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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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ESTABLISHMENT OF A FOOD PROCESSING CENTRE IN UGANDA

UPI-INVEST

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

(UNIDO)

GOVERNMENT OF UGANDA

ESTABLISHMENT OF A FOOD PROCESSING CENTRE IN UGANDA

CONTRACT NO. 86/53

FINAL REPORT

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Prepared by: UPI INVEST, Sarajevo
JNA 20, Yugoslavia

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ABSTRACT

The Agreement reached by the Government of Uganda and Yugoslavia and UNIDO as well as the Preliminary Study were the basis for a decision to carry out the Project entitled "Establishment of a Food Processing Centre in Uganda.

The existing situation in Uganda's industrial food processing calls for integration of the small number of specialists into a single entity - The Food Processing Centre. Construction and development of this Centre will direct the processes of knowledge transfer and adaptation through an institution which will be able to render to its users the professional services necessary for the passing of decisions on further food processing development in the country.

The fundamental concept of the project is based on:

- the priority needs of the country
- the need to extend the export range of products
- the difficulties with imports
- the potentials for food primary production
- the economic situation in the country and the position of food industry
- the need to regulate the legislation in food production

It has been planned to build the Centre in 2 stages.
The present program encompases the aims and the contents, material and personnel inputs and implementation of the first stage of the Centre construction and start-up, covering:

- pilot plant for testing technology processes and training
- laboratories for testing raw materials and products
- library
- necessary pertaining auxiliary rooms

It has been decided that the Centre will be located within the Kawanda Research Station (belonging to the Ministry of Agriculture and Forestry), 20 km from Kampala.

The building designed for the first stage covers a total area of 927.70 sq.m., which would accomodate the planned units.

The number of employees planned for the starting activities in the Centre is 14.

Costs of the Centre construction involve the necessary equipment, personnel training, foreign technical assistance, engineering activities, imported materials required for start-up operations, and these costs are estimated to be US $ 1,496,000.

Implementation diagram, elaborated in details, provides for an overall period of 29 months for the construction and start-up of the Centre's first stage.

The Centre will be financed and operated with the support and under jurisdiction of the Government of Uganda.

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1. INTRODUCTION

1.1. HISTORY OF THE PROJECT

The idea of establishing food processing centre in Uganda was brought up for the first time, during The Fourth session of the UNIDO/Yugoslav Committee for International Cooperation in the Development of Agroindustries in the Developing Countries.
The session was held in Belgrade on 29-30 May 1978.
The Yugoslav authorities expressed their readiness to participate in financing of the preparation phase of the Project.

The idea at that time was a rather rough, therefore it has been suggested that exploitary mission should be mounted to Uganda, with the objective to discuss with local authorities: a. the concept and the formulation of the Project; b. the objectives and scope of assistance; c. the best approach to implementation.

Since the conditions in Uganda, for a certain period, were not suitable for further activities on the Project, the Mission was not fielded to Uganda before April 1984.
This Mission, carried out by UNIDO expert Mrs. Angela Mihelić-Zupančić and financed by UNIDO - Vienna, resulted with a Report, CODE NUMBER - UC/UGA/85/254 which, being accepted by both, the Government of Uganda and UNIDO, gave the necessary guidelines for further steps in the process of implementation of the Project.

On the basis of the above mentioned activities, UPI INVEST, a consulting and engineering firm from Sarajevo, signed parallel Contracts with the UNIDO Centre in Vienna, and the Yugoslav Solidarity Fund with the Non-Aligned and Developing Countries, for the performance of this document.

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The Contract with UNIDO involves the following scope of works to be executed by the consulting company:

- A document with a print of the Centre, indicating location, construction, installations, equipment and all the facilities needed for establishment of the basic nucleus of the Centre and the envisaged expansions;
- A description of all the resources, financial, personnel inputs, etc. needed for the Centre establishment and the start-up operations;
- A description of the functions of the Centre and the basic work programme;
- A detailed plan of the Centre establishment and start-up operations.

The Contract claimed for two basic steps in elaboration of the preparation phase of the Project: a. Field Mission to Uganda for collecting necessary relevant data and b. Elaboration of the Project.

The first step - the Field Mission, was carried out between 21st October 1986 and 15th November 1986.

The Mission, upon collecting available data, ended with a protocol signed in the Ministry of Planning with the participation of all interested parties (Annex A).

1.2. MISSION FINDINGS AND CONCLUSIONS

The time available to the Mission and the area survayed were limited. Discussions were held with the Government institutions officers and some food industry factories were also visited (Annex G).
In making its conclusions, the Mission used available official data of Uganda Government and other institutions.
The long-term development plan for the country was (at the time of Mission stay in Uganda) in the draft preparation stage, therefore it could not be used.

The conclusions of the mission relating to further development of food industry and the construction of Food Processing centre in Uganda are:

- Climate and agropedological soil potentials enable diversification of planning production of food: the major products being: cash crops (coffee, tea), cereals (maize, millet, sorghum, rice and wheat to a smaller extent) tubers (cassava, sweet and Irish potatoe), oil crops (ground nuts, simsin, soya, cotton seed), vegetables (tomato, carrot, onion, egg plant, plantain, beans, peas, capsicum, okra), fruits (orange, mango, avocado, pineapple, passion fruit, pawpaw, jack fruit, melon banana), spices (ginger, chilles, turmeric) and herbs for pharmaceutical use.
- The existing production takes place mainly on small scale farms employing mechanization and other agroengineering means to a very small extent. Due to underdeveloped traffic routes and lack of food industry perishable foods are produced in quantities considerably lower than are the potentials.

- For the period 1971-1985, the production trend, in general, shows a decline in areas as well as yields for most the crops.

- Lack of on-farm storage facilities and inadequate storage at all levels of marketing chain aggreavate the food production economy.

- Cattle breeding has been considerably devasted lately by epizootic diseases and non-controlled slaughtering. Restoration of this sector of agriculture can not be expected within a short period of time.

- Natural fish abundancy presents one of the main sources of animal proteins in the nutrition of the population, but due to its perishability, it is of low commercial significance and thus restricted to the narrow zone around rivers and lakes.
  Implementation of the Government Program for Fishery Rehabilitation and construction of Fish Processing Factory are expected soon.

- Uganda once had developed industrial food processing sector.
  Mills, industrial bakeries, factories for biscuits and candies, factories for soyabased food for children, sugar plants, oil plants, diaries, meat product factories, alcohol distilleries and breweries were built.
  The position of food industry today is difficult and complex.
  The enclosed Annex B indicates to a clean production drop, unsufficient usage of capacities and to suspended operations in some factories.
  The reasons for such negative trends are: unsufficient production of local raw material (meat, milk, wheat); dependance of production on imported components (biscuits, beer) and packaging material, incomplete technology processes (sugar and oil refining) difficulties to procure spare parts from abroad, inadequate maintenance etc.

Rehabilitation programs for the existing industrial food processing plants and the programs for the construction of new food industries have not been established.

In the meantime, a fruit (pineapple) juice factory has been built and the start of its operation is expected in 1987.

- A critical limiting factor in the Uganda's food industry development is the fact that packaging material industry does not exist in Uganda. In addition to the difficulty to provide the hard currency for the procurement of packaging material, transportation costs of empty metal and glass containers from suppliers located at distance of several thousand kilometres increase enormously the price of the packaging material and make food processing uneconomical (e.g. 280 ml bottle is US $ 0.60 CIF Kampala).

- High school and university education in industrial food processing has not been introduced yet in Uganda. There is an initiative to open a Department for Food Technologies at the Faculty of Agriculture and Forestry (Makerere University).
  A number of university educated experts have completed their post-graduate studies in industrial food processing abroad.
  A neglectable number of these experts is employed by the existing industrial food production sector.

- Legislation governing the food quality for commercial consumption and inspection authorizations do not exist. Internal quality standards and adequate laboratory food analyses, except for some modest exceptions in the industrial facilities, do not exist either.

- Thanks to the natural conditions, Uganda has not suffered any serious problems with food provision for the population over the last 15 years,

although it has experienced deficit in some basic food items not produced in the country (salt).

Official data indicate to a discord in food production and the increase of population over the last 15 years (food growth rate was 1.1% while the population grew at a rate of 2.8%).
Although the present proportion between the urban and rural population is 10:90, major migrations of population to urban centres are expected.

Therefore, increase in native food production is not sufficient to meet demands in nutrition of population in the existing conditions. The way out of this situation would be in the restoration of the existing, and construction of new storage areas and facilities for industrial food processing and preservation.

- The prevailing item in the structure of overall Uganda exports is only one (coffee 93%). Diversification of exports is indispensable. A study, made for Uganda's Government by a consulting organization, provides development for 22 non-traditional export items.
In order to meet the foreign market requirements, it is necessary to process and adjust most export items from this list, for which reason, a construction and development of food industry within this program are essential.

- Food industry will play a significant role within the activities and efforts of the country to enable imports substitution and extend the exports range of products by increased food production, thus improving the overall economic position and development of the country.

Establishment and future development of the Food Processing Centre will gather experts capable of contributing to validation and directioning the future industrial food processing development programs.

Along the lines of the present material and human resources, the Centre is planned to be built in two stages. A distribution of contents among the first and the second stage of construction differ somewhat from that provided by the preliminary study.

The first stage of construction involves the microbiological laboratory (in addition to the chemical). Thus it would be possible to analyze food completely and evaluate the canning process in the Pilot Plant and to provide complete supervisory quality control service, both in industry and at food market.

On the other hand, the Pilot Plant project encompasses the simple processes of food dehydration, canning and concentration, the industrial application of which can be reasonably expected in foreseeable future (fruit juice concentration has been postponed for the second stage).

Research activities in some major food processing technologies, for instance fruit concentrates production or meat processing, have been left, based on the established state of affairs, for the next stage of extension Centre's activities, when it is expected that the necessary prerequisites will be created.

This means that on one hand, as in the case of meat, the raw material should exist in sufficient quantities as commodities on the market, and on the other hand, that rehabilitation and development of the necessary pertaining industry has taken place (production of packaging material, slaughterhouses, cold stores, transportation facilities, etc.).

Otherwise, the research activities would be performed for processes that do not have realistic prospects for application.

Accordingly. upon completion of the first stage of construction, the Centre will be ready to perform:

- microbiological, chemical and organoleptic examinations on raw materials and finished products,
- tests and adaptation of a large portion of canning, dehydration and concentration of technological processes on commodities of plant origin, and drying, smoking and canning preservation processes of fish (possibly meat).

Space has been left as a reserve for subsequent minor equipment additions not covered by the first stage of construction.

The period and the contents of the second stage of the Centre will depend on Uganda's long-term programs for food industry development and the possibilities to finance the additional construction of the Centre.

2. BACKGROUND

2.1. BASIC INFORMATION ON UGANDA

2.1.1. Country and People

Uganda is situated along the Equator in the East-Central part of the African Continent, stretching from the $10^{o}23'$ latitude south, to $4^{o}06'$ latitude north of Equator and between $29^{o}30'$ and 35^{o} longitude east of Greenwhich.

It's landlocked situation is a significant transport and time cost to Uganda's foreign trade. Total area of the country is 241,000 sq.km., of which 197,000 sq.km. is land surface and remaining 44,000 sq.km. is open water and permanent swamp. Of the total land surface, 164,000 sq.km. is arable land. Most of the arable land is fertile and suitable for the production of a wide variety of crops and livestock.

Uganda has a mild climate on the average, because of it's relatively high altitude of majority of low-land (ranging from 1,000 and 1,200 m above sea level), and large surface of waters.

Topographically, it ranges from low-laying extension of the Western Rift Valley to the snow-peaked Rwenzori (5,109 m) mountains in the West, and Mount Elgon in the East (4,322 m).

Many lakes and rivers, of which Lake Victoria and river Nile are the most significant ones, have wide economic and strategic value.

Rainfall is relatively stable, with two peaks, in April/May and September/October. It ranges from 700 to 1,500 mm a year and is generally adequate for rainfed agriculture, except in the extreme North-East, where it averages less than 700 mm per year.

According to the results of the 1980 Population Census, Uganda had a population of 12.6 million, and as per estimates of the World Bank (1986), the figure reached 14.3 million in 1984. As per projections of the Statistic Department, Ministry of Planning and Economic Development, that figure should have exceeded 15.0 million in 1986. The growth rate (1973-1983) was 2.8 per cent, thus remaining at the same level as 1969-1980 intercensal period.

There are cultural, socio-economic and environmental differences between the various districts of Uganda. Lately, the political situation has also added a new dimension to it.

Uganda's population is predominantly rural, with less than 10 per cent living in urban areas. The major urban centres are Kampala, Jinja, Masaka, Mbarara, Fort Portal, etc. The largely improved situation now prevailing in towns is expected to induce faster rural urban migration in Uganda.

2.1.2. Economy

- In terms of economic and social development, Uganda is categorised among the least developed countries. Sources of economic problems are numerous and varied. Droughts, constraints caused by political turmoils, commodity prices precipitously falling (specially those of cash crops) and thus disturbing foreign exchange receipts and causing difficulties in servicing debts, have helped tremendously towards economic hardship.
- Real GDP recorded a decline between 1978-1980 of 14.8 per cent, then it recovered by 17.0 per cent between 1980-1983.
  GDP again declined by 10.5 per cent in 1985 compared to 1984.

- Uganda's export continued to be dominated by agricultural products, such as coffee, cotton, tea and tobacco. The general situation in the country had the effect of narrowing exports so much, that at present the only export that can be talked off is coffee, being 94.0 per cent in average over last five years.
Although other export crops already show promising signs of recovery, the quantities are still not worth mentioning.
Composition of exports and imports is shown in the Tables 1 & 2, Annex B.

  There were very high increases in prices in Uganda between 1980-1986. As an illustration, an average consumer price index for the middle income group has moved in the following manner:

April	1981	100
end of	1981	151.6
	1982	200.3
	1983	248.3
	1984	335.0
	1985	799.8
I - VI	1986	1,561.8

  Source: Background to the Budget 1986-1987.

- The exchange rate, as an important policy instrument in the management of the economy, was employed from 1981.
Uganda's shilling was devalued sharply in the beginning (from 8 to 78 UShs per dollar) to reach UShs 94.14 per dollar by mid 1982.
In June 1982, a dual exchange rate system was established.
From May 1986, two exchange rates were introduced - the priority rate and the market rate, the former being for import of absolutely

necessary items for the rehabilitation efforts. The market rate was for the financing of all other goods and services, being set at 5,090 shillings, while the priority one remained at 1,400 shillings per dollar.

These exchange rates were introduced as an interim measure and already in August 1986, the rate was fixed at UShs 1,400 per dollar, abolishing dual rate, but introducing better control over foreign exchange spendings.

- Uganda's economy is predominantly agricultural. The agricultural sector dominates national output, exports, income generations and government revenue.

  It is estimated that 95 per cent of exports and nearly 60 per cent of GDP is accounted for by the agriculture. In addition, it provides employment for slightly over 90 per cent of the rural working population.

  The traditional cash crops are coffee, cotton, tea, tobacco and cocoa.

  Other crops grown include cereals, legume, oilseeds, tubers and plantains. Although grown still on a small scale, rice, wheat, fruit and vegetables are very popular, but production of these is not adequately developed.

  Like other sectors, the agriculture has suffered serious set-back in previous years, resulting in low yields, abandance of some crops, price increase of subsistence agricultural products, etc.

- Uganda offers excellent conditions for livestock production.

  The livestock subsector provides particulary promising prospects for increasing rural incomes and for generating foreign exchange.

Development of this subsector will also help improve nutrition of the people living in the poorer and drier regions.
In some parts of the country, Ugandans are traditionally engaged in cattle ranching, goat and sheep breeding, whilst by far, the least attractive so far is the pig and poultry production.
Most of the livestock are kept by small farmers. A trend of large-scale commercial production declined considerably along with the general decline of economic activities.
The effect of the war, insecurity, as well as drought and famine in many areas of Uganda resulted in depletion of livestock population.
The quality and health of livestock has been seriously imperiled by deterioration of animal disease control measures.

- Uganda's fishing industry is based on the exploitation of her numerous lakes, rivers and swamps. Fish, apart of being a source of high quality protein, also means a source of income to over 200,000 fishermen in the country. There has been a decline in the rate of growth of the fishing industry since 1975, caused by general lack of adequate supply of fishing inputs. Rehabilitation of fishing industry resulted in the increase in fish catch between 1982-1984.

- Another important industry, which has in the past contributed significantly to the economy, is tourism. The importance of tourism derives from the country's rich natural and cultural heritage. In addition, a large infrastructure of hotels, lodges, recreational and transport facilities had been developed, but immensly detoriated when the tourist industry came to a standstill mainly due to security situation.
But, as it is slowly consolidating it's position by concentrating most resources on conservation work, the rehabilitation of national parks, and on the renovation of lodges and hotel units.

- It can be easily concluded that there is almost a total absence of manufacturing industries. A major factor constraining industrial production has been the security of foreign exchange to purchase needed imports of raw material, auxiliary materials and spare parts. Available evidence on the performance of the manufacturing sector in 1985 indicates that output and capacity utilisation continued to be seriously affected by the prevailing security situation.
Structural deficiencies also persist in most industrial plants, arising from often uneconomically sized facilities and operated without adequate managerial or technological capabilities.
Despite the difficulties experineced in the past, the industrial sector has considerable potential for increased production.
The forecast is that capacity utilisation in 1986 is expected to have had an increase of 11.1 per cent over the level of utilisation in 1985.
This progress is expected in the production of beer, textile, leather, corrugated cardboard, motor vehicle batteries, steel beds and steel doors and windows.
The reasons for the improved outlook are the improvement in the security situation, better management of foreign exchange, as well as the overall policy to return to their owners some of the properties once expropriated and hence mismanaged.
Future development of the industrial sector will be based on the general government goal of building an independent, integrated and selfsustained national economy. This entails development of forward and backward linkages between the sectors of economy, broadening the industrial base, selfsufficiency in basic consumer and producer goods, laying the foundation for the development of heavy industries, chemical and machine tool industries.

Particular attention shall be paid to the development of an indigenous scientific capability intended to adapt or develop appropriate technology for the development of the industry and other sectors.

- Uganda is not particulary well endowed with vaulable minerals.
  The major minerals of economic importance are copper, sulphur, limestone, salt, sand, iron-ore and phosphates. There are also limited quantities of tin, beryl, bismuth, columbite/ tantalite, gold and wolfram.
  Mineral production in general has been very low, some, like copper mining for example, coming to a halt at one moment, and some having sharp fluctuation in output over the last 10 years.
  In order to restore the vital contribution of the mining sector to the country`s economic development, a number of activities need to be carried out in further mineral exploitation, increasing the production and the marketing of minerals, etc.

- About 96 per cent of Uganda`s current energy consumption is provided by wood fuels. Commercial wood fuels are used primarily by the urban sector and by a number of agro-industries.
  Charcoal is the most widely marketed commercial wood fuel.
  Import of petroleum products is slightly increasing and in 1985 it amounted to 183,900 tons. Transport sector consumes most of oil imported.
  Uganda` s total electric generation is 626.5 million kWl (1985), but total domestic consumption is only 215.8 million kWh.
  Total installed capacities are 155.5 MW. Availability and consumption of other sources of energy are negligable.

- The transport and communications sector is one of a key sectors in the growth and development of Uganda`s economy.

More or less all subsectors, roads, railways, water and air transport harbours and shipping, posts and telecommunications including broadcasting facilities, experienced a gradual decline in the past years. Rehabilitation of this sector has high priority and further developments are under way.

- Human resources constitute an ultimate basis of the wealth of a nation. The previous censuses and manpower surveys, some less, the other more comprehensive, have proved among other things, that close to 50% of the total population is under age of 15 years, that migration of male population is high, all this having quite serious socio-economic implications in terms of educational and employment requirements.
  As for skills, there is a critical shortage of some essential skill, distribution of highly qualified manpower being uneven, aglomerating around larger centres. Problem for itself is under-qualification, i.e. peopie holding posts for which a higher qualification is required.
  Present Government is making efforts in the way of assesing deficiencies/surplus in skills, training needs, advocating a change in the education system to serve purposes and needs of the country.

- Facilities in the social service sector, such as health institutions, educational establishments, water supply units and housing, have deteriorated during past years, as well as delivery of all these services to people.
  The Government gives now priority attention to the rehabilitation of this sector as a fundamental prerequisite for the improvement of health, living conditions and provision of services to the people.

2.2. PRODUCTION AND PROCESSING

Uganda can produce and generally produces enough food for itself, although localised scarcities are sometimes experienced, often due to the lack of transport and storage facilities and marketing organisation. In spite of recent food shortages in Africa, caused mainly by disastreous droughts, Uganda did not experience serious problems, for her natural resources allow diversity of agricultural production.
However, although people are not hungry, they are often malnutritioned, specially children, consuming improperly balanced food.

2.2.1. Food Crops

The main food crop in Uganda is matooki, being the staple food for much of the country's Southern part. There are considerable surpluses, but due to their bulk and perishability, lot of them are wasted.
Other important food crops are cassava, maize, millet, sorghum, sweet potatoes and Irish potato.
General statistics on area planted and production of selected food crops are given in the Table 3.,Annex B.
Maize is gradually replacing millet and sorghum as the food crop. Yields are still low, but neverthless, provided the production is improved, the country can be selfsufficient and even produce exportable surplus.
As for wheat, in a long run, the country will not produce enough wheat to cover it's own needs. The area for this production will have to be considerably expanded and yields increased before the country becomes selfsufficient in wheat.
There are potentials for producing enough rice to cover Uganda's needs

and to export it, but present production is far from meeting even the country`s demand.

Oil seeds, such as groundnuts, simsim, soya and sunflower are produced as cash crops also, but due to the declining role of cotton, they are more likely to be important as import substitution crops in meeting domestic vegetable oil demand.

Similar situation is with sugar-cane production. Although consumption of sugar has dropped significantly due to precipitous decline in production, large quantities of sugar are still imported.

Production of tree crops, i.e. cocoa and cashew nuts is encouraged, since considerable exports could be achieved.

A variety of vegetable is produced all over the country. Cabbage, carrot, tomato, onion, beans, peas, aubergines, capsicum, okra, etc. are generally still of low quality to think of export, although there is, in some cases, a surplus in production, hence requirement for processing if wastage is to be avoided.

It is still not possible to estimate existing production of fruit, but specific microclimatic conditions allow vast range of production and, in some cases, very high yields. An unfortunate fact is that much of the highly perishable crop is wasted, again due to lack of transport and storage facilities, distribution cannels and cold chain facilities. Improving inputs into this production, thus increasing quality and processing the surplus quantities, would make this important sub-sector of agriculture much more competitive.

Pineapple is by far the most common fruit, followed by passion fruit, papaya, mango, avocado, jackfruit and citrus.
Melon is not common fruit in Uganda, although some exportable quantities could be produced, to be offered to European market in the off-season for the main suppliers.

Ginger, chillies and turmeric are the main spices produced in Uganda. If attention is focused to processing techniques, significant quantities could be cultivated as cash crops.

2.2.2. Animal and Animal Related Products

In spite of livestock production being severely deteriorated, there is still surplus of meat over that intended for household consumption. All meat is sold in the fresh form, since there is virtually no meat processing done in spite of the existance of meat processing factory which has been out of operation for some time. There are few slaughtering plants, but most of livestock is slaughtered by the stock breeders or butchers.

