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EXPLORATORY STUDY FOR THE ESTABLISHMENT OF
A CASSAVA PROCESSING INDUSTRY

UC/BZE/86/065

BELIZE

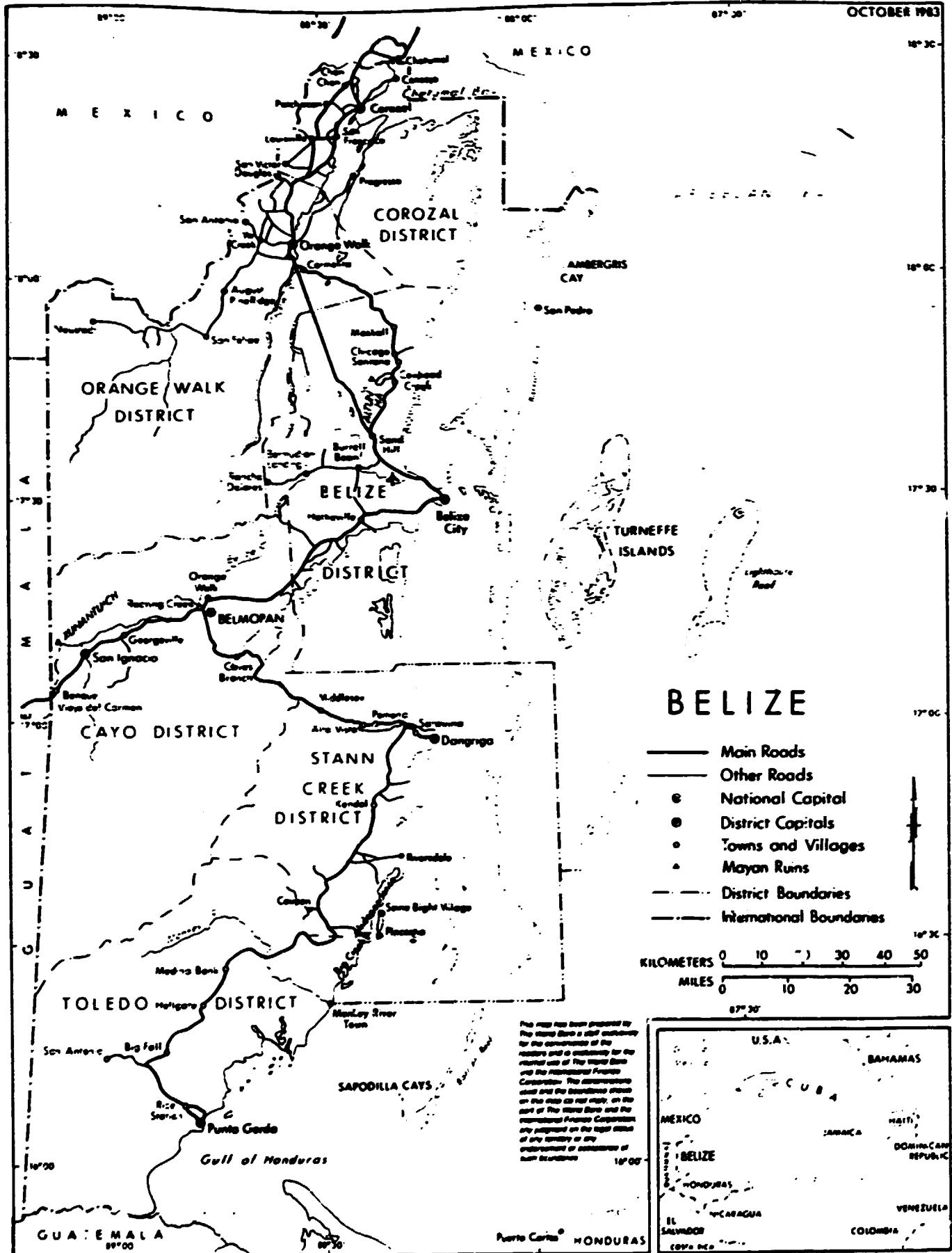
Terminal report*

Prepared for the Government of Belize
by the United Nations Industrial Development Organization

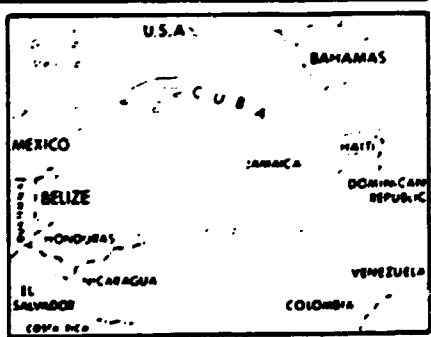
Based on the work of T. R. W. Jarman, agro-industrial and
rural development specialist

Backstopping officer: H. Koenig, Agro-based Industries Branch

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ABBREVIATIONS USED IN TEXT.

BEIPU	Belize Export Investment Promotion Unit
EMB	Belize Marketing Board
BRWA	Belize Rural Womens Association
DFC	Development Finance Corporation
NDFB	National Development Foundation of Belize
NGO	Non Government Organisation
UNIDO	United Nations Industrial Development Organisation
UNICEF	United Nations Children Fund.

CONVERSION FACTORS.

Currency	US, \$1.00 = B. \$ 2.00
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1.0 EXECUTIVE SUMMARY.

1.01 A one man mission, an agro-industrial specialist with experience of the cassava processing industry, visited Belize from the 2nd June -7th July 1987. The Government of Belize agreed to the mission following discussions in 1985 of a paper by messrs Hurley and Usher on the use of cassava as an animal feed or/and as an industrial fuel feedstock. The responsible Ministry for the mission is the Office of Economic Development, part of the Ministry of Finance.

1.02 Belize has the lowest consumption of root crops in the Caribbean and central America. It has been estimated that approximately 100 tons of cassava would be available for sale per year. The population is small, 165,000 people, the density of population is low - 6 persons per square kilometre, and therefore the internal market is small. A cassava industry would have to be export orientated.

1.03 The G.D.P. of the country is based upon agriculture, mostly sugar, citrus, bananas, fish and forestry products. Government policy is to diversify the foreign exchange earnings from agriculture as well as achieve self-sufficiency in basic staple foods where they can be grown in Belize.

1.04 Cassava production is concentrated in the Stann Creek and Toledo districts where the crop forms an important cultural part of the diet of the Garifuna peoples. Cassava is consumed mainly by this social group but is not a popular food amongst the other ethnic groups that make up the population of Belize.

1.05 At present cassava cannot compete with maize for inclusion in animal rations because it is too expensive. The country is self-sufficient in poultry meat and eggs but has to import most of its pork products. These are an important part of the diet, especially hard and cheap pork cuts, despite many attempts, pig feeding has been found to be uneconomic. Cassava prices would need to be at least half their present level of BS \$ 0.10 per pound (US \$ 0.11 per kilo) to compete with maize.

1.06 despite these attractive prices paid on the fresh market very little cassava is produced for sale. There is a shortage of labour in agriculture partly because agriculture is considered a lowly occupation and because of the large labour market in the USA.

1.07 Cassava is not considered a crop which Belize could exploit as a foreign exchange earner because of the very competitive world market for natural starches from other sources and the fact that starches can be readily modified for use. The animal feed industry in Europe is over supplied with cassava pellets from the Far East and at present Belize cannot compete on price.

