-	0.9	38.67

104	11.0	3.9	1.0	-	-	-	0.3	0.2	1.3	35.45
105	11.5	2.8	2.0	-	-	-	0.5	-	2.5	24.36
106	10.0	2.6	3.0	2.0	1.0	1.0	0.5	-	7.5	26.00
107	11.0	2.53	2.0	2.0	-	-	-	-	4.0	23.00
108	11.0	3.36	-	1.0	-	-	-	1.0	2.0	30.55
109	3.5	1.29	0.25	-	-	0.3	-	-	0.4	36.86
110	6.0	2.9	-	0.5	-	-	-	-	0.5	48.33
111	14.5	4.4	1.5	0.5	-	0.5	-	0.3	2.8	30.34
112	2.0	0.5	0.5	-	-	-	-	-	0.5	25.00
113	5.5	2.68	-	0.2	-	-	-	-	0.2	48.73
114	5.0	3.0	1.0	-	0.5	-	1.0	-	2.5	60.00
115	86.0	11.71	-	1.0	-	-	-	-	1.0	13.62

Table :6 : EXPENDITURE ON FOOD AND CLOTHING AS A PERCENTAGE OF AVERAGE ANNUAL REVENUE FROM SUGAR CANE. (KSHS)

CODE	TRFSU	AARFSU	ASFAC	ASFAC/AARFSU X 100%
001	22,413.90	4,482.80	1,000.00	22.31
002	30,064.10	6,013.00	10,000.00	16.63
003	47,017.20	9,403.45	4,500.00	47.85
004	4,525.25	905.05	1,700.00	187.83
005	6,300.00	1,260.00	-	-
006	7,597.60	1,519.50	-	-
007	1,706.00	341.20	500.00	146.54
008	53,380.85	10,676.20	8,000.00	74.93
009	3,610.00	722.00	-	-
010	1,864.10	372.85	600.00	160.92
011	28,723.15	5,744.65	-	-
012	8,100.50	1,620.10	1,300.00	80.24
013	5,375.90	1,075.20	1,000.00	93.01
014	9,476.70	1,895.35	1,000.00	52.76
015	16,911.30	3,382.30	1,150.00	34.00
016	18,588.00	3,717.60	1,000.75	26.92

CODE	TRFSU	AARFSU	ASFAC	ASFAC/AARFSU X 100%
017	29,033.00	5,806.60	900.00	15.50
018	3,364.65	672.95	300.00	44,58
019	20,495.50	4,099.10	5,000.00	121.98
020	3,120.25	624.05	320.00	51.28
021	3,660.85	732.20	1,030.00	140.67
022	7,315.85	1,463.20	600.00	41.01
023	7,666.50	1,533.30	300.00	19.57
024	28,765.40	5,753.10	2,300.00	39.98
025	-	-	-	-
026	22,062.60	4,412.55	3,500.00	79.32
027	26,436.70	5,387.35	9,850.00	186.29
028	4,344.00	868.80	-	-
029	47,361.40	9,472.30	8,380.00	88,47
030	12,909.80	2,582.00	200.00	7,75
031	18,790.40	3,758.10	2,420.00	64.39
032	25,233.10	5,046.65	500.00	9.91
033	12,460.20	2,492.05	600.00	24.08
034	208.50	41.70	158.80	378.90

CODE	TRFSU	AARFSU	ASFAC	ASFAC/AARFSU X 100%
035	17,528.95	3,505.80	-	-
036	12,635.20	2,527.05	4,000.00	158.29
037	15,813.40	3,162.70	1,450.00	45.85
038	26,600.00	5,320.00	7,000.00	131.58
039	3,783.00	756.60	-	-
040	3,192.00	638.40	1,034.00	161.97
041	3,192.00	638.40	566.90	88.80
042	82,826.70	16,565.35	300.00	1.8
043	59,903.15	11,980.65	-	-
044	39,498.00	7,899.60	7,889.00	99.87
045	23,640.00	4,728.00	11,000.00	232.66
046	38,032.55	7,606.50	9,850.00	129.49
047	2,325.25	465.05	1,000.00	215.03
048	12,348.00	2,469.60	1,095.00	44.34
049	10,161.45	2,032.30	-	-
050	72,501.50	14,500.00	4,000.00	27.59
051	20,947.30	4,189.50	-	-
052	5,732.30	1,146.50	-	-
053	36,161.00	7,232.20	3,000.00	41.48
[illegible]	4,609.50	932.90	[illegible]	[illegible]