Endowed with excellent grazing facilities and with ranching tradition, Uganda can produce all her needs for beef and provide significant quantities for processing and export. Consequently, the Government is undertaking urgent steps towards rehabilitating this sub-sector and thus increasing meat consumption in general.

Sheep and goat, as well as pig meat production mainly rely on individual stock breeding and is of a limited quantity.
Few heads of animals are kept by farmers as a by-activity along the main one. A slight increase in a number of animals is being noticed lately, as it is shown in the Table 4., Annex B.

Similar situation implies for poultry meat and eggs production, although the demand, both in urban and rural areas, is large. Various diseases represent a serious problem and once removed and poultry production rehabilitated, it will offer significant quantities and high quality of meat.

It is estimated that Uganda`s lakes and rivers hold large quantity of fish, the main species being Nile Perch and Talapya. Table 5. in Annex B. gives data on fish production in Uganda from 1978-1985.
Fish census is under way and objectives of the country are to promote fisheries and improve fish processing. Fish is now processed only in a traditional way - smoking and sun-drying, more for the reasons to preserve it and bring it to the markets than for preferentials in consumption, since it is done in a very simple manner and the fish is of low quality.

Once very attractive, milk production came almost to a halt, farmer abandoning dairy cows production, since they lacked in many inputs vital for this production. Most dairy plants are out of work and the large plant in Kampala is producing only reconstituted milk.

Efforts are made to improve the situation and eliminate the constraints in this field. On top of rehabilitation of stock itself, a lot has to be done in organising milk collection, setting a number of collecting stations with refrigerating facilities, better transport and providing good feed, as well as other farm inputs.

Other dairy products, such as butter and cheese, consequent to the situation in dairy farming, to a full extent are imported products.

Honey production deserves mentioning, as honey is a very important product of high nutritive quality.

If bee diseases are controlled, Uganda has the potentials to produce honey in quantities not only to cover local demand, but for exports as well.

2.2.3. Food Processing

Inclusive of the little food processing mentioned in the preceding paragraphs, general situation of food processing looks at the present rather poor.

There are numerous plants all over the country, but all seems to be affected by one or the other difficulty prevailing in the country in these hard times.

Some well managed and maintained plants lay almost idle due to lack of raw materials, others are at the standstill because of missing spares or packaging materials, third at a halt due to a mismanagement and neglected machinery.

Those that operate, do it with appealing rate of capacity utilization.

To save what there is to be saved, the Government is making enormous efforts in the way of restoring key processing establishments.

Beside the meat processing, dairy plant, sugar production and other plants aforementioned, there are numerous mills, some of small, and few of large capacity installed, many local bakeries, edible oil production plants, baby food production, biscuits and sweets plant, beer, spirit and soft drinks production.

Pineapple processing plant is due to be opened, but there is no record of any other fruit or vegetable processing plant.

Industrial production statistics 1982-1985 of selected commodities and establishments is given in the Table 6., Annex B.

2.2.4. Existing Constraints

Political turmoils, hence insecurity, are the major constraints from which more or less all other aforementioned constraints result in economic stagnation in full sense of the term.

Technical constraints to agricultural development include the paucity of suitable farm input and implements, lack of appropriate seed and occurance of crop and animal diseases, resulting often in poor qualities and low yields of crops, in deterioration of a number of stock, in low meat, milk and eggs production.

Constraints in the field of lack of various facilities - storage, transport vehicles and marketing channels, result accordingly in scarcity of various products in some parts of the country and great wastage of crops and products, low farmgate prices and inadequate, high market prices.

Lack of raw material and other material inputs, scientific education, technological knowledge and availbale know-how, manpower and often mismanagement, result in poor outputs of the food processing industries and in under-utilization of capacities.

Almost an absolute absence of sound scheme for research work, both on the side of primary production, as well as in food processing, and non-existance of linkage between producers of raw materials and food industry, impede the situation seriously.

2.2.5. Development Strategy

Given political stability and security, the Ugandans have great potential to stabilize their economy. Along with ensuring piece and maintaining independence, the Ugandans are making deliberate efforts in paving the way to build an independent, integrated and selfsustained national economy.

The economy is being re-oriented in such a way that food production, while not abandoning the production of cash crops needed for foreign exchange earnings, is given due emphasis.

Provision of linkage between the raw material producing sectors and the food processing sector will provide many locally procured inputs badly needed in all sectors of food supply and often imported.

Permanent industrialisation along the entire spectrum of agricultural products will first of all ensure selfsufficiency in basic consumer and producer goods, thus declining import, secondly, it will enable increase of non-traditional export and last, but not the least important, it will eliminate the wastage of food.

All this cannot take place without the research in general, aimed to identify the techniques necessary for processing, preserving and packing the various foods.

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3. PROJECT OBJECTIVES

3.1. GENERAL

Further development of the agricultural prc uction, the leading branch of Uganda's economy is tightly linked with the development of food processing and storage capacities. A professional institute, providing professional assistance to the policy makers, planners and food industry in the elaboration and execution of the rehabilitation program and further development of food industry is missing in Uganda.

Construction of one strong food processing development centre will mobilize and pool the funds and staff to integrate activities involving food processing technology in the country.

Concentration of development activities through one single Centre is justified by the present economic conditions in the country and the lack of staff experienced in transfer and development of food technologies.

In the first stage, the Food Processing Centre will start with a limited number of permanent personnel. Compensation of this deficiency may be achieved by the creation of collaborative program with foreign institutions, including international development centres and organizations, and by periodical and permanent inclusions of local specialists (employed in food industry and elsewhere) in the activities of the Centre.

The Centre, conceived in this way, will be in a position to solve most of the development problems in the food processing field in the country. The material basis planned for the first stage of the Centre implementation enables the operation of a higher number of specialists than provided by this Project.

The development of the Centre activities in the future will primarily depend on the possibility to man the Centre with good specialists motivated and qualified for development activities in food industry.

The Centre will act as non-commercial budget institution, within the competent ministry to be assigned by the Government of Uganda.
The ministry assigned to establish the budget and monitor the operation of the Centre will establish the statutory function and the obligations.
The proposal of the targets and functions of the Centre are specified hereinafter.

3.2. FUNCTIONS OF THE CENTRE

Basically, the Centre should become an institution, the purpose of which is to identify the problems and the development tasks in food industry to collect knowledge, to confirm the adequacy of the technological processes for local conditions and to develop technology processes.
Testing of materials and products and performance of a part of methods for food preservation and processing is made possible by its own laboratory, pilot plant and multidsciplinary team of specialists.

The Centre deals with:

- Improvement of the existing technological processes and products,
- Selection, adaptation and development of new processes and products,
- Exploration of the possibility to substitute the imported raw and other materials with the indigenous,

- Professional assistance to legislation in the formulation of norms and standards referring to food products and their quality,
- Tests of raw materials and finished products quality,
- Transfer of knowledge and training the personnel in food industry,
- Economical and technological analysis of development projects.

The numerous and diverse problems encompassed by Uganda's food industry development call for the Centre involvement in all the above listed activities.

Considering the gradual development, the Centre will be proposing short-term programs for its activities, depending on the available materials and specialists. In spite of these limitations, after the first stage of construction (as per this program) the Centre shall be capable to perform:

- Laboratory (chemical and microbiological) tests on materials and products,
- Preservation tests by dehydration, canning, concentration, salting, natural drying and smoking processes,
- Participation in the elaboration and professional evaluation of development programs,
- Consulting services rendered to industry and Government institutions,
- Training of personnel, and
- Transfer of know-how

It is of utmost importance that the Centre should establish successful cooperation with industry and the appropriate Government development institutions involved in food production. It is necessary to have two-way communications, exchange of opinions and evaluation of results. In this way, the Centre will acquire the necessary feed-back and will achieve confidence of the clients.

The annual program of the Centre's work will be coordinated in accordance with priority development requirements of the industry and Government institutions. The Centre will focus its efforts to the selection and preparation of tests and studies for development activities which can be practically applied in the production and which can yield effects in practice.

Evaluation of the centre activities' results will be performed by the competent Ministry to which the Centre will report.

4. PROJECT DESCRIPTION

4.1. UNITS OF THE CENTRE

Upon completion of the first stage of construction the Centre will dispose with the following:

- pilot plant with the equipment for technological procedures: canning, dehydration, smoking, baking and concentration, including also the necessary storage area, boiler house and workshop,
- physical-chemical and microbiological laboratory with the equipment needed to test the properties of raw materials and food products
- library
- administration and other common facilities

The stated units provide for the targets and functions of the Centre planned for the first stage and present an unique entity in terms of programme.

4.2. THE PILOT PLANT

The plant is designed and equipped for test-food processing simplified procedures in hot air dehydration, smoking, canning, production of fruit preserves and nectares, baking of breads, biscuits and similar products.

However, other simple methods could be done on the same equipment, e.g. pickling, natural drying, comminuting of the dehidrated products, etc.

Although, the pilot plant is suited for multi-product processing and supplied by various techniques it is predetermined for one product test-production at a time.

Therefore, the working space, energy, manpower and utilities are programmed according to this assumption.
In order to avoid high initial investment costs, mechanical equipment is avoided, wherever operations can be performed manually.
The equipment chosen in the project is of a minimum capacity and usually introduced in food pilot process, enabling minimal consumption of materials for a test-batch. The equipment, by its simplicity and capacity, is very close to the smallscale factory equipment.

The plant is equipped by cold-store space in a case where further processing requires cooling of materials or test-production is not ready to transform raw materials immediately. In the plant, a 25 sq.m. dry store is planned for storage of dry components` packaging materials and readymade products.

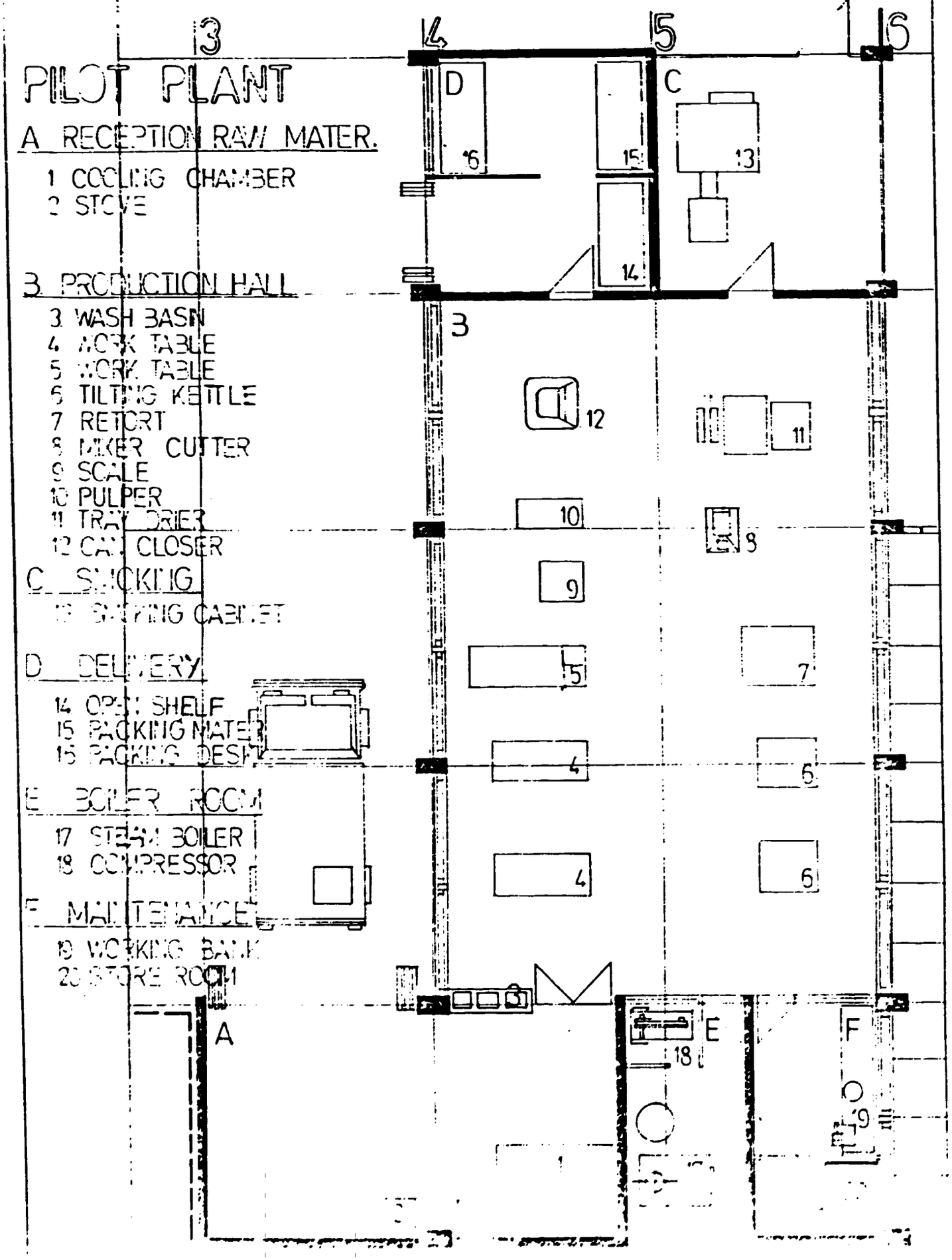
A small workshop, with tools and spare parts, and boiler room are attached close to the production hall.
Fig. 1., on the following page gives a lay-out and equipment of the Pilot Plant.

4.2.1. Equipment

A detailed specification of the equipment is described in the Annex C.
The main equipment includes:

Vacuum Can Closing Machine - able to close cans in a range of 38 to 157 mm diamater and 178 mm height, depending on the chosen procedures, products and possibilities of purchasing cans for the beginning, the machine will be provided with two sets of seaming rolls and corresponding chucks and base plates, enabling closing operation for two most frequent can sizes.

FIGURE 1.


PILOT PLANT
A RECEPTION RAW MATER.
1 COOLING CHAMBER
2 STOVE
B PRODUCTION HALL
3 WASH BASIN
4 WORK TABLE
5 WORK TABLE
6 TILTING KETTLE
7 RETORT
8 MIXER CUTTER
9 SCALE
10 PULPER
11 TRAY DRIER
12 CAN CLOSER
C SHOCKING
13 SHOCKING CABINET
D DELIVERY
14 OPEN SHELF
15 PACKING MATER.
16 PACKING DESK
E BOILER ROOM
17 STEAM BOILER
18 COMPRESSOR
F MAINTENANCE
19 WORKING BANK
20 STORE ROOM
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Seaming operation is completely automatic and the machine can be used for both, vacuum and atmospheric closing.

Vertical Retort and Instrument System - for test sterilization and pasteurization processes, with a retort crate of 58 cm dia x 66 cm deep, (holds 222 cans size 81 x 111 mm or 30 cans size 157x177 mm). The retort enables either steam-cooking or water-cooking and pressure-cooling. The instrument system provides a chart recording the temperature, time and pressure, and visual observations of in-can temperature by means of termocouple.
A special air and water cooling assembly enables safe cooking and cooling procedure in glass containers.

Tray Dryer Cabinet - enables semicontinous dehydration of different plant materials in a hot-air stream.
Air is heated by main bank of heaters in the heating shaft and intermediate bank of heaters incorporated in the drying shaft.
Heating is obtained by pressure steam of 6 atmospheres at the point of utilization. Drying temperatures and speed of trays through the drying shaft can be adjusted according to the kind, size and desirable moisture content of final product. This type of dehydrators is used and approved in many small and large scale factories in production of different kind of dried products, including tropical and subtropical fruits.

Smoking Cabinet and attached Smoke Generator - provide variety of smoking , cooking and drying combination of fish and meat . Both, the cabinet and the smoke generator are operated by electric power.
Smoke is generated by sawdust burning, and its density can be regulated. Hot or cold air mixture with smoke can be adjusted to the desired level and uniform circulation is obtained by a fan.

Two Tilting Kettles, 150 l each - made of stainless steel, operated by regulated steam (2-5 atm), enable atmospheric cooking operations, i.e. evaporation, blanching, heating etc. Bottom is spheric, and jacketing is carefully designed to prevent partial burning of materials.

Pulper and Finisher Machine - mounted on a frame, with variable motor speed, and different screens for pulping and straining can be applied in production of seed-free juices, purees and pastes for further processing.

Universal Mixer and Cutter - consists of 2-speed driving unit and changeable attachments for slicing, dicing, mixing, kneading and milling. A wide variety knives, cylinders and mixing arms could be used according to the desired size of slices or cubes, and firmness of materials. Milling of dry materials (under 15% of moisture) can be adjusted to various degrees of fineness. Mixing and kneading is done in a bowl attachment with a corresponding mixing arm.

A common Kitchen Stove - with time and temperature oven regulators, is placed in the laboratory, and can be used for baking procedures as well.

Under shade, attached to the production hall, a simple cage made of fine mesh is provided (dimensions 150x150x200 cm). It is used for natural or combined (with smoking) methods of fish drying.
The other plants could be naturally dried also, for comparisson tests with dehydration done by hot air.

4.2.2. Processes

Thorough procedures, material calculations and organization of test production should be elaborated for each particular product separatelly. Necessary operations in the planned processes, adopted for the installed equipment, are illustrated in general on the flow sheets.
However, some products might require rearrangement of operation sequence, additional operations or combined operations.

4.2.2.1. Operations Prior to Final Processing

Raw materials, in the first stage, are prepared manually. The comminuting, straining, slicing, dicing and milling procedures are performed on the adequate machines provided by various attachments.
Blanching and cooking are done in steam jacketed temperature controlled tilting kettles.
Product filling and added liquid filling (brine, syrup, sauce etc.) are done manually.
Preparation of all additives and liquids should be done in the laboratory, by careful measurement for each test formula.

Filling of cans and glass containers is done manually, check-weighed by the table scale. To provide partial vacuum in jars and bottles, certain products should be filled hot (an empty glass should be warmed in an oven). Capping and closing the glass containers is performed by manuall devices.
For sealing the cans, both, vacuum and atmospheric Universal Vacuum Can Closing Machine with regulated desired vacuum is used.
Quality of the seaming should be evaluated by sample measurement, using Can Seam Micrometer.
For prolonged brining of fish in vats, refrigerators are used.

4.2.2.2. Canning

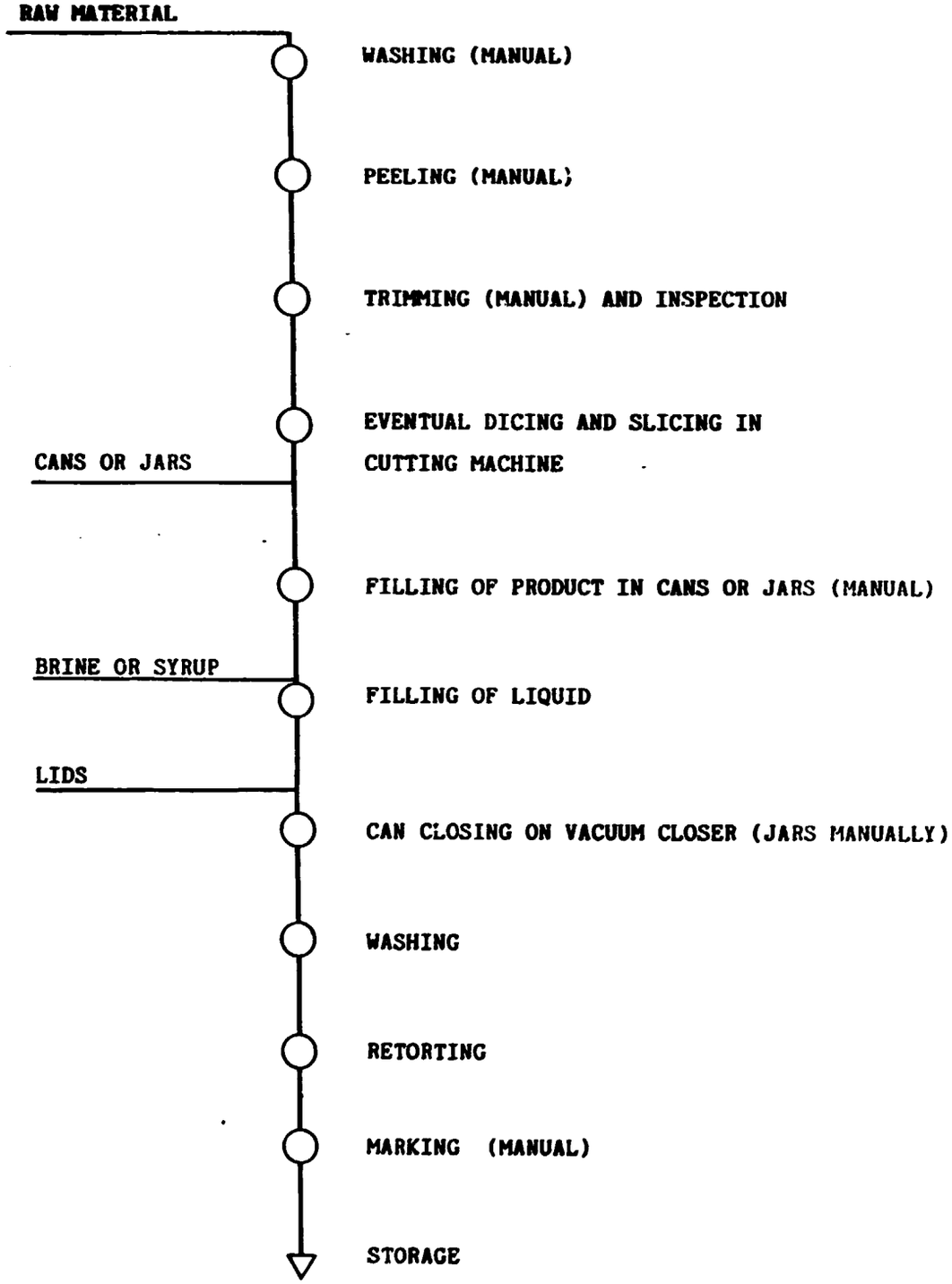
Heat processing and cooling is done in the vertical still retort, supplied with a cooling water assembly, pressure air assembly, regulating valves and recording controller system. A bimetallic termocouple could be used for visual recording of temperature changes inside the container during retorting process.

Visually checked and washed, glass and tin containers are placed in the retort and further steps of heat treatment are forwarded according to the predetermined regime. At the end, cooling containers are lifted from the retort, left to be dried in ambient air, marked by ink or marking pencil, sampled for quality control and stored.