1.08 Small scale processing of cassava into bread is being undertaken which has a good market and is even exported to the USA. One family business, the Sabal brothers, are producing bread on a commercial scale. A proposal is made to assist this operation as a pilot scheme for bread production and pig feeding.

1.09 An agro-industrial development fund has been proposed which would provide money for technical assistance in establishing food processing businesses on a cottage scale in the rural areas. The fund, to be managed by a committee of Government, NGO and private sector personnel should enable the very small businesses to afford consultancy and management services. It is also proposed that the fund would strengthen and train the private sector service industry in management, accountancy, agronomy and process engineering. There is considerable local expertise available in the country to do this.

1.10 A review of opportunities in agro-processing is recommended in order to provide Government with a comprehensive plan and basis on which to develop it's diversification programme.

1.11 Costs of recommended assistance amount to :-

A) Agro-industrial development fund US \$ 50,000 at establishment replenished to US \$ 50,000 annually for five years. Maximum cost US \$ 250,000.

B) Agro-industrial review - Team of six persons at a maximum cost of US \$ 100,000.

Total UNIDO assistance to Belize agro-industry US \$ 350,000 over a five year period.

1.12 There are sufficient funds available in the country to provide commercial loans to small businesses, but assistance is required to enable the very small businesses to use these funds. One of the objectives of the Agro-industrial Development fund would be to enable individuals and NGOs to do this.

1.2 CONCLUSION.

1.2.1 The mission considered the scale of production and processing of cassava in Belize. It does not foresee the development of a large scale export orientated industry based upon the crop. Assistance is recommended to privately owned factory already producing cassava bread which would act as a "test bench" for research into the economics and technology of the cassava industry and animal feeding. Additionally the mission considers that technical assistance should be made available to very small businesses engaged in agro-industry by the employment of locally based consultants through an agro-industrial development fund. A review of the country's agro-industry and possible development including such measures as export incentives, trade tariffs and export enterprise zones is recommended. This would assist government in its long term planning for agricultural diversification.

2.0. PROJECT BACKGROUND AND HISTORY

2.1. This exploratory study arose as a result of a paper put to Government by Messrs. Hurley and Usher in August 1986 entitled "Towards an Agricultural Revolution" * and which was discussed with the regional representative for UNIDO in 1985. The Government officers concerned, employees of the Ministry of Agriculture, are no longer involved with the project. The Office of Economic Development agreed with UNIDO that an exploratory study should be made by a general agro-industrialist with experience of cassava processing. The consultant T. Jarman, visited Belize from the 2nd June till 7th July 1987 to carry out the study.

2.2. Belize has the smallest per caput consumption of root crops in the Caribbean (Annexe 1). Cassava is not a staple food in the country but was found to be an important part of the diet of one ethnic group, namely the Garifuna. Belize's population is composed of a number of different ethnic groups, each having their own dietary habits. The country's proximity to the USA has meant that the diet has been influenced by the availability of imported fast foods. The large US labour market as well as Belize's colonial past has had an influence on the population's attitude to agriculture and has caused many traditional foods and culinary practices to become only occasional or ceremonial. The Garifuna community is centred in Stann Creek district and it is in this district that most cassava is grown and consumed. It has been estimated that approximately 100 tons of cassava is available for sale each year and the mission would estimate that there is approximately 300 tons produced.

2.3. The population of Belize is estimated at 165,000 with 33% resident in Belize City, the commercial capital. The rural population is therefore very small with a density of only six persons per square kilometre. An unknown but very significant proportion of Belizean nationals reside temporarily or permanently in the USA and as a result most families have at least one expatriate member. Remittances are made to relatives in Belize which also tends to discourage the need to work in agriculture. The more important factor is that the most productive age group in the population are overseas leaving a shortage of labour, especially in agriculture. Agricultural work is now increasingly done by immigrant workers from

* Copies may be made available by the Government

surrounding countries. They are attracted to Belize by the higher wage levels (GNP per capita US \$ 1,130 in 1985) and as a result of the political problems in their own countries. Despite this effect on agriculture the sector is still the country's major foreign exchange earner with sugar (54%), citrus (14.2%), bananas (4.3%), fish (10.55%) and timber making up the major exports. The plantation crops are associated with multinational companies which, by setting up processing operations have created a ready market for the smallholders. Belize has in effect become an "orchard" for off shore companies. Nationalisation has taken place within the industry but the export markets are still controlled by the parent companies. The sugar industry is dependent upon world prices and competition from the rest of the Caribbean. The Government's present objectives are to diversify the agricultural base and encourage a larger number of commodities for export. Food self sufficiency is part of this policy but is not a major objective since cheap food can so easily be imported.

2.4. In this context cassava needs to be considered in terms of its opportunity to become an industrial crop with products for export and by so doing supply the needs of the country's own consumers. Cassava is but one opportunity and it must compete economically with other crop or livestock commodities. An objective must be to maximise income per labour unit to the rural population. Unfortunately cassava does not lend itself to this objective since it has a poor marketability and a high labour demand compared to plantation tree crops. The market could be improved by establishing a factory which processed roots but the products that can be made from cassava face competition on the world market from products derived from other carbohydrate raw materials. An instance of this is starch which can be readily made from maize or potatoes and the resultant starch modified for any particular application. The raw material for starch extraction from maize is a by-product of the maize oil industry and is thereby procured at very low cost. The European Community imports large quantities of dried cassava for animal feeding from the Far East. Imports are now over quota and great efforts are being made, by Thailand for instance, to diversify out of cassava production.

2.5. There is a demand for cheap sources of carbohydrate in Belize for animal feeding, especially pigs, but currently the market price for cassava makes it uncompetitive with maize. [B\$ 0.10 per pound for cassava, (US \$ 0.11/Kg) B\$ 0.15- 0.20 per pound (US\$ 0.16- 22 /Kg) for maize but in the preparation of dried cassava chips a conversion factor of at least 5:1 has to be used in the extraction of water which would cause cassava to cost a minimum of B\$ 0.50 per pound.] The feeding value of cassava is also lower since cassava has a protein content of 2 percent against 7-12 percent for maize

2.6. The paper referred to above by Messrs Hurley and Usher⁽¹⁾ proposed the use of cassava as an animal feed but at that period suggested a price of B\$ 0.03 per pound (US\$ 0.03). The paper, see annexe 4, shows that the cost of a home produced ration for poultry would not be dissimilar using maize or cassava at this price and that the great advantage that cassava would provide the producer will be the far greater bulk per unit area than maize, ie. maize, two crops per year yielding 2 ton carbohydrate per acre per year compared to cassava, one crop per year yielding 15 ton/acre/yr. Thus far less labour in land preparation and husbandry required for a greater yield of carbohydrate . On this basis the mission would support the view that cassava could have a future in the feeding of livestock especially poultry on "on-site" produced rations. Yields of cassava of 15 ton per acre, as suggested in the paper, are however not the norm in Belize because of the low level of husbandry and mixed cropping systems and whilst the root can fetch B\$ 0.10 per pound (US\$ 0.11/Kg) it is too expensive as a livestock feed.

2.7. Of interest is the fact that cassava, fresh, sells in the market for B\$ 0.50 per pound (US \$ 0.55/Kg) which if the producer only received half would still provide an income of B\$ 7,500 per acre (15 short ton per acre x B\$ 0.25 per pound.) (US\$ 9,990 per hectare.)