CODE	TRFSU	AARFSU	ASFAC	ASFAC/AARFSU× 100%
055	34,458.60	6,891.75	1,200.00	17.41
056	18,144.00	3,628.80	3,000.00	82.67
057	60,377.95	12,075.60	7,500.00	62.11
058	4,113.25	822.65	2,000.00	243.12
059	-	-	-	-
060	2,298.75	459.75	240.00	52.20
061	18,600.30	3,720.10	1,000.00	26.88
062	9,663.40	1,932.70	340.00	17.59
063	15,755.90	3,151.20	-	-
064	40,551.10	8,110.25	4,000.00	49.32
065	5,514.05	1,102.85	5,000.00	453.37
066	14,078.50	2,815.70	-	-
067	18,532.20	3,706.45	4,000.00	107.98
068	23,494.50	4,698.90	-	-
069	11,965.80	2,213.20	1,967.00	88.88
070	10,870.90	2,174.20	4,000.00	183.98

CODE.	TRFSU	AARFSU	ASFAC	ASFAC/AARFSU X 100%
071	32,102.30	6,420.50	9,450.00	147.18
072	5,140.90	1,028.20	1,440.00	140.05
073	12,393.40	2,478.70	-	-
074	37,152.20	7,430.45	-	-
075	1,105.70	221.15	-	-
076	33,093.55	6,618.75	-	-
077	4,345.50	869.10	-	-
078	11,009.20	2,201.85	3,000.00	136.25
079	22,893.05	4,578.65	-	-
080	15,712.50	3,142.50	500.00	15.91
081	71,564.00	14,312.80	7,000.00	48.91
082	1,789.90	358.00	900.00	251.40
083	76,859.00	15,371.80	56.00	0.36
084	98,745.00	19,749.00	2,000.00	10.13
085	2,235.60	447.15	-	-
086	18,496.00	3,699.20	300.00	8.11
087	15,061.10	3,012.25	760.00	25.23
088	4,664.15	932.85	3,328.30	356.79
089	9,534.00	1,906.80	1,300.00	68.18

CODE	TRFSU	AARFSU	ASFAC	ASFAC/AARFSU X 100%
090	9,812.40	1,962.50	-	-
091	824.85	165.00	-	-
092	6,776.40	1,355.30	813.20	60.00
093	13,992.65	2,798.55	-	-
094	20,264.55	5,652.95	-	-
095	6,287.15	1,257.45	10,000.00	795,26
096	-	-	-	-
097	28,070.80	5,614.20	6,000.00	106.87
098	-	-	-	-
099	5,742.30	1,148.50	950.00	82.72
100	23,053.70	4,610.75	3,175.00	68.86
101	-	-	-	-
102	7,494.30	1,498.90	1,800.00	120.09
103	-	-	-	-
104	18,532.50	3,706.50	8,000.00	215.84
105	8,451.25	1,690.25	2,000.00	118.33
106	10,608.00	2,121.60	960.00	45.25

CODE	TRFSU	AARFSU	ASFAC	ASFAC/AARFSU X 100%
107	3,241.00	648.20	500.00	77.14
108	7,401.00	1,480.20	3,000.00	202.68
109	7,401.90	1,480.30	6,000.00	405.32
110	7,047.35	1,409.50	-	-
111	18,588.00	3,717.60	1,000.00	26.90
112	4,930.00	986.00	-	-
113	7,858.35	1,571.70	-	-
114	27,000.00	5,400.00	-	-
115	16,911.30	3,382.30	-	-

KEY:

Table 6: Expenditure on Food and Clothing as a percentage of average annual revenue from Suger cane.

TRFSU = Total revenue from Sugar cane.
AARFSU = Average annual revenue from Sugarccane.
ASFAC = Amount spent on food and clothing.

KEY

Table 7: Reinvestment of income from sugarcane crop activity

TRFSU = Total revenue from sugarcane

AARFSU = Average annual revenue from sugarcane

ASWBA = Amount saved with bank

ASIHO = Amount spent on improvement of housing

APBCM = Amount ploughed back in cane maintenance

ASDOC = Amount spent on the development of other crops

AICOM = Amount invested in commerce

AINDU = Amount invested in industry

ASPLI = Amount spent on the purchase of livestock

ASOED = Amount spent on education

ASPDU = Amount spent on the payment of dowry

ASSDE = Amount spent on settlement of debts

ASPLA = Amount spent on the purchase of land

Table 7: REINVESTMENT OF INCOME FROM SUGARCANE CROP ACTIVITY (KSHS)