UPI-INVEST

TECHNOLOGICAL PROCESS FOR

CANNED FRUIT AND VEGETABLES

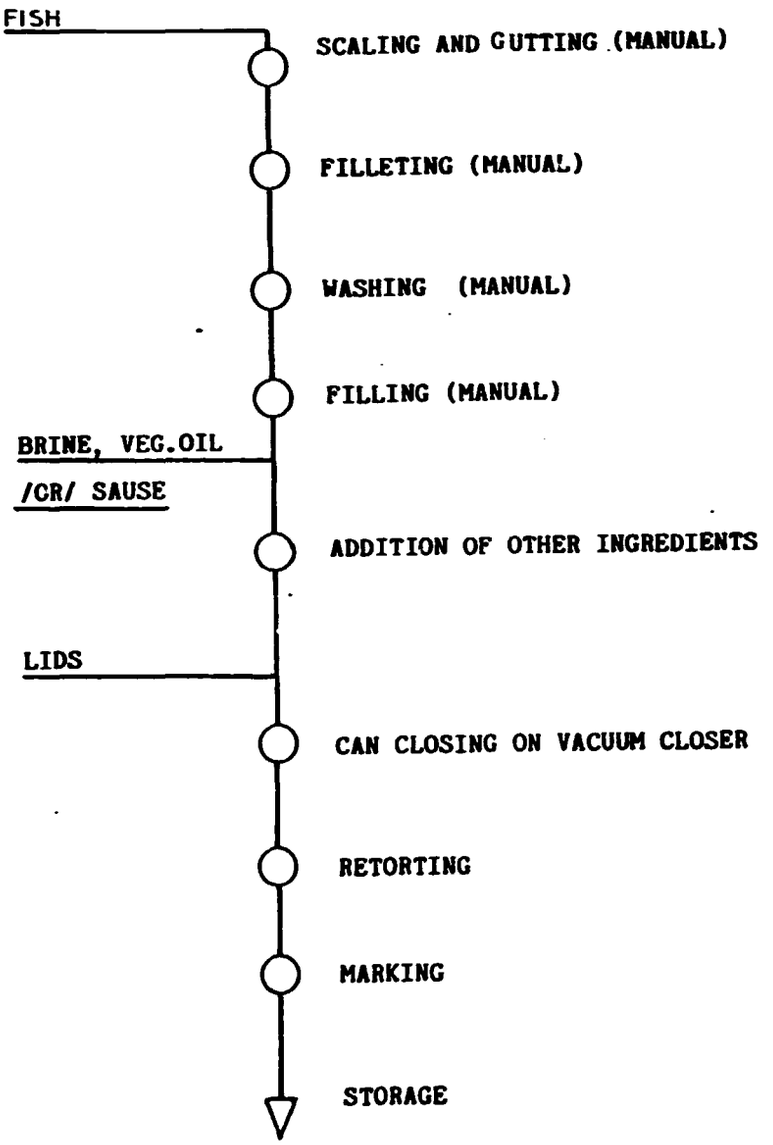


YUGOSLAVIA SARAJEVO PSA 70

UPI-INVEST

TECHNOLOGICAL PROCESS FOR

CANNED FISH



4.2.2.3. Dehydration

Drained, properly sized, and, if necessary, chemically treated materials are dried in the Cabinet Dryer. Wet materials are spread on slotted trays positioned on the lifting frame which moves trays intermittently into the drying cabinet. In the cabinet, the trays are travelling from the top of cabinet to the bottom, towards the hot air stream, according to a particular operating rhythm, passing ten different climatic zones.
After half-way travelling (to the intermediate heater), tray is drown out, its product layer turned to improve drying effect, and slid in again below the intermediate heaters.
Product dehydrated to the required moisture content, is discharged from the cabinet in intervals of 8–15 minutes.
Dehydrated product could be comminuted or milled on the mixing-cutting machine, and must be packed in suitable package, to avoid moisture condensation.
Detailed procedure should be elaborated in close cooperation with the supplier of the dehydrator.

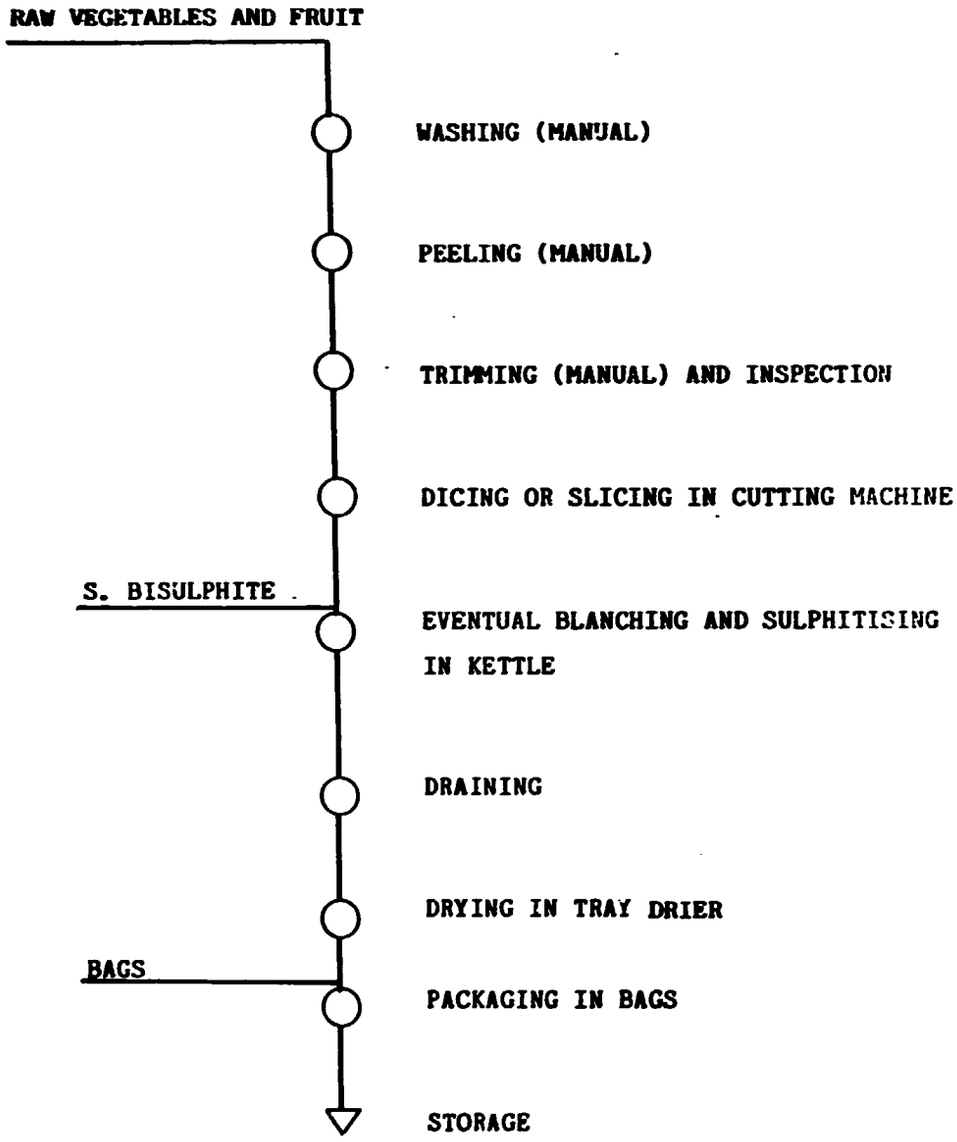
4.2.2.4. Smoking

The Cabinet Smoker with Electric Smoke generator is intended for fish smoking tests, but can be used for meats also. The Cabinet is provided with time and temperature controllers, so that both methods, cold and hot smoking, can be applied. The Generator can be adjusted for various densities of smoke from different kinds of sawdust.
The process starts with manual preparation of fish. Usually a salting method is incorporated before smoking (dry, brine, pickle, bench salting). Prepared fish is hung or racked on a trolley, smoked, cooled in ambient-air and wrapped. Also, smoked fish is dried and cooked to a certain degree, various combined methods of natural drying, salting and smoking could be applied, in order to get favourable flavor of product. (e.g. Watanbe' method used in Zambia).

UPI-INVEST

TECHNOLOGICAL PROCESS FOR

DEHYDRATED VEGETABLES AND FRUIT



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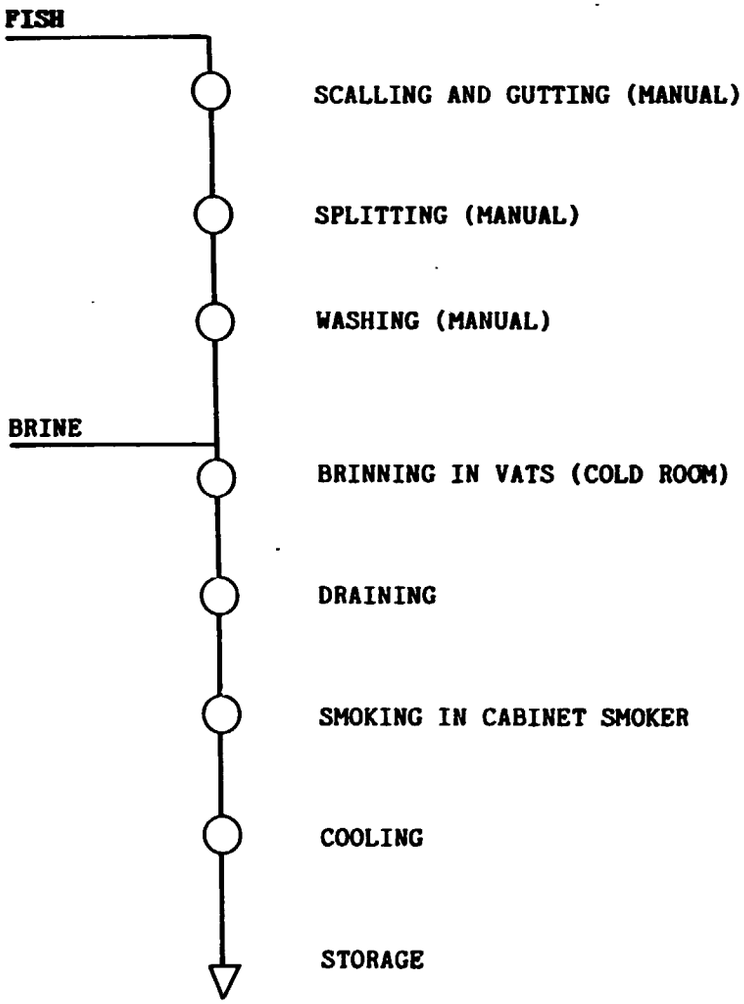
TECHNOLOGICAL PROCESS FOR

SMOKED FISH



A wire-mesh cage is erected outside the production hall, and can be used for natural draying or combined drying smoking procedures.
Besides, lightly smoked fish can be canned in vegetable oil or sauces.

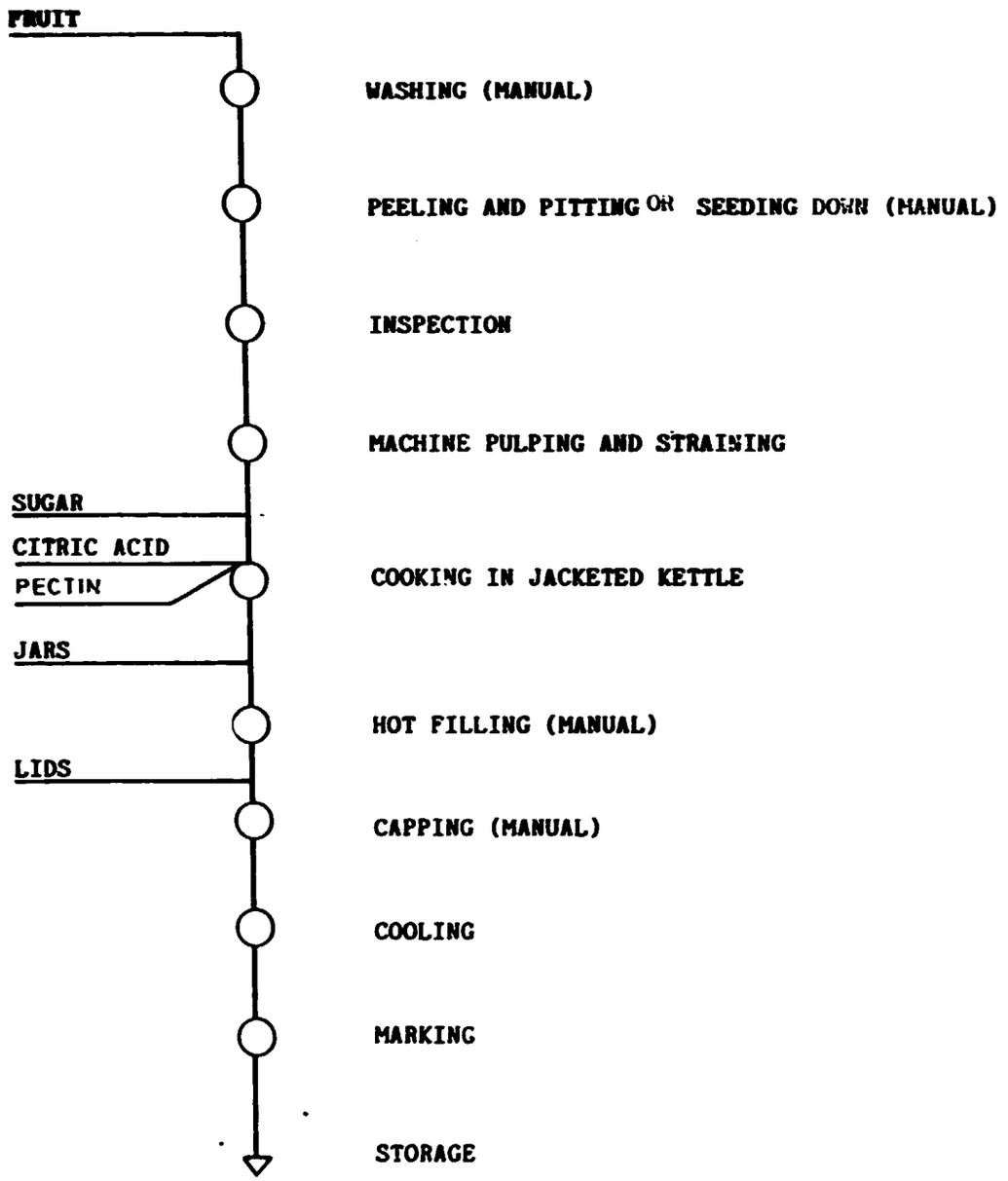
4.2.2.5. Fruit Preserving

Fresh fruit intended for jams and marmelade product are crushed on the cutting machine, hot bathed in a kettle, pulped and finished (not for jams) on the corresponding machines.
Cooking is done in steam-jacketted kettles, where pulps and pastes obtained are mixed with sugar, acids, pectin and other additives, according to procedures adopted for each product. The mass cooked to a pre-set degree of moisture is tilted from kettles in pans, hot filled in previously warmed jars and capped by manual closer. Full jars, after marking, should be immediately cooled.
On the same principles, tomato paste and catsup production could be made using other type of ingredients.
Prior to pulping and finishing (0,6 - 0,8 mm screen), raw material prepared for nectars requires blanching (pot in blanching basket partially immersed in jacketed kettle).
The fruit puree with approximately equal quantity of 15° Brix sugar solution, eventually corrected by lemon juice or citric acid, is mixed in a jacketed kettle.
The nectar obtained should be hot filled (80-90°C) in cans or bottles, and pasteurised in the retort or jacketed kettle, respectively. After processing, containers should be water-cooled immediately.

UPI-INVEST

TECHNOLOGICAL PROCESS FOR

MARMELADE, JAM AND RELATED PRODUCTS



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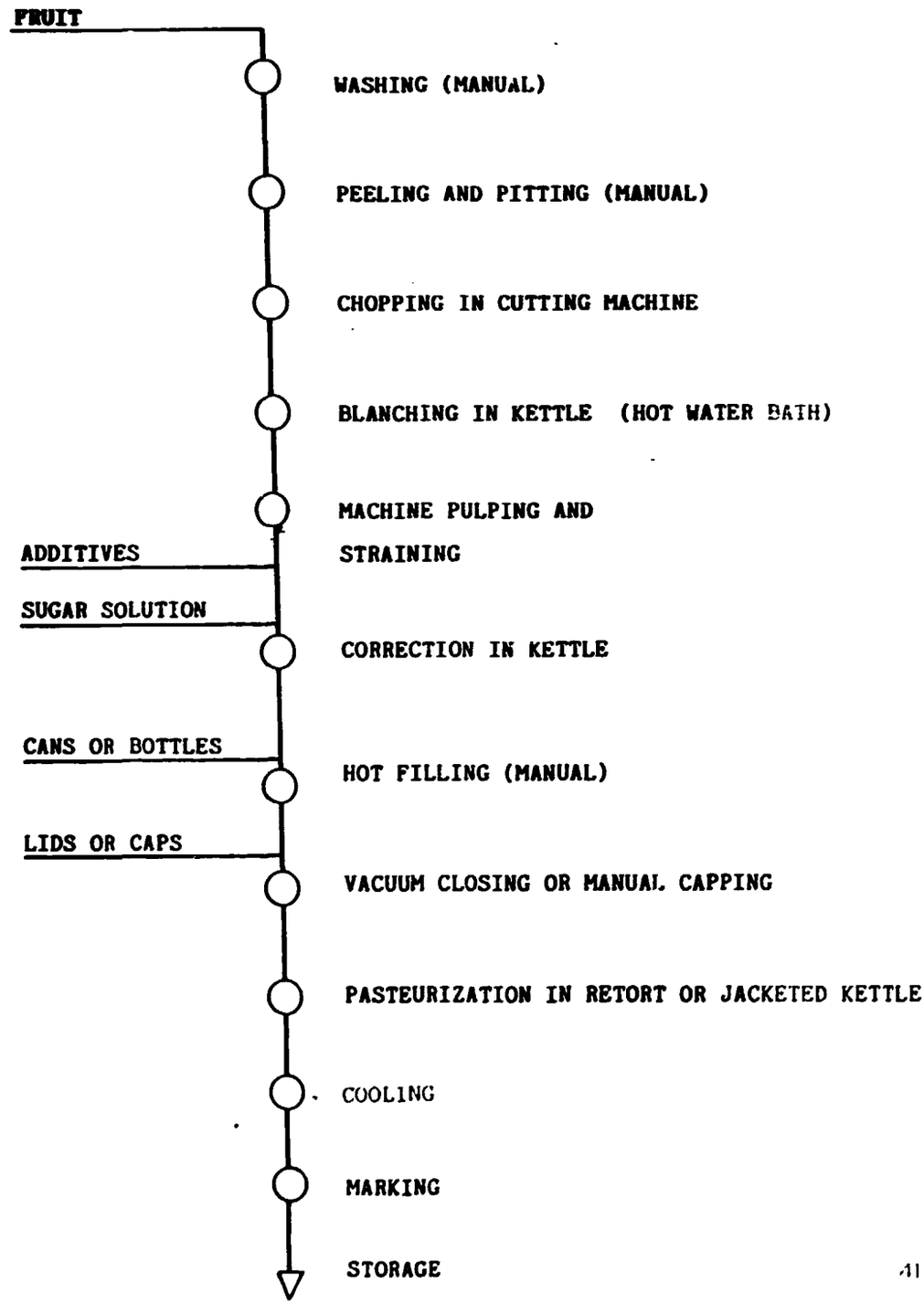
TEHNOLOGICAL PROCESS FOR

HECTARS



4.2.2.6. Bread and Related Products

Keeping in mind the limited equipment installed in the first stage of the operation, cereal components should enter the plant already milled. Basic tests are directed to substitution of wheat flour (predominately imported) by flours made of autochthonic cereals.
From flours and other additives, tested in the own laboratory for physical and chemical properties, different kinds of breads, rolls, pastries, biscuits and cookies could be made. Mixing and dough kneading is done in corresponding attachments of the universal mixer-cutter machine.
Yeast-type doughs should be fermented at ambient temperatures.
Shaping is done manually or by machine. Baking process is performed in an oven with temperature and time controllers, placed in the laboratory, where quality properties of the final product should be checked.

4.2.3. Input Materials

4.2.3.1. Raw Materials

Needless to say that all raw materials intended for test processing must be of a fresh and sound quality, corresponding to the specification elaborated by the Centre. Delivery sources should be found in the nearest vicinity and the material processed the same day when cought or harvested (picked).
To record the initial quality, samples of material should be taken for immediate laboratory check.
Overnight cold storage can be used exceptionally.

4.2.3.2. Additives

Different preservatives, stabilizers, spices, salt, sugar etc. are included here. Due to the fact that they are expensive imported items, they must be carefully stored and controlled against alterations.
Their use should be properly balanced and they should be prepared in the laboratory, for each batch of test production procedure.
The fact that procedures could last long time, needs for additives should be planned on time according to the annual investigation programme.

4.2.3.3. Packaging Materials

Cans, jars, bottles and covers are imported goods and should be purchased according to the specification elaborated by the Centre.
They must be brought into accordance with the installed equipment and planned procedures.
They are very expensive and their purchase depends on import capacities, therefore they should be planned in the annual budget and the foreign currency should be provided on time.
Therefore, the tests should be performed by minimum use of packaging material, and a particular care should be taken against losses, wrackage and rusting.

4.2.4. Products

Samples of finished products should be taken for immediate laboratory tests and evaluation of production procedure.
Certain samples should be left in the laboratory for additional testing of the product alterations, in order to determine the shelf life of the product.

The Pilot Plant can make occassional batches of a certain product and put them on the market in a small scale in order to investigate how the products are accepted by the consumers.

4.2.5. Costs

In addition to the equipment costs, the costs of imported packaging materials and additives necessary for the testing of machines and start-up operations are also provided.

The F.O.B. prices of equipment and material valid in December 1986 are:

Equipment (Annex C)	US $	121,850
Spare parts 10%	US $	12,185
Imported Packaging Materials (cans, jars, lids)	US $	2,500
Additives	US $	1,200
Total US $		137,735

4.3. LABORATORY

The design of the Centre includes a laboratory. Unbiased measurements to be performed in it are aimed to enable the performance and evaluation of technology processes in the Pilot Plant. Due to the fact that there is no institute in the whole country dealing with chemical and microbiological food control and analysis and that there are no adequate laboratories in food producing factories, this laboratory can offer its services to other institutions and food producers.

The Centre laboratory is designed as an unique entity, and, respecting the nature of work to be performed in it, is divided into:

- the microbiological part,
- the physical and chemical part, and
- the organoleptic part

The criterion for the selection of the planned laboratory equipment was as simple handling and maintenance as possible. Such equipment enables the minimum of analysis compulsory in the countries having regulated legislation for quality control.

The task of the laboratory together with the Pilot Plant is to:

- participate in the elaboration of technological procedures,
- define quality specifications for all input materials, intermediate and finished products,
- establish sampling procedures,
- establish procedures for laboratory tests on the available equipment
- define the reporting procedure

Laboratory functions may include also external services by:

- offering training to experts employed in food industry quality control,
- consultancy activities in factories,
- food control and analysis for other clients,

Thorough laboratory control and analyses of the available agriculture raw materials will establish their aptness for the various food processing technologies (tests in Pilot Plant and commercial production).

The laboratory, with the equipment designed for it, can offer services to Government and exporting organizations aiming to establish and improve the quality of exported commodities.