(1) Towards an Agricultural revolution R.Hurley, R.W Usher 1985 and 1986

In fact, producers are accustomed to receiving only B\$ 0.10 per pound and with average yields of only 6 ton per acre, cassava still produces an income of B\$ 1,200 per acre/year. (maize at B\$ 0.2 x 2 ton per acre/yr = B\$ 800 per acre/yr.) Cassava is therefore an attractive crop to produce commercially at the present time and yet one of the manufacturers of cassava bread offering this price cannot get enough root.

2.8 Hurley and Usher also propose the establishment of village processing units which convert cassava to ethanol and in admixture with glycerol from vegetable oil (eg. soya) would produce a diesel substitute at a commercial price. There are as yet no examples of this in the world although the technology is proven and in Brazil "gasahol" is produced from cassava which is mixed with petrol. The plant is however quite capital intensive in the context of Belize and as yet there is insufficient interest in the production of cassava to warrant serious consideration. There is a proposal to convert an existing, but closed down factory into a wet ethanol plant using sugar as the feedstock. This is a joint venture with PetroJam of Jamaica and is situated in the northern district of Corozal where sugar is already grown by smallholders. Corozal is the other end of the country to the present cassava growing area and in this case cassava would have to compete with sugar in the production of fermentable sugar per acre if farmers were to be encouraged to change.

2.9 Three historical projects also detract against the likelihood of cassava becoming a major industrial crop in Belize. In the 1940's a Canadian funded project (Empire Starch) set up a starch factory for export but closed down soon after the second world war because the process was uneconomic and there was a shortfall in the supply of roots. More recently Cassava Products Company (1975) was formed to grow and process cassava into products for export. Although the company still exists it is now defunct through lack of capital and management. Root production on the company's own farm (20 acres) was more costly and more difficult than planned. Cooperation from surrounding producers was also lost due to the company's inability to pay on delivery for the roots. Unfortunately the project never produced enough product, mostly cassava bread, to be able to demonstrate the company's viability. Lastly is the existence of the Starch

Producers Association which is a long established marketing cooperative which has produced starch using traditional technology for export, and internal consumption. World markets for natural starches have declined due to the ability to modify starch from any source for any particular use and therefore cassava would have to be of particularly high quality, at very low cost, which is not possible to achieve under traditional conditions. Members of the cooperative have tended to diversify their production to other crops which they can sell fresh on the local market. All three projects are/were sited in the Stann Creek district and again amongst the Garifuna and Creole people.

- 2.10 The mission investigated the inclusion of cassava flour into the national bread. The bakers and bread consumers in Belize are most discerning about the quality of their flour and bread that even the suggestion of an admixture to the flour would affect the current sales of flour from the mill and a switch to imported flour. Additionally wheat received mostly from Canada and the USA is subsidised by aid and is therefore cheap. Recent shipments were at US \$ 160 per ton C.I.F. Belize City (Equivalent to B\$ 0.16 per pound). This price is likely to be even lower in the future because of american aid.

2.11 Despite the above, pure cassava bread is produced in Belize on a commercial scale and even exported to the USA. Cassava bread is an ethnic product, associated with the Garifuna culture and is made in the home or in small factories in the Stann Creek district. The largest commercial producers are the Sabal family of Dangriga who currently process about two tons of roots per week into bread and have a ready market locally for their product. Occasional deliveries have been made to Belize City and even the USA where demand has outstripped supply. The process is simple, fast but fairly arduous. (see annexe 3 for description) The major constraint to production at the time of the visit was the supply of roots even at the offered price of B\$ 0.10 per pound. Thus, any prospects for the development of cassava in Belize would need to concentrate on the production aspects of cassava as a first priority. This is suggested in a project proposal designed specifically to assist the Sabal factory in this report.

2.13 The only other cassava project suggested by the mission is the shipment of peeled, sliced, frozen cassava to the USA. Costa Rica already exports frozen cassava to the ethnic markets in the USA and there is a demand in other caribbean islands for the product. As a trial it is suggested that shipments be made from the village of Hopkins where there is a fishing cooperative owning freezer plant for the export of fish. By using the same equipment the economics and viability of producing cassava for this market could be investigated. An F.O.B. price Belize City of US \$ 0.20 per pound should be the aim. There are existing organisations and expertise available to undertake the research in Belize. The establishment of an Agro-Industrial Development Fund is suggested in this report. The fund could be administered by BIEPU and used to fund these trial exports.

3.0 PROSPECTS FOR AGRO-INDUSTRY.

3.1 The mission found the development of a project which specifically aimed at promoting cassava was likely to be too narrow in its objectives. With the diversification of agriculture as the national objective in mind the consultant considered some of the constraints which were limiting the development of a food processing industry in Belize. Study of the country's trade statistics in food (annexe 1) show that animal feed, potatoes and onions, pig products and milk products constitute the major imports.

3.2 Animal feed imports are shown to be the protein, vitamin and mineral ingredients which form balanced livestock rations. The country is self-sufficient in maize production mostly through the mechanised farming activities of the Mennonite community at Spanish Lookout and Shipyard. This community also undertakes all the feed milling for the country. The objective must be to produce more high protein food within the country. C.A.R.D.I. (Caribbean Agricultural Research and Development Institute) is already working on the distribution of suitable varieties of soya bean to farmers. Other sources of protein could be: the use of fish and abattoir wastes into meal or the use of oilseed cakes. At present neither industry is sufficiently large to ensure a constant supply at a single location to warrant a drying plant or crushing mill.

3.3 Potatoes (Irish) and onions have been shown to grow in Belize but in both cases storage of the crop to ensure an all year round supply has proven to be too costly at the ambient temperatures and humidity conditions in Belize.

3.4 Pork products are related to the price of feed. Some work is being done to find cheaper rations for smallholder pig production in an attempt to reduce pork imports. Frozen pork can be imported cheaper than home grown pork on the commercial market and as a result very little pork is produced for sale in Belize. The country is now self-sufficient in poultry

products and work is being undertaken to reduce the cost of rations to enable economic intensive pig production to be viable.

3.5 Milk import statistics are misleading because Belize re-exports upto seventy five percent of it's cheese imports to Mexico and other neighboring countries. The Belize Marketing Board (BMB) has a monopoly on the importation of canned milk. During the last five years two dairy plants producing pasteurised milk from local dairy herds successfully demonstrates the possibility of developing an agro-industry in Belize. There is now a growing demand for pasteurised milk

3.6 There are therefore no prospects for import substitution on a large scale but there are significant imports of processed foods that could be substituted. eg potato crisps by plantain and yam crisps. Peanut butter and tropical fruit jams are examples where this process has already begun in the country. Any commercial operation will need to consider exports as a major objective. The processing of waste bananas into puree, paste, dried flour, infant foods and flavourings would provide better prospects than say cassava in Belize because the raw material will have already been grown, assembled and would otherwise be wasted as a by-product of the export industry.

3.7 An Agro-industrial review is recommended to identify opportunities in Belize, and an outline of the suggested terms of reference and justification is given in chapter four.