CODE	TRFSU	AARFSU	ASWBA	ASIHO	APBCM	ASDOC
001	22,413.90	4,482.80	-	-	-	-
002	30,064.10	6,013.00	46,594.40	6,000.00	10.000.00	-
003	47,017.20	9,403.45	20,000.00	3,000.00	-	-
004	4,525.25	905.05	-	-	-	-
005	6,300.00	1,260.00	400.00	-	-	-
006	7,597.60	1,519.50	-	-	-	-
007	1,706.00	341.20	400.00	900.00	2,340.00	-
008	53,380.85	10,676.20	-	400.00	1,000.00	288.00
009	3,610.00	722.00	-	2,500.00	-	-
010	1,864.10	372.85	-	-	4,550.00	1,000.00
011	28,723.15	5,744.65	-	-	-	-
012	8,100.50	1,620.10	24,000.00	-	400.00	500.00

013	5,375.90	1,075.20	400,25	-	1,900.00	220.00
014	9,476.70	1,895.35	23,800.00	4,000.00	14,600.00	-
015	16,911.30	3,382.30	400.00	-	-	-
016	18,588.00	3,717.60	6,900.00	-	5,065.00	-
017	29,033.00	5,806.60	-	-	-	-
018	3,364.65	672.95	410.00	-	-	-
019	20,495.50	4,099.10	5,145.00	-	-	170.00
020	3,120.25	624.05	450.00	-	700.00	-
021	3,660.85	732.20	400.00	70.00	-	-
022	7,315.85	1,463.20	-	-	-	-
023	7,666.50	1,533.30	-	-	-	-
024	28,765.40	5,753.10	-	-	-	-
025	-	-	-	-	-	-
026	22,062.60	4,412.55	500.00	-	-	-

027	26,436.70	5,287.35	-	5,900.00	4,240.00	2,600.00
028	4,344.00	868.80	-	-	-	-
029	47,361.40	9,472.30	-	476.50	2,450.00	170.00
030	12,909.80	2,582.00	400.00	-	800.00	-
031	18,790.40	3,758.10	45,600.00	11,000.00	4,200.00	1,000.00
032	25,233.10	5,046.65	500.00	1,800.00	-	700.00
033	12,460.20	2,492.05	-	300.00	-	-
034	208.50	41.70	-	-	-	50.00
035	17,528.95	3,505.80	2,000.00	2,500.00	-	-
036	12,635.20	2,527,05	-	-	-	-
037	15,813.40	3,162.70	1,808.00	-	-	-
038	26,600.00	5,320.00	5,000.00	6,000.00	1,500.00	400.00
039	3,783.00	756.60	1,184.00	-	-	600.00

040	3,192.00	638.40	-	2,473.85	-	2,700.00
041	3,192.00	638.40	5,000.00	-	-	-
042	82,826.70	16,565.35	-	-	900.00	-
043	59,903.15	11,980.65	-	-	-	-
044	39,498.00	7,899.60	500.00	-	-	300.00
045	23,640.00	4,728.00	-	-	-	-
046	38,032.55	7,606.50	-	5,900.00	4,240.00	-
047	2,325.25	465.05	-	-	200.00	-
048	12,348.00	2,469.60	2,000.00	-	800.00	80.00
049	10,161.45	2,032.30	-	-	7,200.00	-
050	72,501.50	14,500.30	4,000.00	10,000.00	4,000.00	-
051	20,937.30	4,189.50	13,000.00	3,000.00	3,300.00	-
052	5,732.30	1,146.50	-	2,000.00	-	-
053	36,161.00	7,232.20	400.00	800.00	1,900.00	-

054	4,689.50	937.90	-	-	-	-
055	34,458.60	6,891.75	-	800.00	4,700.00	320.00
056	18,144.00	3,628.80	-	4,000.00	-	-
057	60,377.95	12,075.60	300.00	3,580.00	2,650.00	8,150.00
058	4,113.25	822.65	13,000.00	8,000.00	10,000.00	3,440.000
059	-	-	-	-	-	-
060	2,298.75	459.75	-	-	-	-
061	18,600.30	3,720.10	-	-	-	-
062	9,663.40	1,932.70	-	140.00	-	-
063	15,755.90	3,151.20	13,000.00	3,000.00	3,300.00	1,100.00
064	40,551.10	8,110.25	-	4,000.00	10,000.00	4,000.00
065	5,514.05	1,102.85	-	20,000.000	-	-
066	14,078.50	2,815.70	M I S	S I N G		-
067	18,532.20	3,706.45	400.00	-	-	-