The laboratory consists of the following units:

- for physical and chemical analyses with an area for the preparation of samples
- for microbiological analyses with an area for preparation of samples
- for sensory evaluation
- storage of chemicals, culture media and other materials
- for washing laboratory dishes and material sterilization
- other auxiliary rooms

4.3.1. Physical and Chemical Laboratory

4.3.1.1. Methods

The areas of the laboratory, divided as per specific requirements of equipment and the instruments, will be used for the performance of the following test methods:

- preparation of samples, involving weighing and all the gravimetry procedures
- comminution and homogenization, granulometric procedures, drying, incineration and annealing
- quick determination of moisture
- quick determination of concentration of hydrogen and hydroxyl ions
- quick determination of chemical properties of all waters involved in the process and control
- overall digestions for nitrogen analyses in all forms
- all kinds of extractions (fats, oils, etherous oils, vitamines, alkaloides, colours, etc.)
- all electroactive media (gass, metals, sugars, vitamines and other inorganic and organic matter which can be included in the electroactive media)

- calorimetric, transparency and absorption direct and apparent methods
- conventional chemical methods.

The combination of the adopted methods and the proposed equipment enable a wide range of analyses in the control (see Table on the next page).

4.3.1.2. Equipment and Other Materials

The major equipment for the performance of the above stated methods, consists of the following units, sets, instruments and systems:

- precise analytical balance
- laboratory type balance
- set of granulation sieves
- mill
- mixer
- drier
- annealing furnace
- single electric plate
- system of quick definition of moisture
- pH-meter
- conductometer
- Kjeldahl system - I
- Soxhlet system - II
- polarograph with a system of electrodes
- spectrophotometer (UV, VIS, IR)
- laboratory type refractometer
- manual type refractometer

Table: Utilization of physicochemical and Chemical Equipment

No.	Analyses \ Equipment	[illegible] combination	[illegible] vessels	[illegible] (… 120 °C)	[illegible] (… °C)	[illegible]-meter	[illegible] - Water	Granulation Sieves (set)	Mill	Laboratory Balance (500 g-200 mg)	High Precision Balance (five decimal numbers)	Moisture Analyser (type 6010)	[illegible]ometer (VIS, UV)	[illegible]graph	[illegible] (for fibrecellul.)	[illegible] (Special system 2)	[illegible] (Special system 1)
1	Weighing									+	+						
2	Grinding								+								
3	Homogenization		+						+								
4	Granulation		+					+									
5	Cutting		+						+								
6	Solubility	+	+													+	+
7	Dry matter		+	+	+				+	+	+	+					
8	Moisture			+	+					+	+	+					
9	Water			+	+					+	+	+					
10	Ash		+	+					+	+	+						
11	Sand			+	+			+		+	+						
12	Metals	+	+	+	+	+	+		+	+	+		+	+		+	+
13	Reduced sugar	+	+		+	+	+		+	+	+		+	+			
14	Total sugar	+	+		+	+	+		+	+	+		+	+			
15	Starch	+			+		+		+	+	+		+	+			+
16	Cellulose		+		+		+		+	+	+		+	+	+		+
17	Acetylcellulose	+	+		+		+		+	+	+		+	+	+		+
18	Pectins & protopectins		+		+		+		+	+	+		+				
19	Vitamins		+		+		+		+	+	+		+	+		+	
20	Colour		+				+		+				+			+	
21	Carotene colours		+		+		+		+	+	+		+			+	
22	Chlorophyll		+		+		+		+	+	+		+			+	
23	Gases	+	+		+		+		+	+	+		+	+			
24	Fats		+		+		+		+	+	+		+			+	
25	Acroleins	+	+		+				+	+	+		+	+			
26	Residues		+		+				+	+	+		+	+		+	
27	Rancidity		+		+				+	+	+		+	+		+	
28	Acetaldehydes		+		+		+		+	+	+		+	+			
29	Diacetyls		+		+		+		+	+	+		+	+			
30	Tartarates	+	+		+	+	+		+	+	+		+	+			
31	Citrates	+	+		+	+	+		+	+	+		+	+			
32	Peroxide no.	+				+			+	+	+						
33	Barbiturate no.	+				+			+	+	+						
34	Saponification	+				+			+	+	+						
35	Acid no.	+				+			+	+	+						
36	Ester no.	+				+			+	+	+						
37	Iodine no.	+							+	+	+						
38	Amygdalic acid		+		+	+	+		+	+	+		+	+			
39	Hydrogen cyanide	+	+		+	+	+		+	+	+		+	+			
40	Total nitrogen	+	+		+	+	+		+	+	+		+				+
41	Ammoniacal nitrogen	+	+			+	+		+	+	+		+				+
42	Albumoid nitrogen	+	+				+		+	+	+		+				+
43	Protein nitrogen		+				+		+	+	+		+				+
44	Proteins		+				+		+	+	+		+				
45	Aminoacides		+				+		+	+	+		+				+
46	Additives		+						+	+	+		+				
47	Chlorides	+	+						+	+	+		+				
48	Nitrites	+	+						+	+	+		+				
49	Nitrates	+	+						+	+	+		+				
50	Polyphosphates	+	+						+	+	+		+				+
51	Nucleotid phosphates	+	+						+	+	+		+				+
52	pH	+	+				+		+				+				
53	Specific conductance		+						+								
54	Digestion		+						+								+
55	Extraction		+						+							+	
56	Fibres								+						+		

In addition to the listed major equipment items, adequate laboratory furniture is also provided, as well as glassware, chemicals and other consumables, defined in accordance with the estimation of the scope of works for period of 2 years.
Detailed specification of all the equipment and material is given in Annexes D1, D2 and D3.

4.3.1.3. Costs

Based on prices valid late in 1986, equipment and material costs are:

- laboratory units and instruments with spare parts	US $	55,000
- laboratory furniture	US $	18,000
- glassware, dishes and other materials	US $	7,000
- chemicals	US $	8,000
Total:	**US $**	**88,000**

4.3.2. Microbiological Laboratory

4.3.2.1. Methods

The laboratory is equipped with units and instruments necessary for microbiological analysis of input materials and finished products in the Pilot Plant and of food samples from other producers. Thus, the laboratory has to meet the requirements of production processes control and food sanitary control. The incorporated equipment enables quality and quantity determination of the specific saprophytic and pathogen microorganisms, applying the general methods of control and analysis by microscopic and biochemical specific tests (excluding viruses).

4.3.2.2. Equipment

The major equipment involves:

- laboratory type balance
- mill
- mixer
- vibrator
- centrifuge
- heater
- redistiller of organic solvents
- autoclave
- thermostates
- water baths
- sterilizers
- distillizing unit
- microscope
- colonies counter

The adequate laboratory furniture is included with the major equipment. Estimation of scope of works in the microbiological laboratory served as the basis for the definition of requirements in chemicals, culture media, glassware, dishes and other material for a time period of 2 years (see Annex E1, E2, and E3).

4.3.2.3. Costs

The total calculated costs of equipment and material in microbiological laboratory are:

- units and instruments with spare parts	US $	23,000
- laboratory furniture	US $	7,700
- glassware, dishes and consumables	US $	7,500
- culture media and chemicals	US $	8,200
Total:	**US $**	**46,400**

4.3.3. Sensory Testing Room

Sensory testing of the raw materials and finished products will be performed in a separate room of the laboratory. At the very beginning, only the simple tests will be performed with a team of 6 specialists (selected by tests among the available Centre staff), in accordance with the previously established procedures.
Costs of equipping sensory testing room are included in the total costs for the Centre`s furniture.

4.4. LIBRARY

The professional library of the Centre will be made of the basic fund of books, journals, regulations and other information in the field of food technologies, quality control, equipment for food industry, etc.
The permanent and the changing literature fund will be bibliographically processed (files, bibliographic titles record and reports about new titles submitted to the specialists).

The programme provides US $ 5,000 for the procurement of literature and magazines, whilst donations in literature are also expected from UNIDO, WHO, UNDP, etc.

4.5. ADMINISTRATIVE SECTION AND COMMON FACILITIES

For normal functioning of a Centre of this type, it is not enough to define its scope of activities, but it is also necessary to introduce adequate organization system and system of responsibilities due to the fact that it is a state institution.

During the detailed elaboration of Project implementation, it will be necessary to define precisely the place of the Centre within the organization system.
At that time, it will be possible to set the subordination relations and to define the pertaining documents on the Centre operation.
This actually refers to the presentation of operations, work plans, costs recording, reporting and recording of material inputs and outputs, etc. It is certain that the presentation of the results of work in the basic functions of the Centre - Pilot Plant and Laboratory controls and analyses - will be subject to systematization and unification as per form and types of data.

All the above mentioned, indicates that during Project implementation, it is necessary to pay due attention to this aspect, as it is clearly shown by the progress of activities schedule.

In any case, it is necessary to plan the post of Centre Director who will have a secretary - administrator to help him in the management of administration jobs.

Keeping in mind the character of works performed by the leading staff (in the Pilot Plant and in the laboratory), separate areas are provided for their work on upgrading and guided research activities, all within the administration and library block.

For normal functioning of this type of a Centre and for meeting the needs of the employed staff, areas for sanitary rooms, cloakroom and canteen, which are of standard type, are provided.

5. SITE AND BUILDINGS

5.1. SELECTION OF SITE

The process of the evaluation of a site for a determined purpose, is a matter of correct methodology and the selection of relevant factors that influence the suitability of the same. Then again, the influencing factors will, apart from a general consideration, depend also upon the purpose of the subject facility, and sometimes on parametres that are not of a mere technical and/or economic value. The reference is made to certain political decision, or availability of personnel for the given working and living conditions.

In the case of the Food Processing Centre the task was somewhat reduced to a choice of one out of several in advance given sites, proposed by Uganda`s Government. According to the sequence of visits, they were as follows:

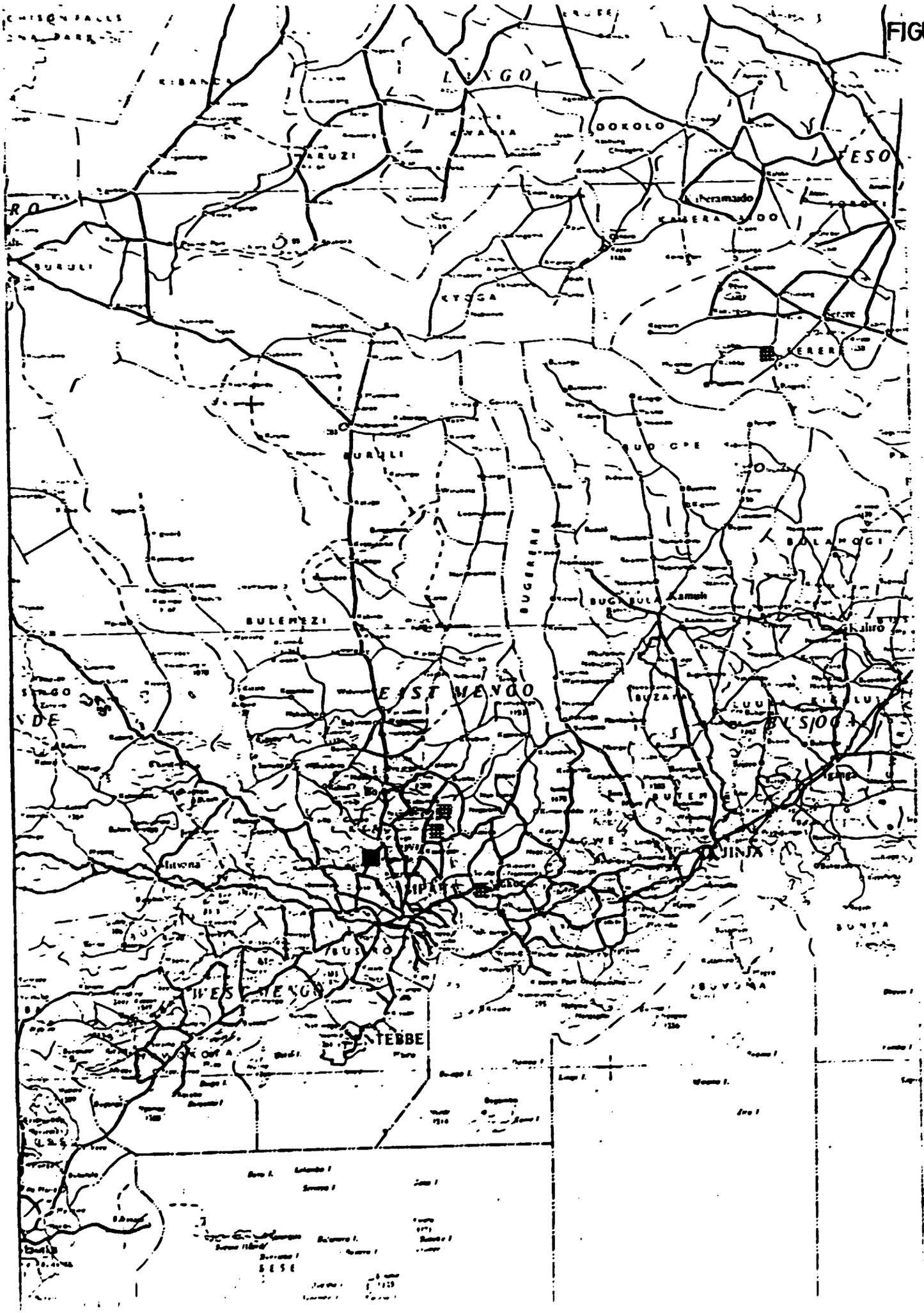
- Kabanyollo University Farm
- Namulonge Cotton Research Centre
- Mukono District Farm Institute
- Kawanda Research Station

The fifth site was also proposed - The Serere Research Station, but the visit was not made for reasons that will be discussed later.

For identification, see indications on the map (Figure 2.).

Since one of the main tasks during the field work, according to the Terms of Reference of the Contract, was to determine the particular location of the Centre, the methodological approach was discussed at the early stage of the Mission`s visit. It was agreed then, that the future Centre should not be placed too remote from the existing food processing industries (Jinja, Kampala) and from educational and experts background (Kampala).

FIGURE 2


LANGO
DOKOLO
KAMPALA
KAMPALA
KYOGA
BUGERERE
BULEMEZI
BUSOGA
TEBBE
JINJA

This conclusion came as a logic consequence of the estimation that the existing situation of interrupted communications (roads, wire and wireless), should not influence and obstruct the functioning of the Centre.

This reasoning resulted in abandoning Serere as possible location. Principal discussion was also he about the location at Kabanyollo University Farm. Although very attractive for its possibilities and precisious facilities, it is feared that possible misunderstanding of the aim of the Centre might occur.

5.1.1. Criteria for Selection of Location

The selection of site, therefore, was focused to the three possible locations - Namulonge, Mukono and Kawanda.

The criteria for evaluation of three sites were therefore reduced to:

- access roads
- distance from Kampala
- infrastructure facilities (potable water, energy sources, etc.)
- topography
- available area for the site and future extension
- existing research and development facilities (both, equipment and staff)

Comparative description of the criteria is given in the Table that follows.

The Table shows that there are evident disadvantages at the location of Mukono District farm as compared to Namulongo and Kawanda, especially for criteria 1., 3. and 5., which does not necessarily mean that it is not acceptable.

No.	CRITERIA	NAMULONGE	MUKONO	KAWANDA
1.	Access Roads	good access asphalt road, 200-300 m McAdam road	3 km earth road in bad shape questionable in rainy season Should be paved	good access road asphalt paved, two lanes
2.	Distance from Kampala	35 km	24 km	15 km
3.	Infrastructure	potable water in sufficient quantities basic electric network extention line step down transformer necessary fuel generator, no free energy	shortage of water adjacent stream to be dam locked water to be tested for quality existing step down transformer almost exhausted need for a new one, fuel generator, no free energy	potable water in sufficient quantities. basic electric network extention line step down transformer necessary fuel generator, no free energy
4.	Topography	hilly sun exposed no big vegetation elevation approx. 1300 m.	declining slope elevation approx. 1350 m close to forest	hilly sun exposed no big vegetation elevation approx. 1200 m.
5.	Available Area	no limitation for space good, healthy environment good soil condition	limited space with difficulties for expansion vicinity of piggery soil needs intensive drainage	sufficient space possible expansion good soil condition good environment
6.	Existing Research and Development Facilities	active laboratories different research programmes running buildings with facilities, not occupied, suitable for the centre	lecture rooms, usual meetings of experts for exchange of information	active laboratories new development Seeds Scheme Rehabilitation Programme buildings in good shape with facilities not occupied, suitable for the Centre.

Remaining two sites are hard to differentiate except for the vicinity of Kawanda Research Station at Kampala, which was stated as an important item. Therefore, in conclusion, the Kawanda Research Station has been proposed and accepted by Uganda`s Government as The Location.
The enclosed map shows the site of the centre and the road connections (Figure 3.).

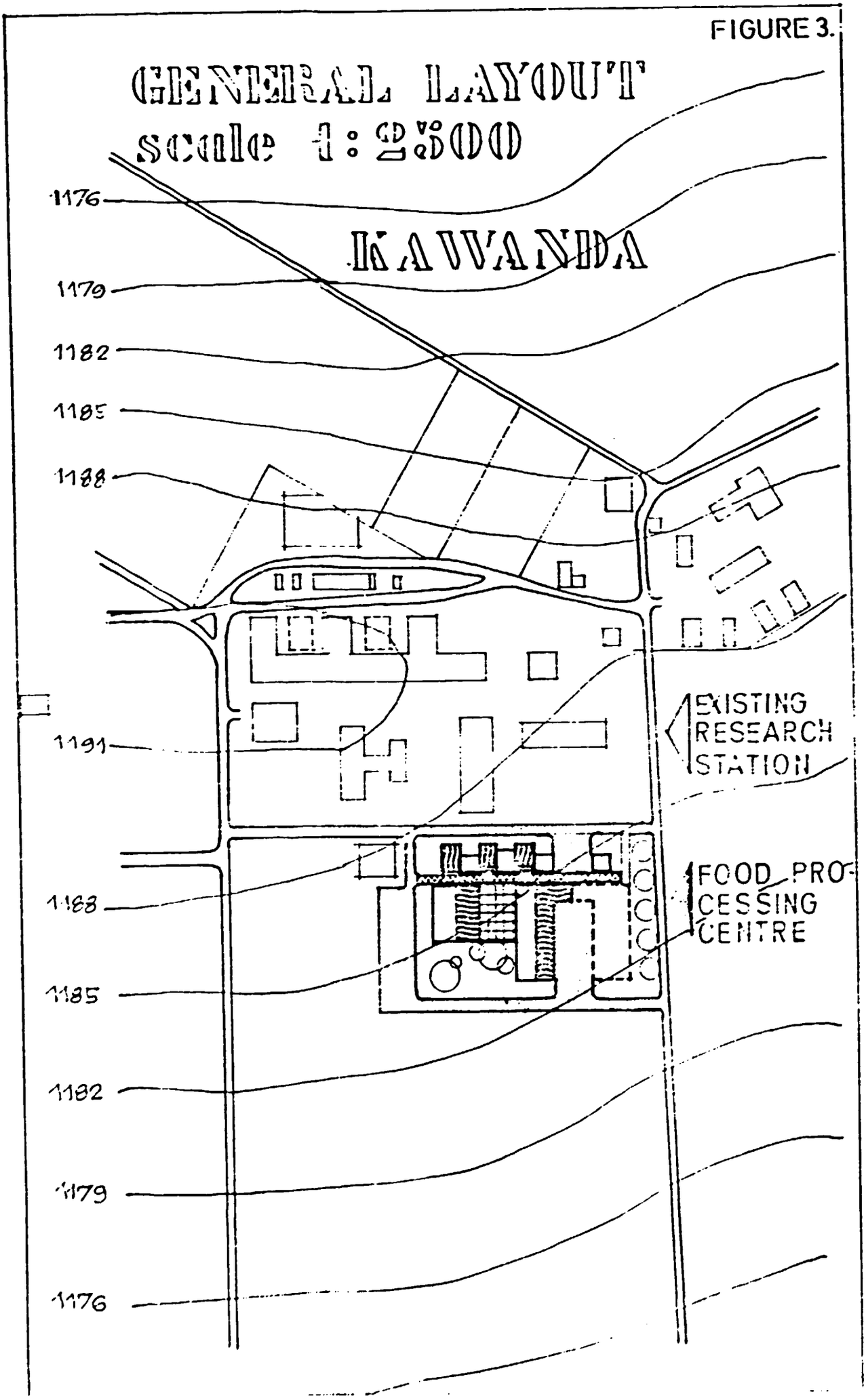
The estimation of costs will be given separately, but nevertheless, it is important to stress, and should not be neglected, that at Namulonge, Kawanda and especially Kabanyollo, there are structures and buildings vacant, somewhere with almost new furniture that could be utilized with minor changes for the purpose of the new Centre, thus cutting down the investment costs.
This Report will leave the final decision on the matter to Uganda`s Government discretion.

5.2. CONSTRUCTION

5.2.1. Evaluation Factors for Construction

The choice of construction materials and structure system in this case is an essential and at the same time a very sensitive task.
There are several main factors to be taken into account.
List of factors is given irrespective of their significance.

FIGURE 3.


GENERAL LAYOUT
scale 1:2500
KAVANDA
1176
1179
1182
1185
1188
1191
1188
1185
1182
1179
1176
EXISTING RESEARCH STATION
FOOD PROCESSING CENTRE

5.2.1.1. Availability of Local Materials

It should be stated that in the present situation, in general, most essential construction material, and especially finishing materials, have to be imported. There is a severe shortage of cement and additives, concrete reinforcement, steel and aluminium sections, glazing, floor and wall-tiles, structural wood for beams, stresses and purlins, roofing materials, paint, thermal and hydroinsulation, etc.
Water, sand, gravel and adobe are not up to any standards, therefore, far from satisfactory to relay upon for any serious undertakings.

5.2.1.2. Technical and technological Ability of Local Contractors and Labour

In the analysis of the existing local contracting potentials, it is obvious that there are no real obstacles.
The envisaged function of the Centre does not impose many difficulties as far as construction is concerned.
The structure is very simple, of standard type and repeatable, all at ground level. Participation of local contractors in the execution of quite a number of the existing buildings in Kampala, for instance, demonstrates their suitability for even more complex tasks.

5.2.1.3. Environmental Conditions

Environmental conditions to be taken into consideration are of course, climatic conditions (temperature, humidity, precipitation, sunshine, winds, etc.), availability of sufficient ground area, adjacent structures, the effect of termits, worms and other vermins.

A detailed study of these conditions will impose the choice of adequate ventilation system, correct hydro and thermal insulation, orientation of buildings, calculation and adequate positioning of openings, ratio of height to depth of building for natural stream of air, etc.
It will also call for due consideration of protection measures of wood vermins, if applied.

5.2.1.4. Impact of Requirements of Centre's Technology and Processes

This factor stands for the segment of the Centre containing the Pilot Plant and the laboratories. The technology and the processing determine a minimum dimension of each room, space and bearing structure, thus leading to a logic choice. They also determine the choice of finishing materials, regarding the aggressivness of raw materials and chemicals. As acid processing is involved and acid aggressivness occur, acid - resistant materials will be applied. As a consequence, the neutralization measures will have to be applied in regard to sewage system.

5.2.1.5. Durability and Quality of Materials

The materials will meet the requirements of Uganda standards and prescribed minimum durability. If such standards are not available, any internationally recognized standards may be applied, like the British Standards, DIN, etc. Also, materials will be tested as prescribed in the chosen standards and to the satisfaction of the engineer, following tender instructions.

5.2.1.6. Material Costs

Keeping in mind the function of the Centre, the choice of materials will give due consideration to costs, thus avoiding unnecessary expenses.