3.8 Small scale food processing is a useful vehicle for alleviating rural poverty which exists in Belize. Projects are already being undertaken in the development of income generation and job creation activities. Agro-industrial processing is often the first of such projects. An objective to be suggested is the concept of making each village or community as self sufficient in food as possible. In the UK for instance the large flour milling, baking or brewing industries grew out of acquisition of the village miller, baker or brewer ie. small cottage industries supplying the local communities before the development of the national transport system. Rural development can, as a result take place by considering a village or a

community as a whole entity and making it self sufficient in food products rather than the development of a single industry because it satisfies a national demand or trend or is the idea of a particular entrepreneur or organisation working in the country. In Belize there appears to be no shortage of ideas, technical expertise or finance/credit for starting small scale processing. The constraint appears to be affording the management skills and training to run a business on a commercial basis for a long enough period to ensure that it is sustained. By observation the mission considered that there is a considerable wealth of expertise in the private and quasi-government sectors to supply management and technical services. The businesses are unable to afford to use these services and as a result the professional skills become disillusioned and will emigrate or find permanent work in the public sector where they might become unavailable for use by these very small businesses.

3.9 It is recommended that an Agroindustrial Development fund be established to provide grant money for the employment of local services, research and development work, marketing, feasibility studies and training. Further details of which are given in the following chapter.

4.0 MISSION RECOMMENDATIONS AND PROJECT PROFILES.

4.1 The opportunities for the establishment of an export industry based on cassava have been discussed. The mission considers that there are small projects which would assist the present cassava industry and demonstrate the possibilities of cassava becoming a more important source of animal feed or commercial crop for export. To do this, assistance is recommended to provide a research studentship based upon the Sabals farm to undertake pig feeding trials. Additionally advice on export marketing, training and management assistance is recommended to the Sabals to determine means of improving cassava bread output. A costing has been made to improve production but it is recommended that a commercial loan be sought from existing development funds.

4.2 In order to seek alternatives in agro-industry and identify areas where agriculture could be diversified an agro-industrial review is recommended.

4.3 One of the major constraints to development was found to be the inability of very small businesses in the rural areas to avail themselves of existing financial and managerial services. It is recommended that an Agro-industrial Development Fund be established to provide grant money to finance the short term employment of local consultants or training and travel for personnel engaged in small food processing businesses in the rural areas. Small scale appropriate technology equipment could also be funded which would mean the fund will provide assistance to local artisans such as blacksmiths in the manufacture of equipment.

4.4 Project profiles of these recommendations are given below. This acts as an identification of opportunities and further work will be necessary before the projects can be funded for implementation.

4.1 TERMS OF REFERENCE FOR AN AGRO-INDUSTRIAL REVIEW OF BELIZE.

4.1.1. BACKGROUND.

Belize has a very small population (est 165,000) and thus a small local market for processed foods and agro-industry. Over 25 percent of G.D.P. and 45 percent of employment is derived from agriculture through traditional export industries such as sugar, citrus, bananas, timber and fish. The Government has a policy to diversify the agricultural base to avoid the vagaries of the world market. Some alternatives already exist i.e. jam and sauces and cassava bread but the whole range of opportunities needs study.

4.1.2. OBJECTIVE.

To determine what industries would make a viable contribution to the country's foreign exchange earning potential and what policies and incentive programmes and legislation would be needed to encourage the growth of the agro-industry.

4.1.3. TERMS OF REFERENCE.

A team of specialists will visit Belize and study the present agro-industry in total, particularly:

1. Review the present agroindustries which are successfully contributing to foreign exchange earnings or savings. Their scale, organisation, economics and constraints will be studied and conditions for success identified.
2. Review the smaller scale projects being designed to develop rural areas and alleviate rural poverty. Particularly income generating projects, employment creation and womens development.
3. Review the fiscal and other incentives policies of Government designed to assist the diversification programme.
4. Identify opportunities which might best utilize the resources that Belize has.

5. Review the present service industry to agricultural production and processing in terms of available expertise, management, accountancy, research and input supply of spares, and raw materials.
6. Determine the existing sources of credit and finance available to the industry and suggest improvements.
7. Identify opportunities and organisations and training needs for any prospective industries and determine how best government could assist. Determine the effect on employment and GDP that these new industries might have.
8. Prepare development plans for future agro-industry and agri-business

4.1.4. EXPERTISE OF THE TEAM.

The team is expected to be a mixture of local consultants and international experts. It will require the following skills, Macro and Micro economics, international marketing, agro process engineering, agronomy and crop and animal production, sociology, credit and project planning.

4.1.5. MAN INPUTS AND TIME SCALE.

A team comprising no more than six consultants of which half should be Belizean. A total lapse time of 3 months with a suggested period of five weeks field work and four weeks analysis and report preparation. Total time input of 330 man days.

4.1.6. SUPPORT FROM GOVERNMENT.

Transport and access to reports.

4.1.7. SUPPORT FROM AID AGENCY.

Finance to cover the cost of fees, daily allowances and preparation of the report. Budgetary cost US.\$ 100,000.

4.2 THE AGRO- INDUSTRIAL DEVELOPMENT FUND.

4.2.1. A number of projects have already been started coordinated by such organisations as the Belize Rural Womens Association, the refugee settlement programmes, UNICEF and other NGOs and cultural societies in the country. These industries need to be monitored by central government, the marketing of their products coordinated and promoted and the experience gained disseminated around the country. Very small businesses cannot afford to employ the services of management and technical consultants. Specific marketing and technical research work is also required to assist in the diversification of agricultural processing into viable alternatives to the multi-national businesses that exist at present.

4.2.2. An Agro-industrial Development Fund is recommended to provide a sum of grant money to be used in the employment of local expertise for research, development, management and training directed at assisting the food and agroindustrial processing sectors of the country.

4.2.3 . The exact method of administering the fund will need to be determined by Government but a suggestion might be that the money be placed with one of the credit institutions such as the DFC or NDFB. A committee be formed comprising members of organisations working in the rural areas as well as individuals from the private sector. The coordinatory body for the fund might be the Belize Export Investment Promotion Unit (BEIPU) who would call regular meetings, once per month, to determine disbursement of the funds according to application. By ensuring that consultants and NGOs are on the committee it is hoped that they in turn will encourage and assist businesses and projects in the rural areas in their application for funds.

4.2.4. It should be stipulated that the fund only be used for agro-industry and that the work that it is used to fund results in a comprehensive and regularly written report on the subject covered. These reports should be centrally stored eg BEIPU and experience and information gained from them be freely accessible to the general public and to

government. An annual report indicating the disbursement of the fund be provided to the aid agency providing the capital for the fund .eg: UNIDO technical assistance grant.

4.2.5. The size of the fund would be modest, estimated initially at US \$ 50,000 which is replenished each year over a five year period following the annual report and accounts. A portion of the fund, say no more than 5 percent be used as travelling, accomodation and administration expenses for the administrative committee. It is hoped that the monthly meetings can be held at convenient locations close to the place of permanent work of the members. The committee should be comprised of no more than ten persons representing as wide a section of interests as possible.