068	23,494.50	4,698.90	-	-	-	-
069	11,065.80	2,213.20	400.00	-	600.00	300.00
070	10,870.90	2,174.20	-	400.00	2,000.00	-
071	32,102.30	6,420.50	900.00	-	4,750.00	300.00
072	5,140.90	1,028.20	400.00	-	300.00	-
073	12,393.40	2,478.70	400.00	-	-	72.00
074	37,152.20	7,430.45	-	-	-	-
075	1,105.70	221.15	2,000.00	-	1,390.00	-
076	33,093.55	6,618.75	-	-	-	-
077	4,345.50	869.10	-	8,200.00	-	-
078	11,009.20	2,201.85	1,400.00	-	250.00	-
079	22,893.05	4,578.65	25,000.00	-	1,500.00	-
080	15,712.50	3,142.50	-	-	-	-
081	71,564.00	14,312.80	6,000.00	10,000.00	-	1,000.00

082	1,789.90	358.00	-	-	-	-
083	76,859.00	15,371.80	-	34.00	-	-
084	98,745.00	19,749.00	-	500.00	5,000.00	-
085	2,235.60	447.15	-	-	-	-
086	18,496.00	3,699.20	400.00	200.00	-	-
087	15,061.10	3,012.25	-	-	-	-
088	4,664.15	932.85	-	6,000.00	n -	-
089	9,534.00	1,906.80	5,881.00	1,300.00	300.00	-
090	9,812.40	1,962.50	553.00	-	-	-
091	824.85	165.00	-	-	-	-
092	6,776.40	1,355.30	813.20	-	-	-
093	13,992.65	2,798.55	-	-	-	-
094	28,264.55	5,652.95	-	-	-	-
095	6,287.15	1,257.45	-	-	1,000.00	-

096	-	-	-	-	-	-
097	28,070.80	5,614.20	6,000.00	3,000.00	5,000.00	-
098	-	-	-	-	-	-
099	5,742.30	1,148.50	400.00	-	1,600.00	-
100	23,053.70	4,610.75	-	-	1,180.00	-
101	-	-	-	-	-	-
102.	7,494.30	1,498.90	400.00	700.00	1,740.00	500.00
103	-	-	-	-	-	-
104	18,532.50	3,706.50	5,000.00	3,200.00	1,276.00	-
105	8,451.25	1,690.25	-	-	700.00	150.00
106	10,608.00	2,121.60	700.00	50.00	150.00	100.00
107	3,341.00	648.20	400.00	-	600.00	700.00
108	7,401.00	1,480.20	450.00	800.00	280.00	-
109	7,401.90	1,480.30	-	-	1,400.00	-

110	7,047.35	1,409.50	200.00	200.00	570.00	-
111	18,588.00	3,717.60	5,900.00	-	5,065.00	-
112	4,90.00	986.00	-	200.00	-	-
113	7,858.35	1,571.70	-	2,800.00	5,700.00	1,800.00
114	27,000.000	5,400.00	-	-	-	-
115	16,911.30	3,382.30	3,382.30	400.00	-	-

CODE	AICOM	AINDU	ASPLI	ASOED	ASPDO	ASSDE	ASPLA
001	-	1,000.00	-	-	20,000.00	-	16,000.00
002	-	-	-	6,000.00	-	-	-
003	-	-	4,000.00	6,000.00	3,000.00	-	3,000.00
004	-	-	1,200.00	328.00	-	400.00	-
005	-	-	-	1,670.35	-	-	-
006	-	-	-	-	-	-	-
007	-	-	-	-	-	1,500.15	-
008	-	-	3,200.00	7,000.00	-	3,000.00	-
009	-	-	-	3,100.00	-	-	-
010	-	-	-	-	-	1,000.00	-
011	-	-	-	6,000.00	-	-	-
012	-	-	60.00	600.00	2,550.00	1,000.00	-
013	-	-	1,900.00	-	880.00	-	910.00

014	-	-	-	1,600.00	-	800.00	-
015	2,000.00	-	-	2,800.00	-	100.00	-
016	-	-	-	-	-	-	-
017	-	-	770.00	400.00	-	500.00	-
018	-	-	-	125.00	1,225.00	300.00	-
019	-	-	1,000.00	-	-	500.00	-
020	-	-	-	500.00	-	1,200.00	-
021	-	-	-	140.00	20,000.00	-	16,000.00
022	300.00	-	-	-	-	-	-
023	-	-	-	-	3,000.00	-	3,000.00
024	-	-	-	100.00	-	400.00	-
025	-	-	-	-	-	-	-
026	-	-	20,000.00	600.00	-	-	-
027	-	-	7,600.00	-	-	1,500.15	-