5.2.1.7. Construction Time

The duration of construction is often of crucial importance.
In conditions of high inflation rate, as is the case in Uganda nowdays, it is essential to choose a quick system of building. Therefore, a prefabricated system will be preferable.

5.2.2. Recommendations and Description

5.2.2.1. The Layout

Kawanda Research Station is situated at a distance of approximately 20 km to the north of Kampala. The research, performed on coffee, palm oil, tea, beans, maize, soyabeans, crop protection, in soil sciences and others, is organized in several buildings scattered over an area of about 6 hectares on a mild slope of a hill.
The buildings date from the colonial period and are still in a good shape, with active electrical and sewage installations.
Within the Station, there is also a new building of the Seed Scheme Rehabilitation Project, sponsored by the EEC, next to which open clear area is available for the future Food Processing Centre.
The plot is clear from buildings and vegetation, with asphalt access road, and the possibility for cross connection to adjacent farm road.
As mentioned before, other infrastructure facilities are available, such as electricity, potable and sanitary water.

Since the plot is situated within the boundaries of the Station, there is no reason for extra fencing and safeguarding, which will reduce initial costs.

As the area available is sufficient, it is possible to develop the whole range of activities on the ground floor, in one-storey building, with the possibility of extension. An area of about 1.5 ha at a maximum, is expected to satisfy all the requirements of the first and second stage, as a final solution.

In the process of development of the layout for the Centre, all aforementioned factors have been evaluated, specially from the climatic standpoint. A compact, two-three storeys structure with small ground area requirements would result, due to Uganda's climatic conditions, in expensive installations for intensive ventilation, or even air conditioning. Bearing this in mind, a layout is proposed, somewhat different to the layout in the preceeding Preliminary Report, utilizing, to a maximum possible extent natural cross-ventilation.

Maximum average temperatures of 26-27^{o}C, with humidity of app. 80% and reduced by natural ventilation for 2-4^{o}C, will be agreable, for both employees and commodities. In any case, for commodities to be preserved in controlled conditions (some raw materials in the Pilot Plant and some chemicals), the cooling chambers, refrigerators and local window air conditioner will be provided.

By deduction from the existing building and structures, it is evident, without unnecessary expensive tests, that the soil is of sufficient bearing capacity, since the load of one-storey building will be moderate, even in the case of the Pilot Plant.

Once the general decisions were made, the layout of the Centre is formed with the following main functions:

- The Pilot Plant

Since the function of the Pilot Plant is to simulate processes and conditions of food industry with small-scale equipment, it's main content is the production hall, free area of about 150 sq.m. with a minimum height of 4.0 m. Apart from the hall itself, there are separate rooms for the steam boiler and compressor, raw materials receipt department, maintenance workshop and dry store, all directly connected to the hall.

Two external walls of the hall are free and allow the cross-ventilation. One wall is oriented to the internal court, and another one to the vehicle-access-platform.

The Plant also includes a step-down transformer connected to the national network and possibly a stand-by generator as a secondary source of electric power, determined by technology demands, an underground fuel tank for the consumption of the steam boiler, with a reserve of three months continuous functioning. The tank is also connected to the generator.

- Laboratories

According to the Project, the laboratories will perform two main activities - testing of the process in the Pilot Plant, and control of food processed elsewhere in the country. To satsfy both presumptions, the integral group of laboratories is placed close to the Pilot Plant, right across the corridor, but at the same time, they are accessible independently for samples brought from outside the Centre.

The organization and the work programme, together with the necessary equipment, are given in a separate chapter.

The layout meets most of the requirements imposed on an up-to-date laboratory, bearing all the time in mind the investment costs.

This approach is evident in the possibility of achieving acceptable environmental conditions by means of natural air exchange and ventilation, except for few cases, like chemicals` and glassware`s store room and digestor cabinet, which are treated as special areas with controlled conditions.

The group consists of the physical-chemical laboratory, microbiological laboratory and sensory testing room. Apart from their individual activities, there are spaces for common purposes, such as wash-room, store-room for chemicals, etc.

- Management, Research and Library

This section of the Centre is meant for accommodation of the managerial staff and the experts who, except for experiments and procedures that are to take place in the Pilot Plant and the laboratories, will perform their studies and reports in the Centre. There is also the library equipped and meant for the follow-up of latest developments in the food processing industry and for those members and/or other experts interested in research in this field. This sector is an independent structure, away from the Plant and other noisy activities, but still in permanent interaction with other sections of the Centre. The library itself is intended not only for its main activity, but also for different expert meetings and exchange of ideas and experience.

- Common Facilities

This section comprises the wardrobes, toiletts and the canteen for the employees of the Centre They do not exceed the standards of similar facilities in food processing. Of course, depending on organizational concepts of Kawanda Research Station, as a whole, in the future, it is advisable for the sake of rationalization to reconsider a possibility of a central kitchen and canteen.
Ground Floor Layout South and North Elevation, as well as East and West Elevations are given in the Figures 4, 5, and 7.

5.2.2.2. Structure

Since the production technology in the Pilot Plant and other facilities allow for comparatively simple structure, the maximum span not exceeding 15 meters, it is advisable to apply prefabricated structure with two possible alternatives. The first alternative is prefabricated reinforced concrete structure, and the second, prefabricated wood structure, the latter being with necessary protection measures against termites and vermins. All structure will be one-storey ground level building based on a grid of 5 meters square.
Skeleton structure will be filled-in with external and partition walls to meet the requirements of the facilities and in accordance with the layout.
The foundations consist of concrete or reinforced concrete, as the need may be, laid in gravel-bedding upon soil of sufficient bearing capacity.

SOME FIGURES
OF THIS DOCUMENT
ARE TOO LARGE
FOR MICROFICHING
AND WILL NOT
BE PHOTOGRAPHED.

5.2.2.3. Materials

The applied materials are designed to meet the requirements of the processes and activities of individual section of the Centre, as they may be, following at the same time the standards and the existing regulations.

- Basic Materials

The basic materials for the structure, as said before, are either concrete and reinforced prefabricated concrete, or glued wood prefabrication.
The bedding is formed of levelled soil, free of organic particles, compacted with gravel and sand layer on top to support foundations or floor slabs, whichever is the case.
Sand and gravel are fractioned and sieved, washed, compacted to the required bearing capacity. Washed and sieved sand and gravel are used also as bedding for horizontal under-ground water and sewage piping, electric and telephone cables laying, etc.

- Masonery:

External walls are laid of bricks or concrete blocks, rendered and plastered. It is recommended also to look for a suitable prefabrication system, thermal insulation inclusive, with finished surface ready for painting.
Partition walls are mainly brickwork or gas-concrete blocks, or, as in the case of laboratories, light wood or plastic partitions in metallic frames.

- Floor Finishes:

The floor finishes vary according to different purpose of the units. The choice is made carefully, considering the exposure of the floor to abrasion or acidity, or any other aggressive activity.

Production hall: This is the most demanding section for floor finishing, since there is a combined action of different aggressive media, such as heat, humidity, steam, acidity, abrasion and similar.
The best answer to them all is epoxy resin floor finish with the addition of anti-slipping grains in the mixture. The floor will incline to covered, gutters running along the longitudinal sides of the hall to enable thorough washing.
The epoxy finish is laid on reinforced slab of not less than 30 NB compressive strength.

Laboratories: Here, the most suitable material will be anti-acid ceramic tiles, with anti-acid joints. At the same time, it is the most durable.
It is also possible to apply flooring of PVC tiles, or similar.

Management, research and library: The floors here will consist of chess pattern wooden laminates in the library, wall-to-wall acrilic and wool carpets, and taftings in the offices, laid and glued on cement smoothed mortar layer.

Common facilities: For durability and cleaning reasons, ceramic tiles are proposed, rectangular or square in form, mono - or multy-chromatic. The floor in the canteen is paved with terazzo, cast in situ.

Corridors: They are paved with cast in situ terazzo with a careful choice of single sieved size of marble crushed particles.

- Wall Finishes

Production hall: The walls and columns are covered with ceramic tiles to the height of 2.0 m , and the rest finished in white paint.

Laboratories: The main laboratory rooms in the physical-chemical micro-biological and sensory testing room are covered with white ceramic tiles, while the remaining surfaces to the ceiling and the walls in the store room and the preparation rooms will have wall paints. The room for head of laboratory is wallpapered.

Management, research and library: The library is suggested to be in wall paint, colour chosen by the architect. Management and research offices are coated with wall paper, or painted. The built-in cupboards are veneered in mahagony, treated with wood impregnating agent, fungicide, pesticide and transparent colours.

Common facilities: Except for the canteen and waredrobe, painted by simple wall paint, all other rooms are to be coated with wall ceramic tiles to the height of 2.0 m , the remainder being painted.

- Ceilings

In the production hall, as well as the wash-room of the laboratories, a moisture-absorbant plastering is applied, finished with moisture-transparent paint. In the management offices a suspended ceiling of gypsum tiles is suggested, while in other rooms, a simple paint will be applied on plaster or directly to the fair finished concrete.

- Glazing

Windows are glazed with transparent glass of 4 to 6 mm in profile galvanized aluminium frames, with overhead adjustable louvres where necessary, to ensure cross-ventilation. Glazed adjustable louvres are planned also at the ridge ventilation of the production hall.
In the laboratory, some partition walls are glazed with light diffusive glass in aluminium galvanized frames.

- Insulation

Two main types of insulations are provided - hydro- and thermal insulation. Hydroinsulation is there mainly to prevent penetration of moisture from the ground and it consists of layers of bituminous coatings applied with hot emulsion and/or polythene sheets. Thermal insulation should prevent heat from direct insolation to interfere with the internal spaces of the Centre, especially where food commodities and chemicals are kept, or where humans dwell.
The thickness of the insulation is according to standards and the proposed materials are foam-glass, expended polyurethene, mineral wool or the like.

- Roofing

Roofs will be inclined, covered by corrugated metal or aluminium sheets, coated with resistant, waterproof colours. The sheets will be of a self bearing type to the span of 3 m supported by steel or reinforced concrete purlins.
The main corridor is covered with painted metal sheet coating.

- Facade

The external walls are rendered and plastered, to be coated by acrylic paint mixed with quartz single-grade sand, colours being determined by the architect. Exception is made in the case of the walls of the offices that are finished with selected facade silicone bricks.
The eaves of the roofs are lined with wood laminate from beneath.
The open edge of the inner court is fenced with decorative brickwork to the height of 2.20 m.

5.2.2.4. Courts

There are two courts within the Centre. One is accessible for vehicles, for repairs on the transformer and the generator, and also for oil refill of the tank underneath the platform.
Another one is bigger, placed between the Pilot Plant and the offices, to allow for sufficient sunshine, natural ventilation and to diminish noise from the production hall. Both courts are paved with square concrete 50/50/5 cm slabs on a bedding of well compacted gravel.

5.2.2.5. External Traffic

As mentioned before, the Centre is an integral part of the Kawanda Research Station, with a proper connection road to the main network. There is already an asphalt road reaching the adjacent Seed Rehabilitation Project building, while extention will serve as the basic access to the Centre, and at the same time as a cross-road to a nearby farm.

The plot enables one-way traffic road for well organized transport, on one hand, and fire protection reasons, on the other.

A parking lot for the staff and visitor`s cars is also provided.

All roads and the parking lot are asphalt paved.

5.2.2.6. Mechanical Installations

A 300 kg/h, 10 bars boiler steam generation is provided for the supply of saturated steam (4-8 bars) to the consumers in the process.

Light oil is used as a fuel in the boiler. The boiler is equipped with a burner and pertaining automatic installations.

A 10 m^3 storage tank is provided to supply light oil to the boiler.

The fuel is transferred by set of gear pumps into the daily 400 litres fuel tank. The daily tank is equipped with a level switch connected to the gear pump. The fuel from the daily tank is taken to the burners by gravitation.

In front of each steam consumer, a reduction valve is placed together with other automatic equipment for the control of the required pressure and quantity.

For the supply of compressed air, a mobile compressor with operation pressure of 7.5-10 bars, capacity 225 lit/min is provided.

Steam traps are provided in front of the consumers.

In addition, the manifold has two compressed air nozzles to which different types of equipment can be connected, for different production requirements. The chemicals` storage area is air conditioned due to the specific conditions. For this purpose, a room air conditioner, type 4700 W is used. A 8000 litres cooling chamber is provided for keeping raw materials.
A pulley type chain hoist is provided for heavy handling (boilers discharging and filling, displacement of equipment, etc.).

5.2.2.7. Electric Installations

- Electric Power Supply:

A vertical type, prefabricated metal clad 10/04 kV substation is provided. Transformer power of 160 kVA is defined on the basis of the data obtained for the demand in the process, mechanical installations, kitchenette, water heaters and electric lightening.
The assesed consumption for the various units is as follows:

x Pilot Plant process	40 kW
x Laboratories	50 kW
x Common Facilities	20 kW
x Lightening, external and internal	20 kW
Total:	**130 kW**

The assesment of 130 kW approximately, for installed power defined the transformer capacity to be 160 kVA. A 250 kVA transformer, encompassing reserves for the future extension is suggested to be built in.
If Diesel generator is to be purchased, depending on possibilities, as a stand-by secondary source of electric power, a room for accomodation of the same is provided.
Electric power consumption shall be measured on transformer`s low voltage side.

- Electric Lightering

Fluorescent fittings are used for electric lightening. Its strength has been selected in accordance with British Standards specifications and it depends on the purpose of the rooms. Lightening fittings will be selected on the basis of ceiling type and type of protection will be selected so as to meet the operational conditions.

- Distribution System for Process Equipment and Other Apparatus

Process equipment will be supplied from the ceiling by rail-type distribution.
This type of supply is flexible, offering reserves for future - the supply of new consumers.
The sockets in the laboratories and offices will be built into U-shape metal case rail distribution system, to enable connection of electric apparatus.

- Weak Current

For consumption in the IT traffic, a telephone switch-board is provided. The secretary will be in charge of the master unit, through which the telephone traffic of several units will be performed.
The fire alarm installation will be covered by the existing system in the Kawanda Research Station.

- Extremely High Contact Voltage Protection

This protection shall be carried out by multiple protective earthing system. For this purpose, the third and the fifth core of the cable are yellow-green. The protection conductor is laid separately in the complete installation and it is connected by Zero to the connection box.

- Lighting Arrestor Installation

A conventional Faradey cage lighting arrestor will be used for protection against lighting.

5.2.2.8. Equipment

There are several main groups of equipment - technological equipment for processing in the production hall of the Pilot Plant, laboratory equipment consisting of diverse apparatures glassware and fixed furniture, furniture for the offices, the canteen and library, and finally, sanitary equipment.

The equipment of the Pilot Plant and the laboratories are elaborated and discussed in relevant sections of the report, while the sanitary equipment is treated as a part of sanitary installations.

Office furniture is mainly composed of veneered chipboard, flat paint varnish with or without steel supporting frames.

Chairs of different type are provided; massive wood armchairs in the library, swivel metal-framed armchairs in the offices of the researchers and management, stackable metal-framed chairs in the canteen.

The tables in the canteen are steel-framed and provided with fibreglass -laminated tops.

Built-in cupboards are also made of mahagony veneered chipboard, transparent flat varnished, to form complete partition walls of the corridor in the office blocks.

The same materials are applied for free standing cupboards.

Book shelves in the library are steel-framed, the shelves are of massive wood, 2.00 m high.

UPI-INVEST

5.3. SPATIAL REVIEW

5.3.1.	Pilot Plant	
5.3.1.1.	Reception compartment	50 sq.m.
5.3.1.2.	Boiler room and compressor	12.5 sq.m.
5.3.1.3.	Maintenance workshop	12.0 sq.m.
5.3.1.4.	Pilot Plant production hall	150.0 sq.m.
5.3.1.5.	Smoking and natural drying	25.0 sq.m.
5.3.1.6.	Dry store	23.5 sq.m.
5.3.1.7.	Power station	12.0 sq.m.
	Total:	**285.0 sq.m.**

5.3.2.	Laboratories	
5.3.2.1.	Testing room	23.50 sq.m.
5.3.2.2.	Microbiological laboratory 17.40+6=	23.40 sq.m.
5.3.2.3.	Head microbiological laboratory	6.00 sq.m.
5.3.2.4.	Weighing and samples preparation	6.00 sq.m.
5.3.2.5.	Physical and chemical laboratory 17.39+6 =	23.40 sq.m.
5.3.2.6.	Head Physical and chemical laboratory	6.00 sq.m.
5.3.2.7.	Weighing and digestor	6.00 sq.m.
5.3.2.8.	Washing	9.10 sq.m.
5.3.2.9.	Chemicals storage	11.10 sq.m.
	Total:	**114.50 sq.m.**

UPI-INVEST

5.3.3. Common facilities	
5.3.3.1. Toiletts L & G. 2x10.56 =	21.10 sq.m.
5.3.3.2. Wardrobe L &G. 2x10.4 =	20.80 sq.m.
5.3.3.3. Kitchenette and canteen	36.50 sq.m.
5.3.3.4. Main open air corridor	121.00 sq.m.
Total:	**199.40 sq.m.**

5.3.4. Management, Research and Library	
5.3.4.1. Head of Center and documentation	23.50 sq.m.
5.3.4.2. Secretary	11.00 sq.m.
5.3.4.3. Library	57.50 sq.m.
5.3.4.4. Offices 4x9.7 =	38.80 sq.m.
5.3.4.5. Corridor	23.00 sq.m.
Total:	**153.80 sq.m.**
5.3.5. Open Paved Courts	175.00 sq.m.
5.3.6. Recapitulation:	
- Pilot Plant	285.00 sq.m.
- Laboratories	114.50 sq.m.
- Management, research and administration	153.80 sq.m.
- Common facilities	199.40 sq.m.
- Open paved courts	175.00 sq.m.
Grand total:	**927.70 sq.m.**

UPI-INVEST

5.4. ESTIMATION OF COSTS

The prices given hereinafter are stated in US dollars, due to high inflation rate of local prices. On the other hand, as stated before, most of materials and equipment must be supplied from abroad, therefore international market prices are applied, with the addition of freight and insurance costs.

The Mission got these prices during its visit.

The costs are given as estimated prices per 1 sq.m. net surface and are not itemized. Exact prices will be available, once the detailed designs are done.

5.4.1. The Pilot Plant

- Civil works		US $ 315 per sq.m.
- Installations		US $ 295 per sq.m.
	Total:	**US $ 610 x 285.0 = 173,850**

5.4.2. Laboratories

- Civil works		US $ 388 per sq.m.
- Installations		US $ 262 per sq.m.
	Total:	**US $ 650 x 114.5 = 74,425**

5.4.3. Management, Research and Library

- Civil works		US $ 400 per sq.m.
- Installations		US $ 284 per sq.m.
	Total:	**US $ 684 x 153.8 = 105,200**

5.4.4. Common Facilities

- Civil works	US $ 315 per sq.m.
- Installations	US $ 210 per sq.m.
Total:	**US $ 525 x 199.4 = 104,685**

5.4.5. Open Courts

- Civil works	US $ 126 per sq.m.
- Installations	US $ 21 per sq.m.
Total:	**US $ 147 x 175.0 = 25,725**

5.4.6. Access Roads, Parking Lots

- Civil works	US $ 36 per sq.m.
- Installations	US $ 13 per sq.m.
Total:	**US $ 49 x 2000 = 98,000**

5.4.7. Water Supply and Electricity

- Connections to network	US $ 15,750

5.4.8. Furniture (Annex F) US $ 32,820

5.4.9. Miscellanious equipment (Annex F)

- FOB price	US $ 78,950

Recapitulation:

- Civil works total (rounded)	US $ 352,582
- Installations total (rounded)	US $ 245,053
- Furniture total (rounded)	US $ 32,820
- Miscellanious equipment	US $ 78,950
Total:	**US $ 709,405**

6. PERSONNEL INPUTS

Uganda has a limited number of food technologists educated abroad. Their experience in organization of food production technological processes are not sufficient. Experts for chemical and microbiological food control are scarce. This is due to non-existance of state food control inspection and inadequately developed or lack of laboratories in the existing food industry. It has to be mentioned also, that secondary school education directed to the requirements in food industry does not exist.

These indicate that it is of key importance for an efficient start of operation of this Centre to train additionally the staff planned to join the permanent team in the Centre, and to have assistance of experts from the outside in the organization of construction, planning and implementation of the initial programme for the Centre operation.

According to the designed volume, the Centre would start the activities in the first stage with a permanent staff of 14, a number of seasonal workers and a programmed participation of international experts.

6.1. REQUIRED LOCAL STAFF

6.1.1. Permanent Staff

Permanent staff of the Centre includes:

Post:	Minimum required qualification:
6.1.1.1. General Service	
Director	M.Sc. Economist or Food Technologist
Food Economist	B.S. Economist experienced in food industry

	Administration Secretary	High School
	Librarian	High School
	Cleaners (2)	-
6.1.1.2.	Pilot Plant	
	Food Technologist	M.Sc. Food Technologist experienced in thermal processing of food
	Food Technician	High School, oriented to food production, possibly agriculture technician experienced in food processing
	Mechanical Technician	High Mechanical Engineering School
	Electric Technician	High Electric Engineering School
6.1.1.3.	Laboratory	
	Chemist	B.Sc. in Chemistry, possibly in food technology
	Microbiologist	B.Sc. in Microbiology, possibly im medicine or veterinary medicine
	Laboratory Technician (chemical)	High School (oriented to Chemical Sciences
	Laboratory Technician (Microbiological)	High School (oriented to biological or medical sciences)

When choosing the permanent team, priority shall be given to persons experienced in food industry and fit for team work in the Centre (in the initial stage it is not possible to define strictly the responsibilities for each post).

It has been pointed out that the scarce Centre's team will have to adjust itself to the different testing programmes, distributing the jobs among them according to specific programme tasks (mechanical and electric technicians are planned to maintain the equipment and installations of the whole Centre).

For this reason, the employed staff should have as wide a range of practical experience as possible.

The choice and the training of permanent team staff shall be carried out during the construction of the Centre in accordance with the plan set out in Item 6.3.

6.1.2. Seasonal Staff

In addition to the permanent staff, the Centre may employ a number of seasonal nonqualified workers for the preparation and performance of production tests. It is necessary to explain to these workers the nature of work and train them for certain manual operations before the performance of the tests.

Their number will depend on the testing programme and calculation of labour needed for each specific test.

6.2. INTERNATIONAL STAFF

Technical assistance of international experts is necessary for:

- selection of equipment, assembly and trial operation,
- preparation and monitoring of trial test procedures,
- evaluation of test results,
- programming of training for the employed staff,
- preparation of the Centre's current activities program
- elaboration of the Centre's organization of work and its interrelations with external institutions and industry.

The below mentioned experts have to be employed for the planned scope of work in the Centre in the first stage.

6.2.1. Project Manager

Project Manager shall be a food technologist (MSc. degree minimum), experienced in research and development activities in food technologies. The total employment period of this expert will be 24 months, starting at the time of equipment contracting (40 weeks before Centre's start-up). His obligations and responsibilities are: programming and supervision over education of professional staff; preparation of Centre's forms and documents; participation in the selection of equipment and material supplier; programming and supervision and deliveries, assembly and equipment start-up, definition of production and control procedures, cooperation with expatriate consultants and local professional institutes; organization of start-up operation work-programme.