4.2.6 Some of the uses of the fund which have been identified by the UNIDO consultant follow. The consultant was contracted to look at cassava processing and as a result there is some extra emphasis on the list towards this crop. However it is important that each crop is considered in relation to other opportunities and the size of the market in Belize.

i) Design of canals and small scale processing equipment. The heat produced in the local stove or canal can be used to make a number of products such as tortillas, popcorn, deep fried products and flour or chip drying. At present they tend to be only used for one purpose in the cassava bread making factory. The smoke should be channelled away from the operator. Likely assistance in design would come from the Appropriate Technology Unit. Pilot models could be paid for from the fund and the results made available to the public.

ii) Banana flour and banana product development. The portion of the crop which does not meet export specifications could be made into products for local consumption. Mixture with soya or sesame would provide a nutritious infant food.

iii) Deep fry products. There are substantial imports of deep fried products entering Belize, eg corn crisps and potato crisps. Using the heat

from canals other products could be produced and packaged for sale to retail outlets, eg. Banana, plantain and root crop crisps and coconut products.

iv) Employment of consultants and management advisers on a part time basis to assist with the technical and financial aspects of small business.

v) Trial cassava shipments to the USA. A trial using Hopkins Fishing Cooperative freezers and shipping to try a shipment of peeled sliced frozen cassava. If successful this could become a business operated by the women's group in Hopkins. The project to be supervised by BEIPU.

vi) Tropical fruit juice extraction and the manufacture of squashes, jams and concentrates. This is already being done but these products provide a good basis for small rural industries. Management advice could be bought from the fund.

vii) Dried fish and protein wastes for animal feeding, an industry using sun drying methods could assist in reducing the national import bill for protein feeds.

viii) Research into the economics of pig feeding using cassava, a possible scholarship for a Belizean student using the Sabal's factory and farm for a commercial trial, in association with the ministry of agriculture's pig unit at Stann Creek.

ix) Provide finance for study tours by persons in the private sector to visit neighboring countries to study and obtain information on process equipment.

4.3 PROJECT PROFILE FOR IMPROVING PRESENT CASSAVA BREAD MAKING OPERATION

4.3.1. BACKGROUND.

The existing operation for making cassava bread at the Sabal family farm is the largest commercial factory in the Stann Creek district. The product has a ready market within the district, country and even export for the USA. The bread is mostly consumed by the Garifuna and Creole community and used as an accompaniment for soups or eaten with spreads. The technology is simple and proven. A shortage of root as raw material limits production and some improvements to the factory could be made

4.3.2. THE PROJECT.

The UNIDO mission which visited Belize during June 1987 could not find justification for the establishment of a new cassava processing operation but considers that by developing an existing factory lessons will be learnt about cassava production, bread making and marketing at reasonably low cost. Existing management and knowledge can be used to the full. The factory will provide a market for fresh roots in the vicinity of the factory and it is proposed that equipment be provided to assist in the preparation of farmers land which will encourage cassava production. It is also planned that the factory provide transport to collect and purchase roots at roadside locations.

1.3 tons of roots per day over a 300 day year will be required which is expected to be produced over an area of 56 acres (23 hectares) assuming a modest yield of 6 ton per acre (15 tonne per hectare). It is hoped that the effect of the project will increase yields.

The mission found that there is a considerable amount of commercial credit available from banks or through institutions such as the Development Finance Corporation and the National Development Foundation Of Belize. The project should be constructed so that it can withstand the cost of a commercial loan. Some estimates of the capital requirements have been made

but it is not recommended that purchasing of equipment be made, nor employment of extra staff be done straight away but that they should be acquired according to the growth of the business. The estimated capital requirements amount to US \$ 83,600 and yet the present factory is able and equipped to process one ton of roots per day so that a cautious approach to capital purchases should be made. (Annexe 2.)

The establishment of an agro-industrial development fund has been recommended to provide technical assistance to operations such as the Sabal's. The money should be provided as a grant so that assistance at no cost can be obtained in such areas as business management and accounts, marketing, packaging and advertising, technical improvements to process and in agronomy of cassava production. The grant should provide for consultancy services for the full preparation of management and financial plan for the Sabals.

It is suggested that the factory has a small pig enterprise so that feeding trials using grated cassava could be carried out. The research and monitoring for such a project could be undertaken by a post graduate student who would also be funded by the agro-industrial development fund.

4.4.0 SUMMARY OF FINANCE REQUIRED TO UNDERTAKE RECOMMENDATIONS.

Recommendations made by the mission are in three parts:-

i) An Agroindustrial review comprising a six man mission to identify industries which would assist the rural areas by the creation of jobs and business opportunities and to the country by diversifying the products available for export. The review is estimated to cost U.S.\$ 100,000 and will provide a detailed planning document for the diversification programme.

ii) Establishing an Agro-industrial Development Fund which would provide money on grant to enable small business to buy in local consultancy services, to fund basic development of process machinery and to provide training through visits to neighboring countries or research scholarships on particular aspects of the food industry eg. pig feeding using cassava by-products. The information resulting from work done from the fund should be freely available to others in the agroindustrial sector. The total cost of the agroindustrial development fund is expected to be U.S. \$ 250,000 provided as a grant to Government over a five year period. The fund should be replenished to U.S.\$ 50,000 each year.

iii) Cassava is a minor crop in Belize but an important one amongst the Garifuna community. Assistance is recommended to an existing commercial operation where advisory and training services could be funded by the agroindustrial development fund. Developing the production of cassava and improving the process of bread making should be undertaken under commercial conditions. It is considered the project could be viable using existing development loan finance available in Belize. As a result no additional funding is proposed but regular progress reports on the business should be made through the agro-industrial development fund so that additional assistance or finance could be obtained as required.

TABLES OF ROOT CONSUMPTION AND TRADE STATISTICS.

TABLE

CARICOM : PRODUCTION & CONSUMPTION OF ROOT CROPS - ANNUAL AVERAGES 1981-1984.

COUNTRY	PRODUCTION 1980-1983 (Tonnes)	IMPORTS	EXPORTS (Tonnes)	CONSUMPTION (Tonnes)	PER CAPITA PRODUCTION (Kg)	PER CAPITA CONSUMPTION (Kg)	POPULATION (1983) (000)
ANTIGUA & BARBUDA	5974	963	842	6095	77.6	79.2	77
BAHAMAS	254	4266	0	4520	1.1	19.9	227
BARBADOS	14093	9066	708	22441	57	90.9	247
BELIZE	200	1711	0	1911	1.3	12.1	158
DOMINICA	23861	177	506	23532	318.1	313.8	75
GRENADA	1218	504	2	1720	11.4	16.1	107
GUYANA	20526	2	2	20526	25.8	25.8	797
JAMAICA	212822	333	6999	206156	101.8	98.6	2091
MONTSERRAT	200	70	0	270	16.7	18.8	44
ST. CHRISTOPHER & NEVIS	504	402	80	826	11.5	22.5	12
SAINT LUCIA	1538	664	50	2152	12.2	17.1	126
SAINT VINCENT & GRENADINES	9821	669	8119	2371	76.7	18.5	128
TRINIDAD & TOBAGO	13419	55600	0	69019	11.9	61.1	1129
ALL COUNTRIES	304420	74427	17308	361539	58.3	69.3	5218