028	-	-	2,300.00	-	-	3,000.00	-
029	-	-	2,0 0.00	14,675.50	-	-	-
030	-	-	-	-	-	1,000.00	-
031	-	-	3,600.00	-	-	-	-
032	-	-	-	-	2,550.00	1,000.00	-
033	-	-	-	-	880.00	-	910.00
034	-	-	-	-	-	800.00	-
035	-	-	1,200.00	1,000.00	-	100.00	-
036	-	-	-	6,000.00	-	-	-
037	-	177.00	-	-	-	500.00	-
038	4,000.00	-	800.00	6,000.00	1,225.00	300.00	-
039	-	-	2,000.00	3,740.00	-	500.00	-
040	-	-	-	-	-	-	-
041	-	-	-	-	-	-	-

042	-	-	-	-	-	9,174.00	-
043	-	-	-	-	-	-	-
044	-	-	-	6,000.00	4,500.00	-	-
045	-	-	1,000.00	-	3,000.00	-	-
046	-	-	7,600.00	-	3,500.00	1,25.00	-
047	-	-	-	1,000.00	-	-	-
048	-	-	-	2,000.00	-	300.00	-
049	-	-	-	-	-	8,000.00	-
050	-	-	1,400.00	5,000.00	12,000.00	16,000.00	13,000.00
051	1,100.00	-	2,000.000	800.00	2,000.00	5,000.00	-
052	-	-	-	-	1,000.00	-	-
053	-	-	4,240.00	100.00	100.00	2,000.00	-
054	-	-	-	-	4,000.00	4,000.00	-
055	-	-	3,600.00	-	800.00	2,400.00	-

056	-	-	500.00	6,353.00	-	-	-
057	-	-	1,960.00	7,150.00	4,800.00	2,100.00	12,600.00
058	-	-	6,000.00	3,000.00	-	-	-
059	-	-	-	-	-	-	-
060	-	-	-	8,000.00	-	-	-
061	-	-	-	3,000.00	-	-	2,000.00
062	-	-	-	-	-	300.00	-
063	-	-	2,000.00	800.00	2,000.00	5,000.00	5,000.00
064	-	600	4,000.00	5,000.00	12,000.00	16,000.00	700.00
065	-	-	-	3,000.00	-	-	-
066	M I S S I N G						
067	-	-	-	1,575.00	-	-	-
068	-	-	-	7,800.00	-	-	-
069	-	-	1,000.00	-	-	-	-

070 -	-	-	-	9,000.00	-	-	-
071	-	-	-	-	8,000.00	-	-
072	-	-	-	3,000.00	-	-	-
073	-	-	800.00	4,000.00	-	-	-
074	-	-	-	-	-	-	-
075	-	-	-	3,700.00	-	14,000.00	-
076	-	-	-	-	-	-	-
077	-	-	2,520.00	1,468.00	-	-	-
078	-	-	1,000.00	-	-	-	-
079	-	-	-	56,840.00	-	-	-
080	-	-	-	-	-	-	-
081	-	-	5,000.00	-	-	-	-
082	-	-	-	800.00	-	-	-
083	-	-	-	150.00	-	180.00	-

084	-	-	350.00	-	600.00	-	-
085	-	-	-	-	-	-	-
086	-	-	-	300.00	-	4,000.00	-
087	-	-	2,010.00	-	-	-	-
088	-	-	-	-	-	-	-
089	-	-	-		-	-	-
090	-	-	-	3,150.00	-	-	-
091		-		-	-	-	-
092	6,000.00	-	5,700.00	-	-	-	-
093	-	-	-	-	-	-	-
094	-	-	-		-	-	-
095	-	-	-	2,000.00	-	-	-
096	-	-	-	-	-	-	-
097	-	-	-	-	-	-	-

098	-	-	-	-	-	-	-
099	-	-	-	800.00	400.00	1,000.00	-
100	-	-	700.00	2,485.00	-	20.00	-
101	-	-	-	-	-	-	-
102	-	-	-	400.00	700.00	11,000.00	-
103	-	-	-	-	-	-	-
104	-	-	25,500.00	10,400.00	1,500.00	5,100.00	-
105	5,000.00	-	2,000.00	3,000.00	-	1,000.00	-
106	-	-	-	-	-	28.00	-
107	p-	-	600.00	-	2,000.00	1,600.00	-
108	-	-	850.00	2,900.00	800.00	2,000.00	-
109	-	-	-	-	300.00	100.00	-
110	12,000.00	-	1,000.00	-	1,500.00	1,500.00	-

111	-	-	-	-	-	-	-
112	5,000.00	-	-	-	800.00	-	-
113	1,000.00	-	3,180.00	4,500.00	4,750.00	4,300.00	-
114	-	-	-	-	-	-	-
115	2,000.00	-	-	2,800.00	1,150.00	-	-

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