6.2.2. Consultants

In order to speed up the mastering of equipment, handling and the production and control procedures, it is necessary to employ consultants in the field of:

- chemical food control
- microbiological food control
- dehydration
- food canning processes

These consultants have to be experienced experts in their respective above mentioned fields.
Their employment has to be included in the guarantee provisions of the contracts with the suppliers of equipment.
Responsibility of the consultants will be to inspect the correctness of assembly works; to prove the contracted equipment performances; to perform the trial procedures on the installed equipment; to write the procedures on handling of the equipment and to carry out the initial training of the Centre's staff.
The beginning of consultants work has to be synchronized with the completion of assembly work and it will last 4 weeks at least.
Due to seasonality of some species, the consultants for canning and dehydration processes will come back to Uganda at the agreed time (not later than 6 months after Centre start-up) and will perform the dehydration and canning processes with specific raw materials.
This consulting mission will also last 1 month and this will be stipulated by the contract with the supplier of equipment.

The total time needed for the employment of foreign experts:

- project manager	24 man/months
- consultants in food processing 2 x 2 months	4 man/months
- consultants in laboratory 2 x 1 month	2 man/months
Total:	30 man/months

6.3. TRAINING OF PERMANENT STAFF

It will be necessary to provide training abroad for a number of Centre's staff according to a programme to be prepared in detail by Project Manager.
The following has been planned to be covered by the training:

6.3.1. Director of the Centre

Training will actually be a study trip involving visits to similar well organized development centres of similar application in the developed and developing countries.
This trip is intended for the studying of organization, administration and management of development institutions.
The planned period for the study trip is 2 months.

6.3.2. Pilot Plant Technologist

The Contracts with the suppliers of technological equipment shall provide training for the technologist on the work pertaining to the contracted facilities (as per the program prepared by Project Manager) in one of the institutes having identical equipment. In addition to this training to be performed in institutes, the program should also include training in food industry facilities, especially in fruit and vegetables canning and dehydration processes and fish processing.
This training lasts 6 months and it has to be completed before equipment assembly starts, i.e. 10 weeks before the Centre`s start-up.

6.3.3. Chemists and Microbiologists

It is understood that the chosen experts for the performance of laboratory tests have the theoretical knowledge in chemistry and microbiology, so that the training for them will include techniques and technologies in laboratory procedures on the selected equipment and evaluation of results.
It is of utmost importance to have training organized in institutions having equipment and procedures identical to those selected for the Centre. The place of specialization and the time in a period of 2 months will also be established in the Contract with the suppliers of equipment.
Training must be completed before assembly of equipment (10 weeks at the latest before the Centre start-up).

N.B. Training of technicians will be performed during assembly works, technical and operation trials in the Centre facilities.

Total training team abroad is:

- Director (study trip)	2 man/months
- Food Technologist	6 man/months
- Microbiologist	2 man/months
- Chemist	2 man/months
Total:	12 man/months

6.4. COSTS

Costs and the wages and salaries for the local labour employed for the construction of the Centre are not included in the Program. They are to be borne by the appropriate Uganda` s Government authority.

Costs pertaining to employment of foreign experts and training of permanent staff abroad are as follows: (in US$)

- Project Manager	
24 man/month ($ 7,150/month)	171,600
- Consultants	
6 man/months ($ 7,150/month)	42,900
Total:	214,500

Costs of permanent staff training abroad

- Director`s study trip	12,000
- Training abroad of the technologist, chemist and microbiologists	
10 man/months	55,000
Total:	67,000
Grand Total US$	281,500

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The prices are indicated on the basis of the present UNIDO rates for the employment of international experts in Uganda.

Costs of the Centre`s permanent staff training abroad are based on approximate calculations, and the actual costs will be obtained on the basis of a thorough calculation of transportation costs and taking into account the conditions of stay in the country in which training of Uganda`s experts will be performed.

Standard procedures should be used to seek for Uganda experts training from the relevant Governments of equipment suppliers` countries.

7. ESTIMATION OF INVESTMENT COSTS

Preceeding paragraphs gave listing of works, equipment and other investments required for the establishment of the Centre.
The costs of technical assistance in the construction and start-up period has been estimated too and included herewith, to provide good start for the Centre.
Due to shortage and/or lack of some materials, two years supply of glassware, chemicals, culture media, additives and packaging material has been provided for, to enable continuous and undisturbed work of the Centre.
The basic fund of literature for the Centre`s library has been also provided for, although donations from various world institutions are expected too.
To all these costs, freight and insurance, as well as assembly costs for the equipment have been added. The amount of US dollars 29,000 is planned for designs and US dollars 97,000 for complex engineering activities which will last along the whole period from decision making to the start-up of the Centre, to technical takeover, respectively.
Thus, the amount of US $ 1,496,000 is estimated to be a cost for establishment of the Centre, training and technical assistance throughout the start-up period of 56 weeks.
Therefore, itemized investments would be:

7.1. Civil works	US $	352,582
7.2. Installations	US $	245,053
7.3. Project	US $	29,000
7.4. Equipment	US $	392,945
of which:		
- Pilot Plant Equipment	US$	134,035

- Phy.-Chem. Laboratory	US $	55,000
- Microbiol. Laboratory	US $	23,000
- Miscellanious equipment	US $	78,950
- Freight and insurance	US $	72,860
- Assembly	US $	29,100
7.5. Furniture	US $	58,520
7.6. Glassware, chemicals, culture media, additives and packaging material	US $	34,400
7.7. Literature	US $	5,000
7.8. Training	US $	67,000
7.9. Technical assistance	US $	214,500
7.10. Engineering	US $	97,000
Total investments:	US $	1,496,000

8. IMPLEMENTATION

In order to present clearly all the activities and interactions expected during the implementation, a network analysis has been prepared. The diagram and the description of activities are given herewith (Fig. 8 & 9).
It will be useful to comment on some aspects of the procedure:

- Implementation Time

At this moment, it is not possible to predict the exact date of the starting activities since there are certain prerequisites, such as, financial structure and decision making, to be fulfilled.
These are the responsibilities of the authorities and should be taken as a given fact for the zero time of the starting activities.
In any case, the duration of the implementation activities is estimated to 60 weeks, and the start-up operations are suggested to last 14 months with the participation of expatriate consultants, which will ensure independent running of the Centre in the future years.

- Project Manager

One of the crucial points is that the Project Manager should be appointed at an early stage of the implementation in time to ensure full coordination of all activities. His presence will also be essential for timely decisions on many problems arising along the Project progress.

- Training of Personnel

The training of personnel, according to the given programme, will have to be concluded before the assembly of the equipment.
This will apply to personnel trained both, abroad and in the country, for reasons of supervision and better familiarization with the equipment and possible problems thereof.

- Choice of Equipment

In the procedures of final choice of equipment, apart from prices, special consideration sho ld be paid to availability of spare parts, and above all to the possibility of servicing and maintenance.
Should this be neglected, there is a fear of consquences experienced so many times before - almost new equipment might run out of function.
One general comment should be discussed. If it seems as if the total implementation time is somewhat overestimated, an explanation should be seeked in the difficulties in communications and transportation, considering the need for importation of the majority of materials and equipment.

PROJECT NETWORK ANALYSIS

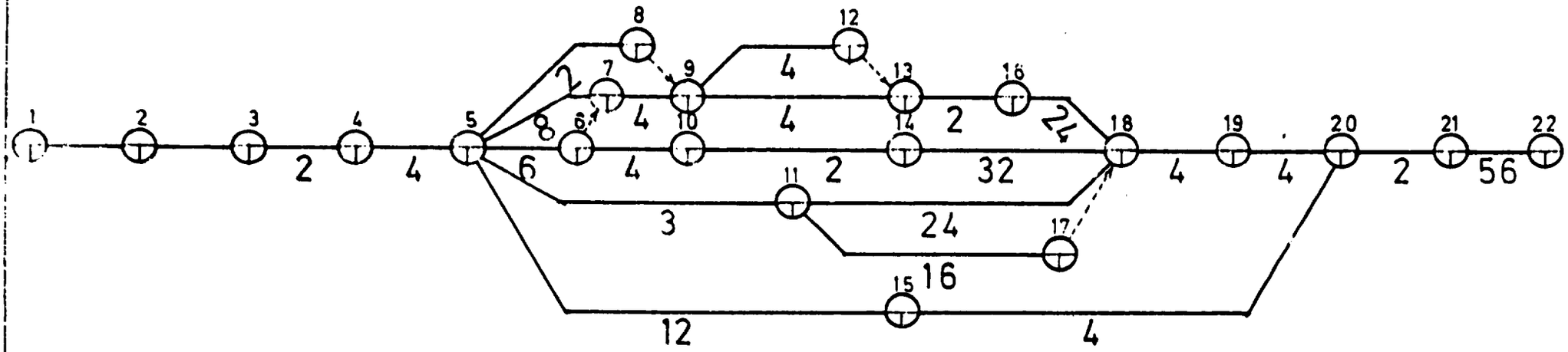

FIGURE 8.

DESCRIPTION OF ACTIVITIES

ACTIVITY	D E S C R I P T I O N	DURATION IN WEEKS	EARLIEST START (WEEK No.)	LATEST FINISH (Week No)	
1-2	ACCEPTANCE OF THE PROJECT	Not Determined	-	-	
2-3	DETERMINATION OF FINANCIAL RESOURCES	Not Determined	-	-	
3-4	INVESTMENT DECISION-MAKING	2	0	2	*
4-5	CONTRACTING THE ENGINEERING ACTIVITIES	4	2	6	*
5-6	TEHNOLOGICAL DESIGNS	6	6	12	*
5-7	BUILDINGS AND INSTALLATIONS DESING PHASE I	8	6	16	
5-8	PRELIMINARY PERMITS	2	6	20	
5-11	TRAINING PROGRAM ELABORATION	3	6	26	
5-15	CENTRE ORGANISATION PROGRAM	12	6	54	
6-10	TENDER AND BIDDINGS (EQUIPMENT)	4	12	16	*
7-9	BUILDINGS AND INSTALLATIONS DESIGN PHASE II	4	14	20	
9-12	FINAL PERMITS	4	18	24	
9-13	TENDER AND BIDDINGS FOR CONSTR. WORKS AND INSTALLATIONS	4	18	24	
10-14	EQUIPMENT - CONTRACTING	2	16	18	*
11-17	TRAINING IN THE COUNTRY	12	9	50	
11-18	TRAINING ABROAD	14	9	50	
13-16	CONTRACTING CONSTRUCTION WORKS AND INSTALLATIONS	12	22	26	
14-18	SUPPLY OF EQUIPMENT	32	18	50	*
16-18	CONSTRUCTION WORKS AND INSTALLATIONS	24	24	50	
15-20	PURCHASE OF LITERATURE AND DOCUMENTATION	4	16	58	
18-19	EQUIPMENT ASSEMBLY	4	50	54	*
19-20	FINAL WORKS	4	54	58	*
20-21	TRIAL PRODUCTION AND COMMISSIONING	2	58	60	*
21-22	START-UP	56	60	116	*

* = ACTIVITIES ON CRITICAL PATH

FIGURE 9.

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INVESTITOR:

PREDMET:

SIERA SIRANA

UPI-INVEST

TRANSCRIPT ANNEX A

MEMORANDUM

ON THE UNIDO/UPI INVEST YUGOSLAVIA MISSION TO UGANDA FROM 29th OCT - 15th NOVEMBER, 1986

Project: UC/UGA/85/254

Purpose of the Mission: Field Work for Elaboration of the Program for Establishment of a Food Processing Centre

UPI INVEST, Sarajevo, Yugoslavia, as per Contract No. 86/53 with UNIDO Vienna, sent a Team of experts consisting of:

Mr. Branko Šućur, Food Technologist, the Team Leader
Mr. Branko Danon, Architect, Expert
Ms. Lejla Musić, Economist, Expert

to Uganda to collect all necessary information in order to elaborate the program and design the Centre.

As per above mentioned Contract, the liaison office between the Contractor's Team and the Government of Uganda was UNDP office in Kampala who, together with the Government of Uganda, decided the Ministry of Agriculture and Forestry to be the counterpart to the Team on behalf of Uganda's Government.

The Team, in the presence of the UNDP Representative, made the Program for the Mission together with the Ministry of Agriculture and Forestry.

During the Mission, the Team paid visits to competent and relating Government Authorities, Institutions and Food Industries.

At the end, the Team had a final Reception by Hon. Robert Kitariko, the Minister of Agriculture and Forestry and Senior Officers of his Ministry.

The Team reported its findings during the Mission, gave its proposals and opinions, on the basis of which, the following conclusions were reached:

(a) Site of the Centre:

Out of several locations proposed, Kawanda Research Station was selected.

(b) Jurisdiction over the Centre:

As at present suggested, the Centre will be run by the Ministry of Agriculture and Forestry as a development non-commercial institution.

(c) Priorities:

First stage of the centre should be programmed in accordance with the priorities given in the Economic Development Plan of the Government of Uganda. This Plan gives priority to self-sufficiency in food, substitution of imports and promotion of new, non-traditional export products. For the present time, these priorities should be given to development of processing of cereals, fruit, vegetables and fish.

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(d) Relating Industries:

The Team stressed importance of development of industry of packaging materials as relevant to the development of food industry.

(e) Finance:

Details of financing the project will be discussed upon final estimation of the investment costs.

The above conclusions were reported and accepted at the wrap up meeting organised by the ministry of Planning and Economic Development in liaison with the UNDP Office.

Kampala, 14th November, 1986.

On behalf of UNIDO/UPI INVEST Team:

Mr. B. Šućur, Team Leader, signed

On behalf of Uganda Government:

Mr. W.W. Kirunda, Under Secretary, signed and sealed

On behalf of UNDP:

Mr. F. Mumm von Mallinckrodt, Resident Representative, signed

Table 1. Composition of Exports (F.O.B.) 1978–1985 **ANNEX B.**

Year	1978	1979	1980	1981	1982	1983	1984	1985
Volume "000" Tonnes"								
Coffee " " " "	113.7	143.1	110.0	128.3	174.7	144.3	133.2	151.5
Cotton " " " "	11.7	3.6	2.3	1.2	1.8	7.0	6.7	9.6
Tea " " " "	8.7	1.4	0.5	0.5	1.2	1.3	2.5	1.2
Tobacco " " " "	1.2	0.4	0.3	-	-	0.7	0.7	0.3
Maize " " " "	-	-	-	-	1.6	30.3	29.7	9.8
Unit Value US $/Kg								
Coffee " " " "	2.8	3.0	3.1	1.9	2.0	2.4	2.7	2.3
Cotton " " " "	1.7	1.8	1.8	1.9	1.8	1.6	1.8	1.4
Tea " " " "	1.0	1.0	0.6	0.6	0.7	0.9	1.3	0.8
Tobacco " " " "	1.5	2.3	1.0	-	-	1.3	2.1	1.3
Maize " " " "	-	-	-	-	0.4	0.4	0.3	0.3
Value (US $ million)								
Coffee " " " "	312.7	425.9	338.7	241.6	341.0	339.7	359.0	355.0
Cotton " " " "	19.8	6.4	4.3	2.2	3.3	11.6	12.4	15.4
Tea " " " "	8.3	1.4	0.3	0.3	0.8	1.2	3.2	1.0
Tobacco " " " "	1.8	0.9	0.3	-	-	0.9	1.5	0.5
Maize " " " "	-	-	-	-	0.6	11.3	10.1	3.1
Other Exports " " "	10.6	5.1	2.2	2.5	0.7	2.1	6.6	4.3
Unadjusted Total	353.2	439.7	345.8	246.6	346.4	306.8	392.8	378.3
Adjustments	-30.3	-42.5	-26.7	-1.1	+0.7	+0.9	+15.1	+0.7
Total Exports	322.9	397.2	319.1	245.5	347.1	367.7	407.9	379.0

NOTES: 1. Coffee for 1978–1980 are based on invoices while that for 1981–1984 are based on shipment.
2. Data for 1985 are provisional.
3. Data on quantity and value of tea for 1984 are not related. Quantity refers to actual exports whereas value is based on invoices.
4. Adjustments for errors and omissions, valuation, coverage and timing.
5. "___" means nil.
6. For the year 1984, the value of tea exports is on receipts while volume is based on returns from UTA.

Sources: Coffe Marketing Board, Lint Marketing Board, Uganda Tea Authority, Uganda National Tobacco Corporation/ B.A.T.(1984) Ltd. and Bank of Uganda

Table 2. Composition of Imports 1984–1985 **ANNEX B.**

Categories of Imports		1984.	1985.	Percentage (%) 1984	1985.
1.	Foods and Beverages	6,229.6	4,733.9	4.9	4.2
2.	Salt	3,421.1	2,170.5	2.7	2.0
3.	Sugar	20,382.3	5.952.0	16.0	5.2
4.	Cigarettes	1,896.9	450.0	1.5	0.4
5.	Alcoholic Beverages	716.4	1,123.3	0.6	1.0
6.	Saop cleaning and polishing preparations	8,924.1	6,991.9	7.0	6.2
7.	Drugs, Medical and Pharmaceutical Products	7,044.2	4,956.5	5.5	4.4
8.	Textile Fabrics and ready-made Clothing	12,285.3	4,253.2	9.6	3.7
9.	Motor Cycles and Bicycles	766.9	2,271.7	0.6	2.0
10.	Road Motor Vehicles	13,702.1	7,942.2	10.8	7.0
11.	Matches, Candles and Electric Instalations	2,256.0	2,942.1	1.8	2.6
12.	Househol Equipment	2,548.9	2,712.0	2.0	2.4
	A. SUB-TOTAL-CONSUMER GOODS	80,191.5	46,499.3	63.0	41.0
13.	Rubber Tyres and Tubes	2,811.8	4,676.2	1.9	4.2
14.	Industrial and Agricultural Machinery	3,663.6	8,491.0	2.9	7.5
15.	Spare parts	7,096.3	8,021.7	5.6	7.1
16.	Lime, Cement and Fabricated Construction Materials	10,142.1	15.457.7	8.0	13.7
17.	Precision Instruments	1;707.2	2,274.4	1.3	2.0
18.	Office Machines, Stationery Supplies and Books	4,638.4	5.140.4	3.6	4.5
19.	Shoes Materials for making Shoes	1.559.2	2.106.8	1.2	1.9
20.	Packing Materials	5,492.1	3.247.1	4.3	2.9
	B. SUB.-TOTAL-PRODUCTIVE IMPORTS	37.110.7	49.415.3	28.8	43.5
	C. OTHER GOODS	10,452.7	17.648.9	8.2	15.5
	GRAND TOTAL (A+B+C)	127,754.9	113.563,5	100,0	100,0

NOTES; These are imports on cash basis through suction which do not include imports financed through loans and grants,
Source: Bank of Uganda.

Table 3. Area Planted and Production of Selected Food Crops: 1978-1985

ANNEX 9

	PLANTAINS	CEREALS						ROOT CROPS				PULSES					OIL SEEDS			
	Bananas	Finger Millet	Maize	Sorghum	Rice	Wheat	Total	Sweet potatoes	Irish potatoes	Cassava	Total	Beans	Field beans	Cow Peas	Pigeon Peas	Total	Ground Nuts	Soya Beans	Simsim	Total
AREA PLANTED (000 HECTARES)																				
1978	1,287.0	510.0	450.0	286.0	24.0	7.0	1,277.0	476.0	37.0	529.0	1,042.0	388.0	34.0	80.0	105.0	607.0	234.0	6.0	137.0	377.0
1979	1,173.0	313.0	272.0	187.0	12.0	3.0	787.0	256.0	21.0	322.0	599.0	227.0	19.0	43.0	58.0	347.0	122.0	4.0	60.0	186.0
1980	1,173.0	279.0	258.0	167.0	11.0	8.0	723.0	231.0	24.0	302.0	557.0	224.0	17.0	38.0	50.0	329.0	95.0	4.0	65.0	164.0
1981	1,180.0	300.0	280.0	170.0	12.0	4.0	746.0	350.0	25.0	310.0	685.0	259.0	18.0	41.0	55.0	413.0	110.0	5.0	70.0	185.0
1982	1,199.0	330.0	285.0	200.0	15.0	5.0	835.0	372.0	28.0	331.0	731.0	364.0	20.0	46.0	60.0	490.0	120.0	6.0	80.0	206.0
1983	1,209.0	341.0	295.0	207.0	17.0	5.0	865.0	457.0	30.0	372.0	859.0	398.0	32.0	46.0	62.0	538.0	124.0	6.0	95.0	225.0
1984	1,209.0	332.0	347.0	206.0	17.0	4.0	906.0	387.0	17.0	401.0	805.0	385.0	16.0	49.0	72.0	522.0	172.0	11.0	86.0	269.0
1985(Estimate)	1,209.0	312.0	271.0	186.0	14.0	4.0	787.0	347.0	15.0	387.0	749.0	343.0	14.0	45.0	63.0	465.0	160.0	10.0	75.0	245.0
PRODUCTION (000 HECTARES)																				
1978	8,855.0	561.0	594.0	351.0	26.0	14.0	1,564.0	1,669.0	293.0	2,028.0	4,010.0	291.0	14.0	31.0	42.0	378.0	187.0	6.0	40.0	233.0
1979	6,090.0	481.0	453.0	316.0	15.0	5.0	1,270.0	1,272.0	131.0	2,100.0	3,503.0	182.0	6.0	22.0	19.0	229.0	70.0	3.0	16.0	99.0
1980	5,699.0	459.0	286.0	299.0	17.0	17.0	1,078.0	1,200.0	168.0	2,072.0	3,438.0	133.0	7.0	16.0	26.0	182.0	70.0	3.0	20.0	93.0
1981	5,900.0	480.0	342.0	320.0	15.0	8.0	1,165.0	1,300.0	175.0	3,000.0	4,475.0	240.0	8.0	18.0	25.0	291.0	80.0	5.0	25.0	110.0
1982	6,596.0	528.0	393.0	388.0	19.0	10.0	1,308.0	1,487.0	196.0	3,127.0	4,810.0	300.0	10.0	20.0	28.0	358.0	90.0	6.0	35.0	131.0
1983	6,647.0	545.0	413.0	407.0	22.0	12.0	1,399.0	1,843.0	223.0	3,239.0	5,305.0	314.0	17.0	37.0	29.0	397.0	99.0	7.0	42.0	148.0
1984	6,461.0	223.0	281.0	164.0	20.0	7.0	695.0	1,791.0	78.0	1,881.0	3,750.0	265.0	13.0	39.0	25.0	342.0	118.0	9.0	39.0	166.0
1985 (Estimate)	5,552.0	210.0	252.0	148.0	18.0	7.0	635.0	1,142.0	65.0	1,673.0	2,880.0	235.0	11.0	35.0	22.0	304.0	107.0	8.0	26.0	141.0

Source: Planning Unit, Ministry of Agriculture and Forestry

Table 4. Livestock Statistics 1978-1985

ANNEX B.