SOURCE: COURIER, JULY 1987

TABLE 1

IMPORTS BELIZE

	1982	1982	1983	1983	1984	1984	1985	1985	1986	1986
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$
WHEAT	14150815	3596	15942689	3544	2422899	561	700	0	24439750	3463
RICE	4190	6	12010	13	154699	110	1430755	600	306846	136
MAIZE	63577	63	138239	214	4618532	980	2290507	753	98885	83
WHEAT FLOUR	746123	320	872116	292	8548639	2473	11373205	3602	3505517	795
MAIZE FLOUR	172680	62	47041	40	122902	69	183630	83	111943	45
PREP CEREAL FOODS	249030	441	201006	404	226614	510	221724	547	253054	405
MALT ROASTED (beer)	1364973	647	1318605	637	9342100	445	224262	357	816183	344
MACARONI PASTA	52887	69	73104	113	72013	112	65879	87	21734	28
BREAD	749	2	117	0	3861	5	140	0	588	1
BISCUITS UNSWEETENED	56387	74	84866	80	91569	97	65422	50	80801	71
BISCUITS SWEETENED	384156	896	507722	627	680499	903	675837	949	738632	963
OTHER PASTRY	32037	87	15656	38	19545	49	36852	88	30701	76
INFANT FOOD	110058	370	145660	358	114962	303	167295	400	152477	278
FLOURMEAL STARCH MALT	468391	0	222446	473	333307	778	471090	1174	247807	419
COCONUT DESSICATED	100	0	20	0	0	0	28	0	0	0
BRAZIL & CASHEW NUT	127	0	72	0	1323	3	338	2	2571	23
OTHER NUTS	497	1	2136	13	1967	11	3465	18	20011	98
TROPICAL FRUIT DRIED	1573	6	1933	5	872	4	1133	5	1071	4
JAMS MARM JELLIES	406	0	27650	55	11060	21	7519	9	2346	3
PEANUTS PREP, PRESERVED	12882	52	7308	18	2494	12	7866	25	2081	7
POTATOES FRESH	3473888	2857	3943892	3045	3894625	2470	4178005	2609	4104636	2435
RED KIDNEY BEANS	301113	304	180	0	420300	377	666300	568	945497	684
ONIONS	1899220	1356	1780465	1216	1631234	1044	1812977	908	1849359	1252
DEHYDRATED VEG	2746	19	5326	27	4384	22	3443	18	5773	20
TAPIOCA	1008	3	233	1	351	2	204	1	420	1
TOMATO PASTE	54811	75	43431	71	74023	79	76377	75	38303	41
GLUCOSE LACTOSE MALT0SE	44534	31	34460	31	41383	41	36710	37	37957	24
POULTRY FEED	7876077	3249	9683743	3977	9298689	4450	10613360	3186	11489428	3465
CATTLE FEED	425108	107	448326	176	816104	273	1749763	284	301893	80
PIG FEED	35069	11	129072	44	83687	41	212243	35	100334	45
LARD	2563298	2619	3578486	2977	2953046	3052	2353469	2210	3664130	2867
TOMATO KETCHUP	239069	239	227034	218	229801	235	359707	265	341792	253
PEANUT BUTTER	37040	107	40264	95	58400	134	1627	3	12333	15
GILSEEDS MOSTLY PEANUTS	0	0	1548	2	2550	3	7454	3	125	0
VEGETABLE OILS TOTAL	1216630	633	1653380	617	733480	908	640060	720	19136	208
HOUSEHOLD SOAP	54903	50	141377	105	146280	111	150721	89	131497	53
TOILET SOAP	394542	957	255660	466	439934	847	330038	683	314402	485
STARCH ARROWROOT INULIN	21882	29	16555	21	36100	29	15305	21	34080	41
DEXTRINS ROASTED STARCHES	3921	9	3669	8	2976	5	3843	8	3764	7
TRACTORS (NUMBER)	190	1257	163	265	47	766	183	1309	59	973

TABLE 2

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LIVESTOCK IMPORTS BELIZE

	1982 QUANTITY LBS	1982 VALUE 000 B\$	1983 QUANTITY LBS	1983 VALUE 000 B\$	1984 QUANTITY LBS	1984 VALUE 000 B\$	1985 QUANTITY LBS	1985 VALUE 000 B\$	1986 QUANTITY LBS	1986 VALUE 000 B\$
MEAT OF BOVINE	1105	1	3789	10	46592	179	27243	96	9494	22
SHEEP	46817	147	58716	173	62800	205	27731	92	20200	63
SWINE	74825	186	78835	205	111147	240	69837	209	40334	121
CHICKEN	197982	251	624	2	440	1	198	0	50849	71
PORK SALTED IN BRINE	1099451	1226	356880	1031	1028158	1038	902	945	989399	1006
SAUSAGES	338966	742	365257	764	483583	967	456704	891	451160	901
CORNER BEEF	288456	713	354232	781	357673	639	277466	548	212910	398
OTHER MEATS EG PIGS FEET	741242	1361	642600	1123	980472	1626	1434427	2109	904074	1669
TOTAL MEATS		6136		5612		6442		6473		6414
MILK SWEETENED CONDENSED	3496341	4168	2714862	2570	2842915	2719	3573261	2883	2917499	2728
MILK BELOW 8% FAT	1533998	1223	1508946	1264	1082006	853	1237042	1004	950969	1067
MILK SOLID ABOVE 8%	1829363	4126	287786	753	807183	1743	1479615	2715	829300	1758
MILK POWDER BELOW 8%	651383	1485	676471	1603	657190	1588	1316767	1941	863024	1665
FRESH MILK	79868	68	1931	4	393402	347	573996	597	342239	334
BUTTER	302290	1109	43806	142	190559	585	447531	1177	183536	398
CHEESE AND CURD	3032803	6841	1898186	3620	3325156	7388	8101631	10923	3990657	6781
EGGS FOR EATING DOZEN	144332	312	90985	209	63040	115	87473	193	69962	139
TOTAL DAIRY & EGGS		20790		11089		16675		22550		16144

TABLE 3

EXPORTS BELIZE

	1982	1982	1983	1983	1984	1984	1985	1985	1986	1986
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$
CEREAL & CEREAL PREPS	1762690	381	2935182	198	1000000	198	100	0	0	0
RED KIDNEY SHELLED	280000	327	192490	134	292500	73	80000	81	360000	387
SUGAR AND HONEY	0	68805	0	71417	0	67836	0	47982	0	64457
OTHER FOOD PREPS SAUCES	130	0	0	0	0	0	35	0	13443	13
OILSEEDS	0	0	0	0	0	0	36435	1	1450	2
BULBS AND TUBERS	0	0	0	0	0	0	150	0	0	0
BEEF	0	0	4916	12	0	0	274140	493	430043	856
DAIRY PRODUCE & EGGS	0	0	1290	2	0	0	0	0	0	0

TABLE 4

SUMMARY IMPORTS AND EXPORTS FOOD SECTOR.

	1982	1982	1983	1983	1984	1984	1985	1985	1986	1986
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE
	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$	LBS	000 B\$
TOTAL VALUE IMPORTS				n/a		260373		256333		244015
TOTAL VALUE EXPORTS				n/a		145719		128852		148957
TOTAL VALUE RE EXPORTS				n/a		40685		51432		36324

GROSS MARGINS ON CASSAVA PRODUCTION & BREADMAKING.

ANNEXE 2 TABLE 1

P/O FIELD CAPITAL COSTS- EQUIPMENT.

NUMBER	QUANTITY	UNIT	DESCRIPTION	LOCAL	FOREIGN	UNIT COST US \$	FOREIGN	LOCAL	TOTAL
P1	1	EACH	75 HORSE POWER TRACTOR		X	17000	17000		17000
P2	1	EACH	3FURROW DISC PLOUGH		X	2000	2000		2000
P3	1	EACH	RIGGING BODY		X	1800	1800		1800
P4	1	EACH	TRACTOR MOUNTED FRONT END LOADER		X	7000	7000		7000
P5	2	EACH	TWO WHEEL TIPPING TRAILER		X	8000	16000		16000
TOTAL								43800	43800

ANNEXE 2 TABLE 2

F/O FACTORY CAPITAL COSTS AND EQUIPMENT

F1	1	EACH	CASSAVA GRATER 1 TON PER HOUR	X	X	1700	1500	200	1700	
F2	1	EACH	CASSAVA CHIPPING MACHINE	X	X	1500	1300	200	1500	
F3	1	EACH	FLOUR SIFTER	X	X	1000	1000	300	1300	
F4	1	EACH	HYDRAULIC PRESS		X	200	2000		2000	
F5	6	EACH	BREAD OVENS CANALS	X		200		1200	1200	
F6	2	EACH	POLYTHENE BAG SEALERS		X	400	800		800	
F7	VAR	EACH	HAND TOOLS SIEVES BRUSHES	X		ESTIMATE		500	500	
F8	1	EACH	10 HP HAMMER MILL		X	4000	4000		4000	
F9	1	EACH	FEED MIXER		X	6000	6000		6000	
F10	1	EACH	STARCH EXTRACTION TABLE	X		1000		1000	1000	
F11	2	EACH	MOTORISED POWER SAWS		X	400	800		800	
F12	1	EACH	WATER TANK AND PUMP	X		2000		2000	2000	
F13	VAR	EACH	INSTALLATION OF ELECTRIC POWER	X		4000		4000	4000	
F14	VAR	EACH	PIPING AND WIRING	X		ESTIMATE		1000	1000	
F15	1	EACH	BUILDING COSTS 400 sq ft EXTENSION	X				12000	12000	
TOTAL								17400	22400	39800

TOTAL CAPITAL COST OF PROJECT EQUIPMENT

43800 22400 86200

ANNEXE 2 TABLE 3

LABOUR COSTS CASSAVA PROCESSING FACTORY

NUMBER	DESCRIPTION	DAYS PER YEAR	COST PER DAY		ANNUAL COST	
			B \$	US \$	B \$	US \$
1,50	MANAGER DAILY OPERATIONS	365,00	27,50	5000,00	5000,00	
1,00	BOOK KEEPER	300,00	25,00	7500,00	3750,00	
1,00	SALESMAN /DELIVERY MAN	300,00	20,00	6000,00	3000,00	
12,00	PROCESS OPERATORS	300,00	18,00	5400,00	32400,00	
2,00	FUEL AND CHARCOAL OPERATORS	390,00	16,00	9600,00	4800,00	
20,00	CASUAL LABOUR	100,00	16,00	32000,00	16000,00	
37,00	TOTAL			129900,00	64950,00	

ANNEXE 2 table 4

FACTORY PRODUCTION COSTS

DESCRIPTION	AMOUNT	UNIT	COST/UNIT		TOTAL COST	
			B \$	US \$	B \$	US \$
PURCHASE CASSAVA ROOTS	748000,00	LBS	,10		74800,00	37400,00
LABOUR (SEE LABOUR COSTS table 3)					129900	64950,00
PACKING MATERIALS	80000,00	PKTS	,02		1600,00	800,00
TRANSPORT/SALES/MARKETING,	80000,00	PKTS	,05		4000,00	2000,00
FIREWOOD PLUS FUEL	250,00	LOADS	40,00		10000,00	5000,00
ELECTRICITY (ESTIMATE)	300,00	DAYS	10,00		3000,00	1500,00
WATER	300,00	DAYS	1,00		300,00	150,00
TOTAL					223600	111300

ESTIMATED GROSS MARGIN FOR CASSAVA FARM SABAL.

COSTS							
NUMBER	DESCRIPTION	QUANTITY	UNIT	COST/UNIT	TOTAL COST	REVENUE	TOTAL
				B \$	B \$	B \$	US \$
1	LAND PREPARATION	200	HOURS	40	8000		8000
2	PLANTING	20	ACRES	75	1500		750
3	WEEDING	40	ACRES	60	2400		1200
4	HARVESTING	20	ACRES	365	7300		3650
5	CHEMICALS SPRAYS	20	ACRES	60	1200		600
	PLANTING MATERIALS (5000/acre)	100000	STICKS	.02	2000		1000
	COSTS				22400		11200
REVENUE							
1	SALE OF ROOTS TO FACTORY	260000	LBS	.1		26000	13000
2	CONTRACT LAND PREPARATION	200	HOURS	50		10000	5000
3	SALE OF PLANTING MATERIAL	50000	STICKS	.025		1250	625
4	CONTRACT LABOUR	100	DAYS	20		2000	1000
	TOTAL					39250	19625
MARGIN							
						16850	8425
MARGIN PER ACRE						842.5	421.25

ANNEXE 2

REVENUE AND MARGIN FROM FACTORY

DESCRIPTION	NUMBER	UNIT	COST/UNIT	VALUE	
				\$ \$	US \$
CASSAVA BREAD	75000	BREADS	3.5	252500	131250
CASSAVA ANIMAL FEED	100000	LBS	.12	12000	6000
CASSAVA STARCH	2000	LBS	1.2	2400	1200
				276900	138450
FACTORY PRODUCTION COST (FROM TABLE 4)				223500	111800
MARGIN FOR FIXED COSTS DEPRECIATION, INTEREST, PROFIT				53300	26650
RETURN ON CAPITAL					66.625PERCENT

CASSAVA BREADMAKING IN STANN CREEK DISTRICT.

ANNEXE 3. CASSAVA BREAD MAKING IN STANN CREEK DISTRICT.

A3.1 Cassava roots are carried to the factory in sacks and tipped at the peeling area. Most of the root is grown on the Sabal family's farm where fields are within easy walking distance of the buildings. Some root is purchased from surrounding farms but insufficient quantity to supply the present capacity. The reasons for this could be that the Sabals do not supply transport and do not know which smallholders have root for sale on any day. Another reason is that producers are not generally paid on delivery of root but upto one month later, there is no system of weighing or recording quantity delivered which results in loss of confidence from the producers supplying the factory. Labour is a constraint and it is felt that more would be grown if land preparation could be done mechanically.

A3.2 The roots are hand peeled. This can be done quite quickly since a knife inserted under the skin and cortex will cause easy separation. The process is however labour intensive, the Sabals estimating one person being capable of peeling 50 pounds of roots per hour. (23 Kg/Hr)

A3.3 Washing the roots is done in an open tank to remove sand and soil.

A3.4 The rasping machine consists of a wooden cylinder on a mechanically driven shaft (3 H.P petrol engine) which has been covered by perforated tin. As a result the surface of the cylinder is very rough. The cylinder rotates in a box which has a close clearance with the cylinder. The roots are pushed into the box and against the rasper. The resultant pulp is often passed through the machine twice but the operation is very fast. The pulp is deposited onto an inclined board so some draining of the starch water occurs.