	Unit	1978	1979	1980	1981	1982	1983	1984	1985
Cattle[1] " " "	'000	5,245,6	5,242.2	4,770.6	4,745.4	4,821.1	4,871.3	4,993.1	5,000.0
Sheep " " "	'000	1,195.6	1,255.6	1,318.4	1,384.3	1,453.3	1,526.0	1,602.0	1,674.0
Goats " " "	'000	2,609.1	2,624.3	2,543.6	2,670.8	2,804.3	2,944.6	3,091.0	3,246.0
Pigs " " "	'000	169.2	177.7	186.6	195.9	205.7	216.0	227.0	238.0
Poultry[2] " " "	'000	407.4	154.0	377.0	176.2	324.4	1,000.0	1,200.0	3,000.0
Estimated Fresh Milk[3] "	'000Lt.	150.6	246.8	233.1	337.5	289.0	260.0	251.9	220.7
Processed Milk	'000Lt.	8,897.5	5,105.2	6,761.7	6,155.2	17,699.2	16,379.1	20,668.2	15,932.0

NOTE: 1. Dairy and beef cattle.

2. Total Number of birds on Commercial farms including Chickens, geese, turkeys and ducks.

3. Excludes milk fed to calves.

Source: Statistics Section, Ministry of Animal Industry and Fisheries and Dairy Corporation Ltd.

Table 5. Fish Production in Uganda by Lake Region 1978-1985

ANNEX B.

Water Body	Tonnes '000							
	1978	1979	1980	1981	1982	1983	1984	1985
Lake Victoria	14.2	12.0	10.0	17.0	13.0	17.0	44.8	45.6
Lake Albert	20.6	17.0	13.0	6.0	10.0	4.0	4.0	6.0
Albert Nile	5.7	4.5	3.2	3.0	1.0	4.0	1.9	1.6
Lake Kyoga	167.0	133.0	131.0	130.0	138.0	140.0	150.0	100.0
Lake Edward, George and Kazinga Channel	11.8	9.6	7.0	5.0	6.9	6.0	10.4	6.6
Lake Wamala	1.8	2.0	1.0	3.8	0.5	0.7	0.5	0.3
Other Waters	1.1	1.8	0.7	3.0	0.6	0.6	0.7	0.7
Total	222.2	179.9	165.9	167.8	170.0	172.3	212.3	160.8

NOTE: 1985 Figures are provisional.

Source: Fisheries Department, Ministry of Animal Industry and Fisheries.

ANNEX 8

Table 6. Industrial Production Statistics: 1982-85 (Selected Commodity and Establishments)

	Name of Establishment	Commodity	Unit	Installed Capacity p.a.	Production 1982	1983	1984	1985	Expected Production for 1986	% of Capacity Utilisation 1982	1983	1984	1985	Change in Capacity Utilisation 82/83	83/84	84/85
(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1.	Diary Corporation Ltd., Kampala Plant....	Milk	'000 Litres	47,450.0	16,528.0	15,130.0	19,621.2	15,565.7	-	34.8	31.9	41.4	32.8	-2.9	9.5	-8.6
2.	Diary Corporation Ltd.,Mbale Plant	Milk	'000 Litres	10,950.0	1,717.0	1,249.0	1,047.0	1,030.7	-	10.7	11.4	9.6	9.4	0.7	-1.8	-0.2
3.	L.M.B. Edible Oil and Soap Industry.....	(a)Edible Oil	Tonne	-	-	100.7	167.6	214.8	-	-	-	-	-	-	-	-
		(b)Soap	Tonne	-	-	2,747.7	1,019.2	772.7	-	-	-	-	-	-	-	-
4.	Uganda Millers	Wheat Flour	Tonne	45,000.0	4,434.0	5,298.0	4,214.0	7,889.8	1,980.0	9.9	11.8	9.4	17.4	1.9	-2.4	8.0
5.	Kakira Sugar Works, Ltd.	Sugar	Tonne	90,000.0	2,745.0	1,452.0	58.0	-	-	3.0	1.6	0.1	-	-1.4	-1.5	-
6.	Sugar Corporation of (U) Ltd.	Sugar	Tonne	60,000.0	396.0	2,340.0	2,391.0	808.3	-	0.7	2.2	3.9	1.3	1.5	1.7	-2.6
7.	National Sugar Works (Kinyala)	Sugar	Tonne	10,000.0	148.0	341.0	946.1	-	-	1.5	3.4	9.5	-	1.9	2.1	-
8.	Midas Foods Ltd.	Sweets	Tonne	270.0	88.0	58.0	14.0	136.7	694.0	32.6	21.5	16.6	50.6	-11.1	-4.9	34.0
9.	Malvard Sweets and Toffees Factory	Sweets and Toffees		4,200.0	82.0	54.0	10.0	22.4	-	1.9	1.3	0.2	0.5	0.6	-1.1	0.3
10.	Nakasero Soap Works (Sweet Factory)	Sweets	Tonne	960.0	10.0	12.0	9.4	31.3	-	1.0	1.3	1.0	3.3	0.3	-0.3	2.3
11.	Midas Foods Ltd.	Biscuits	Tonne	648.0	32.0	52.0	57.0	33.2	66.0	4.9	8.0	8.7	5.1	3.1	0.7	-3.6
12.	Blenders (U) Ltd.	Tea	Tonne	1,150.0	697.0	524.0	111.6	115.6	240.0	84.1	45.6	9.7	10.1	-38.5	-35.9	0.4
13.	Green Tea Factors Ltd.	Tea	Tonne	-	-	84.0	52.0	-	-	-	-	-	-	-	-	-
14.	Kaman Kawanara Mabuka Ltd.	Coffee	Tonne	1,000.0	26.0	15.0	41.7	39.5	50.0	2.6	1.5	4.2	4.0	-1.1	2.7	-0.2
15.	C.M.B. Roasting Plant	Coffee	Tonne	120.0	n.a	n.a	56.1	53.8	72.0	-	-	46.8	44.8	-	-	-2.0
16.	African Basic Foods Ltd.	Soybean Foods	Tonne	600.0	-	96.5	45.0	22.3	37.6	-	16.1	7.5	3.7	-	-8.6	-3.8
17.	Mirinda Spices	Curry Powder	Tonne	59.0	51.0	49.0	18.7	30.7	35.0	86.4	86.4	33.7	52.0	-5.3	-51.4	20.3
18.	Uganda Food Products Ltd.	Curry Powder	Tonne	93.0	11.0	4.0	-	-	-	11.8	4.3	-	-	-7.5	-	-
19.	Uganda Maize Industries	Maize Flour	Tonne	9,360.0	4,610.0	4,070.0	1,513.2	1,314.8	-	49.3	43.5	16.2	14.0	-5.8	-27.3	-2.2
20.	Mukwano and Co.	Soaya	Tonne	n.a	-	-	66.8	338.0	360.0	-	-	-	-	-	-	-
21.	Uganda Animal Feeds	Animal Feeds	Tonne	18,300.0	2,238.0	5,229.0	3,008.0	4,191.0	7,200.0	12.2	28.6	16.4	22.9	16.4	-12.2	6.5
22.	E.A. Distilleries Ltd.	Uganda Waragi	'000 Litres	2,000.0	19.5	21.7	31.8	153.3	315.0	0.9	1.4	1.6	7.7	0.5	0.2	6.1
23.	Uganda Breweries Ltd.	Beer	'000 Litres	31,250.0	5,995.0	6,477.1	6,482.2	5,373.5	8,500.0	19.1	20.7	20.7	17.2	1.6	0.1	-3.5
24.	Nile Breweries Ltd.	Beer	'000 Litres	16,000.0	3,832.0	7,737.0	8,334.4	2,810.7	6,221.5	24.0	48.3	52.1	17.6	24.3	3.8	-34.5
25.	Chibuku Ltd.	Beer	'000 Litres	1,878.0	-	-	310.4	221.6	240.0	-	-	16.5	11.8	-	-	-4.7
26.	Lake Victoria Bottling Co. Ltd.	Soft Drinks	'000 Litres	12,109.6	1,682.6	3,893.9	5,601.8	4,750.2	6,030.0	13.9	32.3	46.3	39.2	18.3	14.1	-7.1
27.	Uganda Mineral Waters Ltd.	Soft Drinks	'000 Litres	586.6	80.5	20.0	195.5	230.0	-	13.7	3.4	26.5	39.2	-10.3	23.1	12.7
28.	Jubilee Ice and Soda Works	Soft Drinks	'000 Litres	528.0	-	-	-	21.6	n.a.				-	-	-	-
29.	Nile Crystal Springs (1973) Ltd.	Soft Drinks	'000 Litres	513.0	1.6	9.4	5.5	-	-	0.3	1.8	1.1	-	1.5	-0.7	-

Source: Statistics Department, Ministry of Planning and Economic Development.

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ANNEX C

PILOT PLANT EQUIPMENT

1. Small-Scale Retort Instrument System, including standard accessories, pressure and temperature recording instruments, termocouples connectd to a reader, air line gauge regulator set, steam and overflow valves, check valves, dual top valve, orifice and capacity tank, 4-way air selection valve and needle valve, also including retort air regulating valve assembly and lid cooling water assembly for glass containers, canning, 2 crates (58 cm diameter x 66 cm deep).

2. Universal Vacuum Closing Machine with vacuum pump and motors, two sets of seaming rolls, base plates and chucks (for two can sizes chosen according to source of supply), mounted on a metal stand.
   Closing range: cans from 38 to 157 mm diameter up to 178 mm height.
   Can seam test kit (micrometer) and a can opener should be included.

3. Two Steam- Jacketed Kettles, tilting model, constructed of stainless steel with dome covers, including pressure reducing safety valves, pipe line strainers, steam traps, pressure gauges, thermometers and three blanching baskets. Capacity: 150 l each.

4. Tray Dryer, with a 5 square meter drying surface, mounted on a frame, including electric tray lifting device, 10 stainless steel slotted trays (75 x 75 x 12.5 cm each), single - entry centrifugal fan, corresponding connections, valves, steam traps and 2 temperature controllers connected to a low pressure steam gauge, and control panel.
   Capacity: 40-300 kg of raw materials (wet weight) per 8 hours shift.

5. Smoking Cabinet with trolley, electricially heated, made of stainless material, including smoke generator (sawdust), programmer and control panel. Capacity per batch: 200 kg.

6. Universal Mixing - Cutting Machine with changeable attachment: bowl for mixing and kneading with corresponding arms, slicer and dicer attachment with adjustable knives and cylindres, a mill capable to comminute dry materials into grits and flours.

7. Pulper - Finisher Machine with variable speeds (600-1750 RPM) for fresh fruit pulping and straining, with two sets of screens (1.0 and 1.5 mm for pulper and 0.5 and 0.8 mm for finisher).

8. Table for Cleaning and Trimming with two sinks mounted on racks, table top stainless steel, with edges turned up and on one end, racks and sinks and legs made of galvanized steel, dimensions 250 x 80 cm.

9. Table for Filling the cans and glass containers, table top stainless steel, other galvanized steel, top edged turned up with a drain opening, dimensions 200 x 80 cm.

10. Walk-in Cooler, 8 m^3, with shelves on one side, and door 120 cm wide.

11. Free Standing Scale 0 - 100 kg, dimensions 80 x 80 cm.

12. Table Scale, 0 - 5 kg.

13. Electric Stove with programmable (time and temperature) oven.

14. Manual Cart for internal transport, platform dimensions 100 x 80 cm.

15. Ten Pans of 50 litres, with 2 bearing handles, made of plastics.

16. Three Vats, capacity 300 litres each, made of hard plastics.

17. Utensils and accessories - a number of pots, saucepans, cutlery, etc., required for work performed.

LIST OF PILOT PLANT EQUIPMENT

1.	Retort and instrument System	pcs 1
2.	Universal Vacuum Closing Machine	pcs 1
3.	Steam Jacketed kettles	pcs 2
4.	Tray Dryer	pcs 1
5.	Smoking Cabinet, Smoke generator and trolley	pcs 1
6.	Universal Mixing and Cutting Machine	pcs 1
7.	Pulper - Finisher	pcs 1
8.	Table with Sinks	pcs 1
9.	Table for filling	pcs 1
10.	Walk-in Cooler	pcs 1
11.	Free -Standing Scale	pcs 1
12.	Table scale	pcs 1
13.	Electric Stove with programmable oven	pcs 1
14.	Manual Cart	pcs 1
15.	Pans 50 litres each	pcs 10
16.	Vats, 300 litres each	pcs 3
17.	Utensils and Accessories	pcs -

Total FOB Cost : US $ 121,850

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ANNEX D1

LIST OF EQUIPMENT FOR PHYSICAL AND CHEMICAL LABORATORY

	pcs
1. PRECISE ANALYTICAL BALANCE 0.01 g. resolution	1
2. LABORATORY TYPE BALANCE Balancing range from 50 mg to 2000 gr	1
3. SET OF GRANULATION SIEVES	1
4. MILL with set of knives and axis for cutting pressing and milling	1
5. MIXER for samples homogenization with set of knives, mixers and vessels and attachment for straining	1
6. DRIER 50^{o} - 200^{o} C $\pm$ 2^{o}C	1
7. ANNEALING FURNACE WITH REGULATOR for temperature up to 1200^{o}C	1
8. SINGLE ELECTRIC PLATE (300x300x2)	1
9. SYSTEM FOR QUICK DEFINITION OF MOISTURE ULTRA X with two vessels	1
10. pH - Meter, digital	1
11. CONDUCTOMETER - SYSTEM FOR WATER QUALITY DETERMINATION BY CONDUCTING, Range conductivity from 0,1 $pScm^{-1}$ to 1300 $mScm^{-1}$	1
12. KJELDAHL SYSTEM I for all kinds of digestion with temperature and time regulation	1
13. SOXHLET SYSTEM 2, for all kinds of digestion with temperature and time regulation	1

14. POLAROGRAPH WITH SYSTEM OF Hg, Pt and graphite Electrodes for electroactive species determination, with range ± 5 V	pcs	1
15. SPECTROPHOTOMETER (UV, VIS, IR) with set of cubette		1
16. LABORATORY TYPE REFRACTOMETER		1
17. MANUAL TYPE REFRACTOMETER		1
18. LABORATORY FURNITURE:		
- CUPBOARD 600/490/1800 mm		2
- CUPBOARD 1200/490/1800 mm		2
- TABLE 2850/600/915 mm		2
- TABLE 1350/600/915 mm		1
- TABLE 1350/1500/915 mm		1
- SINK 1250/600/900 mm		1
- SINK 1350/600/900 mm		2
- DIGESTOR 1240/820/2850 mm		2
- TABLE FOR PRECISE ANALYTICAL BALANCE		1
- TABLE FOR DESTILATION 1950/600/2050 mm		1
- WALL RACK FOR DRIPPING		3
- TABLE SET FOR TITRATION		2
- SIDE TABLE 900/550/840 mm		1
- SIDE TABLE 1000/620/750 mm		1
- WRITING DESK 1350/600/765 mm		1
- SWIVEL CHAIR		3
- SWIVEL STOOL		2

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ANNEX D2

LIST OF GLASSWARE AND ACCESSORIES
(for 2 years)

1.	Meat Mincer	pcs	1
2.	Kitchen knife	pcs	2
3.	Reserve Soxhlet flask, long neck with cooler	compl.	12
4.	Reserve Kjeldahl system (with flasks for digestion)	compl.	2 (24 pcs)
5.	Soxhlet flask, long and short neck (250+100)	pcs	10 + 10
6.	Cooler for Soxhlet (long and short)	pcs	10 + 10
7.	Automatic burette à 25 ml	pcs	4
8.	Automatic burette à 25 ml (dark)	pcs	4
9.	Automatic burette à 10 ml (dark)	pcs	4
10.	Automatic burette à 10 ml	pcs	4
11.	Spray bottle	pcs	2
12.	Cubette for ultra x apparatus	pcs	5 (min)
13.	Funnel	pcs	10
14.	Porculan mortar	pcs	10
15.	Pippete à 25 ml	pcs	10
16.	Pippete à 10 ml	pcs	10
17.	Pippete à 50 ml	pcs	10
18.	Pippete à 100 ml	pcs	10
19.	Pippete à 5 ml	pcs	10
20.	Erlenmayer flask à 250 ml	pcs	10
21.	Graduated beaker (wide neck) à 100 ml	pcs	10
22.	Graduated beaker (wide neck) à 200 ml	pcs	10

23.	Graduated beaker	(wide neck)	à 500 ml	pcs 10
24.	Graduated beaker	(wide neck	à 1000 ml	pcs 3
25.	Graduated pippete	à 1 ml		pcs 10
26.	Graduated pippete	à 50 ml		pcs 10
27.	Graduated pippete	à 100 ml		pcs 10
28.	Graduated pippete	à 1000 ml		pcs 10
29.	Measuring cylinder	à 25 ml		pcs 10
30.	Measuring cylinder	à 10 ml		pcs 10
31.	Graduated pippete	à 10 ml		pcs 10
32.	Erlenmayer flask	à 100 ml		pcs 10
33.	Graduated flask	à 25 ml		pcs 10
34.	Measuring cylinder	à 100 ml		pcs 10
35.	Measuring cylinder	à 50 ml		pcs 10
36.	Beaker	à 100 ml		pcs 10
37.	Beaker	à 250 ml		pcs 10
38.	Beaker	à 500 ml		pcs 10
39.	Beaker	à 800 ml		pcs 10
40.	Beaker	à 1000 ml		pcs 10
41.	Beaker	à 2000 ml		pcs 5
42.	Clock glass			pcs 10
43.	Filter paper	3 x 10 box + 250 pcs sheet of paper		
44.	Litmus paper (pH paper)	3 x 5 box		
45.	Buchner funnel (with botle, stopper and water pump)			pcs 4

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ANNEX D3

LIST OF CHEMICALS

(for 2 years)

1. Tetrachlor carbon (Organic disolver)		144 l
1.1. CCl_4		24 l
1.2. CH_3Cl		24 l
1.3. Ether		24 l
1.4. Acetone		72 l
2. H_2SO_4 cone		48 l
3. $CuSO_4$ Clear		960 g
4. K_2SO_4		9600 g
5. NaOH		500 g
6. Phenalophtalein		100 g
7. Ethanol		20 l
8. H_2SO_4 "Titrival"	compl.	288 g
9. NaOH	compl.	288 g
10. Methyl Red		10 g
11. Quartz Sand		2000 g
12. K_2CrO_4		150 g
13. $AgNO_3$ "Titrival"	compl.	24
14. $ZnSO_4$		300 g
15. $KMnO_4$ "Titrival"	compl.	16
16. HC' "Titrival"	compl.	14
17. Sulphaniline Acid		3000 g
18. AcH (Anhydrous)		192 l
19. a - Naphtylamine		150 g
20. H_2O_2		20 l

21.	KH_2PO_4	4800 g
22.	$(NH_4)_6MO_7O_{24}$	500 g
23.	Na_2SO_3	2000 g
24.	Hidrocinone	96 g
25.	Buffer Solution pH=5 "Titrival" compl.	10
26.	Buffer Solution pH=7 "Titrival" compl.	10
27.	Buffer Solution pH=10 "Titrival" compl.	10
28.	$K_2Cr_2O_7$	150 g
29.	Methylorange	10 g
30.	Methyl blue	10 g
31.	Ditizon	10 g
32.	Brucine	25 g
33.	Hidrazin (Hydrosulphate)	50 g
34.	1,10 - Phenantroline	50 g

YUGOSLAVIA SARAJEVO JNA 20

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ANNEX D4

LIST OF REAGENTS

(for 2 years)

1. HNO_3	conc.	48 l
2. H_2SO_4	conc.	25 l
3. Ammonium Oxalate		1500 l
4. HCl	conc.	17 l
5. Citric Acid		5000 g
6. NH_4OH		24 l
7. Diethylditiocarbamat		100 g
8. HCl "Titrival"	compl.	96
9. $CuSO_4 \times 5\ H_2O$		7000 g
10. Bromine Thymol Blue		10 g
11. NaOH "Titrival"	compl.	24
12. Buffer Solution pH=9,1		5000 ml
13. Seignette Salt		40.000 g
14. NaOH crystal		10.000 g
15. Ethanol pro analisy		20.000 ml
16. Ether pro analisy		20.000 ml
17. Feroamoniumsulphate		10.000 ml
18. Metyl Orange		10 g
19. Feroamonium "Titrival"	compl.	10
20. Iod		288 g
21. KJ		2400 g

UPI-INVEST

ANNEX E 1

LIST OF MICRO-BIOLOGICAL LABORATORY EQUIPMENT

1.	Laboratory type balance	pcs 1
2.	Mill for sample homogenization	pcs 1
3.	Mixer	pcs 1
4.	Vibrator	pcs 1
5.	Laboratory heater (plate 2 x 300)	pcs 2
6.	Microbiology redistiller of organic solvents	pcs 2
7.	Autoclave	
8.	Bacteriological thermostates (300x350x300) 30-80^{o}C $\pm$ 10^{o}C	pcs 1
9.	Bacteriological thermostates (800x600x500) 30-80^{o}C $\pm$ 1^{o}C	pcs 1
10.	Hot waterbath (290x160x240) t max = 80^{o}C	pcs 1
11.	Hot waterbath (540x300x240) t max = 80^{o}C	pcs 1
12.	Sterilizer (440x300x300) 50-200^{o}C $\pm$ 2^{o}C	pcs 1
13.	Express sterilizer (300x350x300) 50-200 $\pm$ 2^{o}C	pcs 1
14.	Water distiller	
15.	Microscope (binocular)	
16.	Contrast rectifier and stabiliser	pcs 1
17.	Colonies counter	pcs 1
18.	Centrifuge (6 places, 1000 rpm)	pcs 1

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LIST OF EQUIPMENT B

1.	Cupboards	pcs 2
2.	Cupboards	pcs 2
3.	Work benches	pcs 1
4.	Work benches	pcs 1
5.	Work benches	pcs 1
6.	Work benches	pcs 1
7.	Sink	pcs 1
8.	Work benches	pcs 1
9.	Work benches	pcs 1
10.	Precision balance	pcs 1
11.	Desk equipment for titration	pcs 1
12.	Side desk	pcs 2
13.	Writing desk	pcs 1
14.	Swivel chair	pcs 3
15.	Swivel stool	pcs 2
16.	Freezer (200 l)	pcs 1

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ANNEX E 2

LIST OF LABORATORY GLASSWARE AND ACCESSORIES

Specification for 2 years

1.	Petri`s dishes	pcs 500
2.	Microbiological tubes 16 x 160 mm (with corcs)	pcs 500
3.	Microbiological tubes 18 x 180 mm (with corks)	pcs 200
4.	Microbiological pippete 1 ml	pcs 50
5.	Microbiological pippete 2 ml	pcs 10
6.	Microbiological pippete 5 ml	pcs 10
7.	Microbiological pippete 10 ml	pcs 50
8.	Standard dripper	pcs 10
9.	Glass pearl	kg 10
10.	Glass stick 100 mm	compl. 10
11.	Microscope slide 10 boxes	pcs 50
12.	Cover - slip 10 boxes	pcs 50
13.	Pincers 12 cm	pcs 2
14.	Pincers 10 cm	pcs 2
15.	Hystological needle	pcs 2
16.	Scalper	pcs 1
17.	Mortar with pestle Ø 16 cm	pcs 2
18.	Scissors, big	pcs 1
19.	Scissors, small	pcs 1
20.	Rubber bubg, different	pcs 200
21.	Platinum fine needles (wire Ø 0,3 mm)	pcs 3 (24 cm)

22. Ertenmayer flask (wide neck)	pcs 2
- à 200 ml	pcs 10
- à 1000 ml	pcs 10
- à 500 ml	pcs 20
- à 250 ml	pcs 20
- à 100 ml	
23. Graduated flusk	
- à 1000	pcs 4
- à 500 ml	pcs 4
- à 250 ml	pcs 10
- à 100 ml	pcs 10
24. Glass bottle with frosted glass stopper	
- à 1000 ml	pcs 10
- à 500 ml	pcs 10
- à 250 ml	pcs 20
- à 100 ml	pcs 50
25. Microbiological spirit-lamp	pcs 6
26. Durham ` s tubute, 30x6 mm	pcs 100
27. Durham` s tubute	
28. durham`s tubute	
29. Graduated beaker, narrow neck	
- à 600 ml	pcs 10
- à 250 ml	pcs 10
- à 100 ml	pcs 10
- à 50 ml	pcs 10

30. Graduated beaker, wide neck	
- à 1000 ml	pcs 4
- à 800 ml	pcs 10
- à 400 ml	pcs 10
- à 250 ml	pcs 10
- à 150 ml	pcs 20
- à 100 ml	pcs 20
- à 50 ml	pcs 20
31. Vessel for crystalization	
- Ø 60 mm	pcs 10
- Ø 115 mm	pcs 10
- Ø 140 mm	pcs 10
32. Plastic traces, big	pcs 4
33. Plastic traces, small	pcs 4
34. Microbiologcal trace, enameld, small	
35. Basket for test tubes, wire	pcs 10
36. Insert rack for test tubes (for 48 test tubes)	pcs 20
- for test tube 16 x 160	pcs 10
- for test tube 18 x 180	pcs 10
37. Insert rack for pippete	pcs 4
38. Measuring cylindre, glass	
- à 500 ml	pcs 4
- à 250 ml	pcs 4
- à 100 ml	pcs 4

39. Spray bottle 1 l	pcs 4
40. Spray bottle 500 ml	pcs 2
41. Porculan dishes, Ø 100 ml	pcs 10
42. Filter G_4 (B_4)	pcs 5
43. Filter G-35 (pore to 0,5 micr.)	pcs 5
44. Dripping bottle, dark	
- à 50 ml	pcs 10
- à 100 ml	pcs 10
45. Dripping bottle, light	
- à 50 ml	pcs 10
- à 100 ml	pcs 10
46. Laboratory brush, for test tubes, small	pcs 4
Laboratory brush, for test vessels, big	pcs 2
47. Medicine gloves	pcs 10
48. Buchner funnel (with bottle, stopper and water pump)	pcs 4

Other Material

1. Medicine cotton wool	kg 5
2. Filter paper, sheet	pcs 100
3. Filter paper, white, black and blon strip	box 2+2+2
4. Rubber bowel	
- Ø 5 mm	m 2
- Ø 10 mm	m 5

5. Medicine gauze	m 10
6. Soxlet flask	
- 100 ml	compl.
- 250 ml	compl.
- 500 ml	compl.
7. Small pot for heating	
- 30 x 38	pcs 10
- 35 x 44	pcs 10
- 40 x 32	pcs 10
- 40 x 50	pcs 10
- 45 x 36	pcs 10
- 50 x 40	pcs 10
8. Automatic byrette 25 ml	(bottle 2000 ml)
- as per Mohr	pcs 5
- dark	pcs 5
9. Automatic byrette 50 ml	(bottle 2000 ml)
- as per Mohr	pcs 5
- dark	pcs 5
10. Pippete fortuna	
- à 1 ml	pcs 10
- à 2 ml	pcs 10
- à 5 ml	pcs 10
- à 10 ml	pcs 10
- à 25 ml	pcs 10

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ANNEX E 3

LIST OF CULTURE MEDIA AND CHEMICALS

Culture Media and Reagents

Specification for 2 years

1.	Feeding agar	
2.	Feeding bouillon spore forming	g 200
3.	V.L. Agar for anaerobic bacteria	g 200
4.	Selenite bouillon	g 200
5.	Wilson - Blair culture Media	g 500
6.	SS Agar-Agar	g 500
7.	Double sugar as per Kliger	g 100
8.	Christen` s urea	g 200
9.	Phenylalanine Agar	g 100
10.	Feeding gelatine	g 100
11.	Peptone watter for proving indole	g 100
12.	Brilliant - green agar	g 500
13.	Briliant - green lactose bile bouillon	g 500
14.	VRB - violet-red bile agar	g 500
15.	Methyl Red Voges Proskaver	g 400
16.	Simon` s citronate culture media	g 200
17.	Salt Bouillon (10% NaCl)	g 100
18.	Peptone 1	g 100
19.	Peptone water	g 4000
20.	Bairo-Parker Agar	g 100
21.	Rosenow - a culture Media	g 100
22.	Sulphite agar	g 300
23.	Sabourand Maltose Agar	g 200
24.	Blood Agar-Agar for β-streptococae as per Liebermeister and Braveri	
25.	Bouillon for β- streptococae as per Liebermeister and Braveri	g 9200
26.	Tributirin Agar	g 200

27.	Peptone water with lactose and Andrade` s Andrade` s indicator (LAP)	g 500
28.	Endo Agar	g 500
29.	Hanny - Noron Bouillon	g 200
30.	triptone	g 100
31.	Polyvalent, Collectiv O Aglutamination Serum for Salmonellae	box 5
32.	Chapman` s Culture Media	pcs 5
33.	Desoxihalate citrat agar	g 200
34.	Dextrose teleurite agar	pcs 5
35.	McConkey` s Bouillon	pcs 3
36.	McConkey` s Agar	g 300
37.	Base for blood agar	g 200
38.	Agar	g 200
39.	Thioglicolate culture media	g 100
40.	Andrade peptone water	g 200
41.	Andrade lactose peptone water	g 200
42.	Lactose	g 100
43.	dextrose	g 100
44.	Saccharose	g 100
45.	Maltose	g 100
46.	Glucose	g 100
47.	Columbia blood agar	g 100
48.	Base for blood agar	g 100
49.	Eosin Methyl blue agar	g 100
50.	Wilkins-Chalgreen anaerobic agar	g 100

CHEMICALS

Specification for 2 years

1.	NaCl	kg 1
2.	Sodium citrate ($C_2H_5Na_3O_7xH_2O$)	g 100
3.	KOH	g 500
4.	NaOH	g 500
5.	H_2SO_4	ml 1000
6.	HCl	ml 3000
7.	Ethyl Alcohol, 96%	
8.	Starch	g 500
9.	Vaseline	g 100
10.	Anyline	g 10
11.	Formaldehyd	ml 250
12.	Xyol	ml 250
13.	Tritone x-100 (anionic detergent = Octylphenol-polythylen glyco glycolethar)	g 100
14.	Trihydroxymethylaminomethan, M_w=121,14	g 100
15.	Lead Acetate	g 15
16.	Phenylalanine	g 25
17.	Indol	g 25
18.	Glucose	g 25
19.	Saccharose	g 25
20.	Gelatin	g 50
21.	Methyl Red	g 10
22.	Methyl Blue	g 10
23.	Phenyl red	g 10
24.	Alfa Napthyl	g 25

25.	Fuxin alcaline	g 10
26.	fuxin sour	g 10
27.	KJ	g 100
28.	J	g 100
29.	Gentian violet	g 10
30.	Lugol`s solution (J_2+KJ)	ml 250
31.	$CuSO_4$ x 5 H_2O	g 100
32.	$FeCl_3$	g 100
33.	Na_2HPO_4	g 100
34.	K_2HPO_4	g 100
35.	KH_2PO_4	g 100
36.	Sodium Acid	g 10
37.	$MgSO_4$ x 7 H_2O	g 100
38.	KCN	g 20
39.	Geosine	g 50

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ANNEX F

LIST OF FURNITURE AND MISCELLANIOUS EQUIPMENT

1.	**FURNITURE**	
1.1.	Built-in cupboard to form corridor	22,0 sq.m.
1.2.	Sitting set (Table and chairs)	5 sets
1.3.	Working desks and chairs in the studies	4 sets
1.4.	Secretary set and chair	1 set
1.5.	Free standing cupboards	24,0 sq.m.
1.6.	Manager office desk and chair	1 set
1.7.	Library check-in desk and chair	1 set
1.8.	Two-sided open book shelves	19 sq.m.
1.9.	Library desk and chair sets	5 sets
1.10.	Conference table and 8 chairs	1 set
1.11.	Conference table and 18 chairs	1 set
1.12.	Canteen tables and 4 chairs	4 sets
1.13.	Snacks bar and 4 bar chairs	1 set
	Total:	US $ 32,820

2. MISCELLANIOUS EQUIPMENT

2.1. Boiler for fast steam production	1 pc
2.2. Air compressor	1 pc
2.3. Pick-up lorry	1 pc
2.4. Step-down transformer	1 pc
2.5. Maintenance equipment for mechanical and electric workshop	1 set
2.6. Kitchenette equipment and utensils	
2.7. Trach container	2 pc
2.8. Cleaning utensils	
Total US $	78,950
Total for furniture and miscellanious equipment	**111,770**

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ANNEX G.

CONTACTS MADE DURING THE TEAM MISSION STAY TO UGANDA 29.10-15.11.1986.

1. UNDP	- Mr. FREDERICH MUM VON MALINCKRODT, Rezident Representative - Mr. LAD BYENKYA - ABWOOL, National Programme Officer
2. FAO	- Mr. ABNER SYAMBI - Mr. EDWARD LWANGA
3. THE WORLD BANK	- Mr. GRANT SLADE, Rezident Representative
4. MINISTRY OF AGRICULTURE AND FORESTRY	- Hon. ROBERT KITARIKO, The Minister - Mr. POLICARDO OFWONO, Perm Secret. - Mr. A.K. OSUBAN, Commissioner for Agriculture - Mr. F.A. OJACOR, Dep. Comm. for Product. - Mr. J.B. MUBIRU, Dep. Comm. for Agricult. - Mr. OTHIENO, Dep. Comm. for Develop. - Mr. NYUGO, Director for Agric. Inform. - Mr. A.R. SEMANA, Research Officer - Mr. D. WAMAJJI, Food Techn. Researcher - Mr. P.PADDE, Officer for Development
5. MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT	- Mr. G.W. LUTAYA-KAMYA, Govt. Chief for Development - Mrs. A. GAVA, Dep. for Agriculture
6. MINISTRY OF INDUSTRY	- Mr. J. KAPASI-KAKAMA, Head of Dept. for Food Technology
7. MINISTRY OF FINANCE	- Mr. F. SSEKANDI, Consultant for Invest. - Mr. OCHERO " " "

8. MINISTRY OF REGIONAL COOPERATION	- J.C. OKALANY, Personal Assist. to the Minister
9. MINISTRY OF HOUSING AND URBAN DEVELOPMENT	- Dr. A. LUBEGA, Chief Architect - Mr. QAZI, Assistant - Miss. S. BAUDA, Officer
10. MINISTRY OF ANIMAL HUSBANDRY AND FISHERIES	- Mr. W. SSEKONO, Undersecretary for Planning and Development
11. AGRICULTURAL SECRETARIAT	- Mr. C.G. OLOK, Deputy Director - Mr. L. ETURU, Ass. Director - Mr. K.M. AGARWAL, Financ. Analyst - Dr. N.S. SHETTY, Agricultural Economis - Dr. A.M. MUTHEE, Economist/Statistic.
12. UGANDA DEVELOPMENT CORPORATION	- Dr. G.S.B. KINYATTA, Director - Mrs. M. UAWILLY, Research Officer
13. GOVERNMENT CHEMIST (Ministry of Internal Affairs)	- Mr. K.Z. OKELLO, Chief Inspector
14. MAKERERE UNIVERSITY FAC. FOR AGRIC. AND FORES.	- Dr. OKELLO-UMA, Assoc. Proff., Head of Animal Science Department

15. KABANYOLLO UNIVERSITY FARM

16. MAMULONGE COTTON RESEARCH CENTER (MINISTRY OF AGRIC.)

17. KAWANDA RESEARCH STATION (MINISTRY OF AGRIC.) - Mr. MATOWU, Dep. Director

18. MAMALERE CENTRE FOR AGRI-CULTURE MECHANIZATION (MINISTRY OF AGRIC.)

19. MUKONO DISTRICT FARM INSTITUTE AND RURAL TRAINING CENTRE - Mr. H.G.W. MUKASA, Assis. Principal

20. UGANDA GRAIN MILLING LTD. - Mrs. A.N. MUKASA, Gen. Manager
x UGANDA MILLING JINJA
x UGANDA MAIZE MILL, KAMPALA - Mr. L.D. OKEE, Dep. Gen. Manager
x UGANDA FEEDS LTD, JINJA - Mr. J.G. NABENDE, Dir. of Uganda Feed
x BAKERY, JINJA

21. PINEAPPLE PROCESSING PLANT (COOPERATIVE UNION, MASAKA) - Mr. G.W. MAKASA-MAYANA, Gen. Director

22. MUKISA BISQUITS, KAMPALA - Mr. A. KAAHWA, Dec. Director

23. DAIRY PLANT KAMPALA - Dr. J. HABYA-RIMANA, Gen. Director

24. AFRICA BASIC FOOD (SOYA PROCESSING PLANT)

25. LARCO CONTRACTORS, KAMPALA - Mr. L. LARCO, Director

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ANNEX H

LIST OF MAPS:

UPI-INVEST

B I B L I O G R A P H Y

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YUGOSLAVIA SARAJEVO JNA 20

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ATTACHMENTS

UNITED NATIONS
DEVELOPMENT PROGRAMME

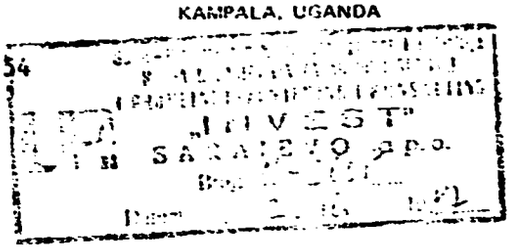
PROGRAMMED DES NATIONS UNIES
POUR LE DEVELOPPEMENT

OFFICE OF THE RESIDENT REPRESENTATIVE

P.O. BOX 7184
KAMPALA, UGANDA

TELEPHONE: 233440 2, 233445
CABLES: UNDEVPRO KAMPALA
TELEX: 61255

REFERENCE: UC/UGA/85/254



17 September 1987

Dear Mr. Vassiliev,

Subject: UC/UGA/85/254 Establishment of a Food Processing Centre - UPI Invest Draft Report

..... Please find herewith enclosed a copy of the comments on the UPI-Invest Draft Report, by the counterpart in the Ministry of Agriculture.

We agree with the comments as made, except No.5, which would need to be further elaborated. It is true that housing accommodation for staff is a major constraint. The idea of the problem being addressed by the project could be examined with the construction of the staff housing being government contribution.

We would appreciate your advising us in time of the planned dates for Mr. Sucur's return mission.

Yours sincerely,

Mustafa Jalil

Friedrich W. Hamm von Pallinkrodt
Resident Representative

Mr. A.A. Vassiliev
Deputy Director-General
Department of Industrial Operations
UNIDO, Vienna

cc: Mr. Branco Sucur
UPI-Invest
JNA 20, 71000 Sarajevo
Yugoslavia

TELEGRAMS: AGRICULTURAL ENTEBBE
TELEPHONE: ENTEBBE 20351

OFFICE OF THE
COMMISSIONER FOR AGRICULTURE
P.O. BOX 2,
ENTEBBE, UGANDA.

THE REPUBLIC OF UGANDA

IN YOUR CORRESPONDENCE ON THIS SUBJECT PLEASE QUOTE NO. C/MIN. 175

15 September, 1987

The Resident
Representative
UNDP,
KAMPALA.

UC/UGA/85/254 ESTABLISHMENT OF FOOD PROCESSING CENTRE

- UPS INVEST DRAFT REPORT

Please refer to your letter UC/UGA/85/254 dated 31 July, 1987 in connection with the above report. We wish to make the following comments on the report. Generally the report sets out the project in the manner that we discussed and we are happy with it. We, however have the following specific comments to make.

1. While Maize consumption as a staple food has increased in the recent years it is our view that sorghum and millet remain significant staple foods and, therefore, emphasis should be placed on these crops as well, at the centre.

2. Among the Centre's functions it is our feeling that the training of farmers and other people connected with food production should be included especially in respect of preservation of produce at the primary level.

3. The equipment envisaged for the Centre appear to be those intended for processing fruits, vegetables and fish mainly. While we support this direction, we feel, however, that the Centre should be able to provide services covering a wider range of commodities. In this case, therefore, provision should be made for more versatile equipment for the Centre.

4. Regarding packing materials to be used in the Centre, the report lays emphasis on importation of these materials.

   We feel that a unit should be incorporated within the Centre to look into the possibility of providing packing materials locally

5. The report recomendsthe construction of the Pilot Plant, laboratories, common facilities etc. but does not mention construction of staff houses for the centre. It is our view that housing accomodation for staff would remain a major constraint and should be adressed by the project. In this connection we would recommend that houses be constructed from concrete structures to give them a little more longevity.

6. The report recommends the recruitment of 2 Food Technologists. One to be Director and the other to be in-charge of the Pilot Plant. We feel that one Food Technologist in the initial stages of the project would suffice for both the Centre and the Pilot Plant. Meanwhile local personnel should be sent for training to come and fill vacancies that should be indentified. As the Centre activities pick up two Food Technologists may be recruited.

...../2

In the same vain the number of consultants to be required to inspect the Assembly and the Plant performance trial tests and ascertain the performance of the machinery could likewise be reduced.

We trust that these views will be taken into account in making a final decisison on this matter.

Yours Sincerely,

Augustine K. Osuban
Commissioner for Agriculture

UPI-INVEST

C O M M E N T S

on the Remarks to Food Processing Centre Report (UC/UGA/85/254) by Uganda Republic Government, Ministry of Agriculture

1. General

This Project is based on the Preliminary Study (Mission of Mrs. Angela Mihelič), the Contract with UNIDO Centre in Vienna and the priorities set by the Memorandum signed in Kampala (Annex 4).

It has been established by all these documents that the Centre should be built in stages, and that Stage I of the construction should encompass those facilities enabling investigation of the possibilities to preserve perishable foods by processes likely to be soon introduced in Uganda.

As has been pointed out in Chapter 4.3, upon completion of Stage I of the Centre (elaborated by this Project), it will be possible to perform analytical tests on all food types in its laboratories. Due to financial and personnel constraints such equipment was selected for the Pilot Plant, which enables simulation of majority of technological processes in such situation.

2. Replies to the Remarks by The Republic of Uganda Government, Ministry of Agriculture & Fishery

2.1. Staple food commodities as maize, sorghum and millet have certain limitations in industrial processing for human food. The prevailing products - flour and grits have comparatively restricted area of application in further food processing. For this reason the planned tests in the Pilot Plant are limited to the possibility of partial substitution of the imported wheat in bread and biscuits and in preparation of cereal mixtures, enriched with dehydrated fruit or protein (soybean) components.

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Numerous products of maize and sorghum, well known in the world, are obtained by complex chemical processing procedures (starch hydrolisys to dextrins, syrups etc.) or by extrusion (corn flakes). Such processes are generally patent protected and present the most advanced technology with expensive investments which can not be expected in Uganda in the near future. It is possible to get oil from maize germs in an economical way, only if a simultaneous and synchronized processing of maize and oil plants exist on the same location.

2.2. Farmers training for food conservation is the task of other organizations (FAO etc.). The Food Processing Centre may contribute to this end, participating in the selection of procedure, analyzing the raw materials and the results of food conservation in rural circumstances. Due to the limited number of experts in Stage I of the operations it is not possible to expect the Centre to be the leader of farmers' education at remote locations.

2.3. By the equipment selected for Stage I of the Project it is possible to simulate procedures for different types of perishable food, conserved by universal methods - sterilization, pasteurization, concentration, dehydration, smoking and salting. It was not possible to include equipment for specific purposes (meat processing to sausage, milk dehydration e.g.) or specific production processes (production of proteins from soybeans) into the programme of the initial stage of Centre operation.

2.4. The request for production of packaging material in the Centre can not be accepted as realistic, because the production processes of tin, glass, polymers etc. are complex ones, and its inclusion into Centre operation exceeds its framework and assignments.

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We have proposed to include into the financial plan of the initial stage of Centre operation such quantities of packaging material which would be necessary for the first two years of Centre operation.

2.5. Staff housing has not been stated in the Terms of Reference and it has not been included into the Project. At the debriefing at UNIDO Centre in Vienna, when coming back from Uganda, the Team Leader got a negative reply to this request of the Uganda Party.

2.6. The comment on the number of technologists in the Centre is not clear. If this is to do with the permanent staff of the Centre, it has been suggested that the Centre Director may alternatively be a technologist.

The number of consultants during erection works and equipment commissioning in the Centre can be reduced only if the number of suppliers is reduced to 1 or 2, provided that the supplier of equipment will undertake the obligation to prove the guarantee parameters and to instruct the staff.

It is our experience that start-up of such installation and knowledge transfer to local personnel is the critical point of utmost importance for further successful operation of the plant and that no money should be spared on that.

Branko Šućur

Branko Šućur, MSc
Team Leader

PROTOCAL

From meetings held in the Ministry of Agriculture in Entebbe, on the 29.01.1988 and the 03.02.1988.

Purpose of the meetings : Review of the Draft and Final Report of UNIDO Project UC/UGA/85/254 Titeled "Establishment of Food Processing Centre in Uganda", Prepared by UPI Invest Sarajevo, Yugoslavia.

PRESENT AT THE MEETINGS WERE :

ON BEHALF IF THE MINISTRY OF AGRICULTURE

1.	Mr. A.K. Osuban	- Commissioner for Agriculture
2.	Mr. John B. Mubiru	- Deputy Commissioner for Agriculture
3.	Mr. F.A. Ojacor	- Deputy Commissioner for Agriculture
4.	Mr. J.R. Kahangirwe	- Chief Agricultural Economist
5.	Mr. Mukasa-Kiggundu	- Chief Agricultural Research Officer
6.	Mr. L.K. Yiga	- Senior Agricultural Officer/Horticulture
7.	Mr. D.W. Wamajje	- Senior Agricultural Officer.,

ON BEHALF OF UPI INVEST

1. Mr. B. Danon - Expert of the Mission

During the Meetings two documents were discussed:

1. A letter from UNDP Resident Representative office in Kampala

with the remarks of the Ministry of Agriculture, Dated 17.9.87

2. A paper prepared by IPI Invest Titled Comments on the remarks to food processing centre Project (UC/UGA/85/254) by Uganda Government, Ministry of Agriculture.

After thorough discussion it was agreed that comments prepared by UPI Invest are acceptable, and that both documents will form an integral part of the final report.

As to the housing problem for Permanent Staff both parties agreed that it is still a major one. Since the problem is out of the scope of the report, the Government of Uganda will look for proper solutions.

Government of Uganda will determine the institutional framework under which the project will be operated, whether Government Department or a Parastatal body.
Depending on this , sources of funds will be established.
This protocol is to certify that the report is accepted

ON BEHALF OF THE MINISTRY OF AGRICULTURE
Mr. A.K. Osuban .....

ON BEHALF OF UPI INVEST
Mr. Branko Danon .....

c.c. UNDP Resident Representative, Kampala