A3.5 Straining or water extraction is done in long woven tubular baskets. Each round basket is about 10 feet long (3 metres) with a diameter of about 9 inches (23 cm). The tube has a mouth at one end in the side of the tube. At both ends there are strong loops woven into the tube. The cassava pulp is loaded into the baskets by hand which take on a thicker configuration. The basket is hung from the roof structure and a pole

passed through the bottom loop. Two people sit on the pole adding weight to the basket. The weave of the basket responds to the tension on both ends and attempts to elongate thus squeezing the contents. The process is very efficient since the pulp is left for 15 minutes only or until the basket stops dripping water. The basket is then lifted down and emptied. By this time the pulp is compressed into cylindrical blocks which feel quite dry to the touch. Four persons operate the baskets, one person stationed at the top of the building to lift and guide the baskets for hanging. The other three fill baskets and sit on the pole during squeezing.

A3.6. A mechanical sieve has been constructed locally but is not in use due to bearing failure. The machine consists of a box with sieve bottom which is mechanically shaken by a cam-shaft which is driven by a 5 H.P. motor. During the mission's visit sieving was being done by hand by rubbing the dried pulp through a woven basket. A damp flour results and some fibre is produced.

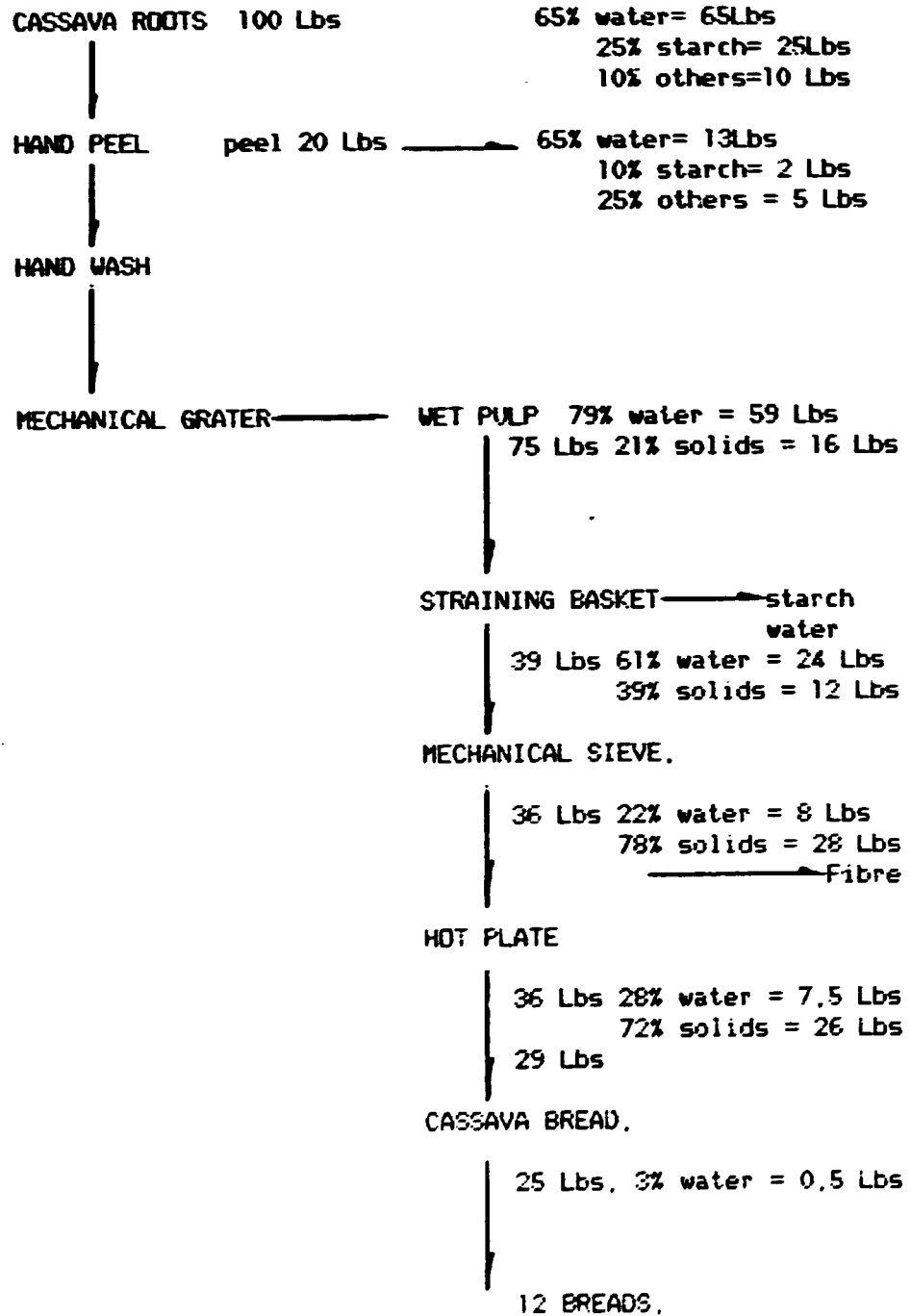
A3.7 Baking is done on an open hot plate which is heated by firewood. The operation is mostly done by women who take approximately one kilogram of flour and spread it evenly over the hot plate at a depth of about 10 mm. The hot plate known as a canal, consists of oil drum sides to keep the heat in and a 10mm steel plate placed over the top. Firewood is burnt below the plate. The height of the working surface is at about 40cms which means the operators are stooped over the hot plate as they attend to the bread.

The flour is compressed onto the circular plate (diameter of 900mm) with wooden trowels or with brushes. After approximately 3 minutes the flour has congealed into a biscuit and can be turned on the plate. The cooking time is about 8 minutes and just before the end of cooking the bread is scored into segments which readily break up when the bread is removed from the canal. Additional flour is added during the cooking and is sprinkled over the bread. This is quite wasteful as some flour is scraped onto the floor.

A3.8. The breads are allowed to cool and then transported to market in halves or broken into segments and packed into polythene bags.

CASSAVA BREAD MAKING. (SABAL OPERATION.

ESTIMATED MASS BALANCE.



A3.9 The premises consist of an open sided shed, the camals placed in one area with the smoke rising through the working area and out through the sides of the building..

IMPROVEMENTS TO PROCESS

A3.10. Some immediate improvements could be made to the camals. They could be higher and an enclosed fire with chimney made out of clay or brick. The top of the stove could have a hole to accept the plates for cooking or a dish into which deep frying operations could be done for products such as cassava, yam or plantain chips. Pop-corn could also be produced on such a stove.

Raising the height of the camal would also enable cooking to be done at a more comfortable attitude.

Pulp pressing could be done mechanically either by hydraulic or screw press but the present method is quick and efficient although filling the tube baskets is quite labour intensive.

Mechanical sieving would speed up the production of flour but this would only mean repairing the present machine.

Some experiments were made by filling flat moulds with flour and placing these on the camal. (A dried milk tin top was used) Half-way through the cooking the lid is overturned and cooking is completed directly on the camal. An acceptable bread was made which required no trimming, ie less waste and no additional flour was added. This could be a simple means of reducing waste and time spent over the camal but the method requires additional research.

The breads have an indefinite shelf-life since they have a very low moisture content.

The starch water is drained to waste from the squeezing baskets but this could be run over a starch extraction table where starch for sale would be

deposited from suspension. This could then be collected and sun-dried and a market identified within Belize.