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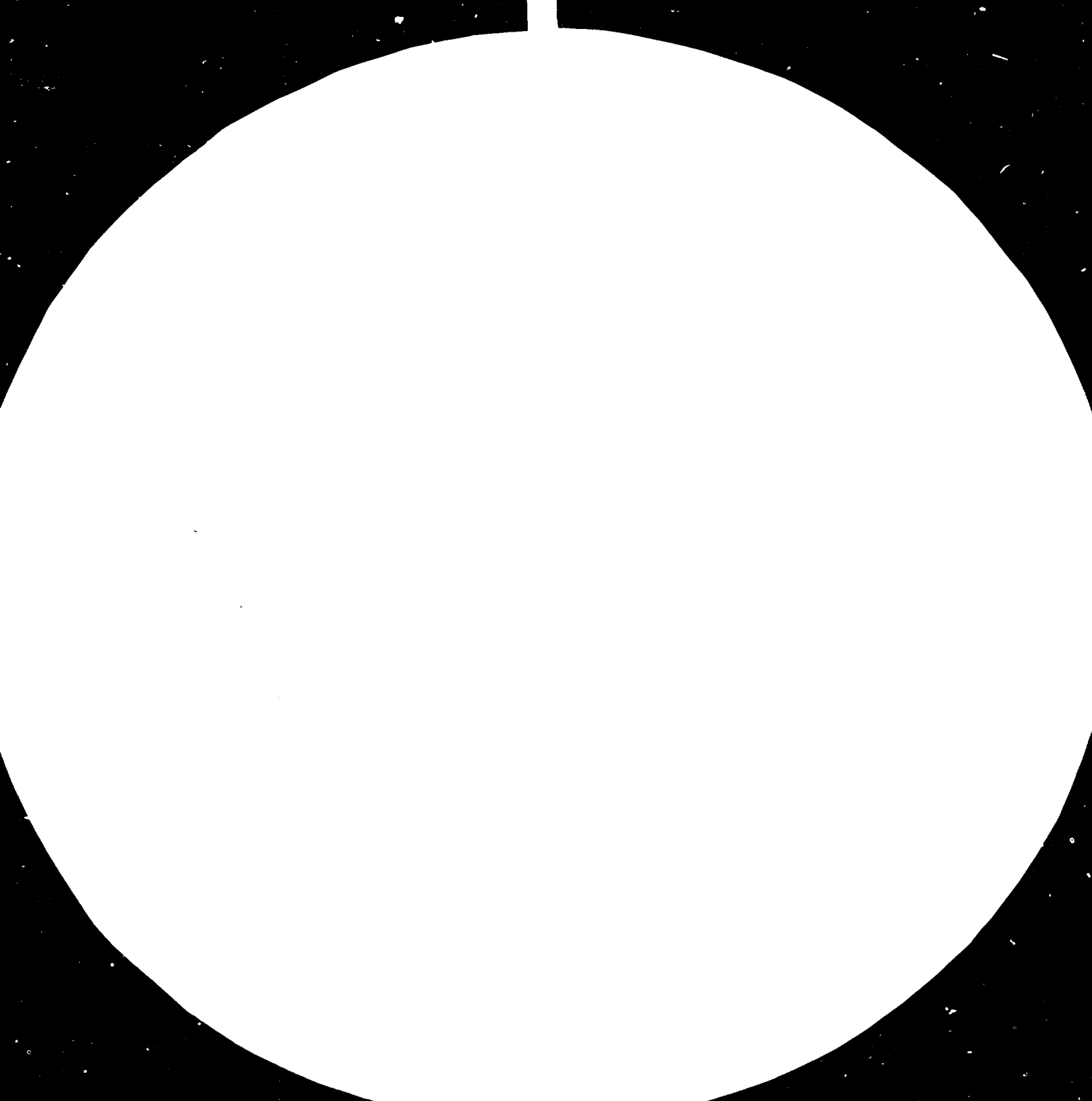
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COMMUNITY FOOD PROCESSING CENTRE

SI/UGA/83/801

UGANDA,

Technical report: An assessment of the basic aspects  
concerning food production and food supply\*

Prepared for the Government of Uganda  
by the United Nations Industrial Development Organization,  
acting as executing agency for the United Nations Development Programme

Based on the work of Angela Mihelić-Zupančić, Consultant in Agro-Industry  
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## INTRODUCTION

The main objective of the Project of Community Food Processing Centre is the economic and social development of the country based on accelerated supply with nutritive products by including the rural population into a more modern, industry-based activities and involving own commodity resources to a larger extent.

The type of the Community Food Processing Centre has not been determined yet. The main task was to find and suggest solutions for an accelerated development of food preservation and processing methods by taking into account the equipment already available and/or the equipment to be developed. The most suitable way of food processing and the most appropriate products should be suggested.

In order to realize this aim, which represents a long-term policy, basic characteristics of the Centre, the necessary technical assistance required for its establishment and start up have to be determined.

The respective problems were discussed with the governmental officials and members of other institutions, who are concerned with food supplies and food processing, during the one-month consultancy mission in Uganda in April 1984 (See Annex 10). Several plants were inspected, too.

The entire report results from findings at the aforementioned visits by having considered the conclusions and recommendations set forth in studies, programmes, projects etc. that were submitted during the visit in Uganda.

## I. SUMMARY

The present state has been examined in order to determine the basic organizational scheme and the activities required for a long-term goal of this research. The findings on the present state as referred to in this report encompass the general findings, i.e. the findings on organization and personnel, as well as the findings on the present state of food processing in inurbane settlements, and the industrial food processing.

The findings, resulting from the present state, require the Community Food Processing Centre to be organized gradually, by stages:

The first stage: The material basis has been proposed and determined, i.e. the pilot plant for processing the already available commodities, laboratories for commodity and product control as required by the organoleptic and basic physical methods, and necessary rooms to accommodate the documentation and information services. The proposal includes a solution to the space requirements for the plant as a whole, as well as the solutions pertaining to the process lines by taking into account that the construction of the plant should proceed gradually. The required equipment and the estimation of the investment cost (excluding civil works) have been stated. The technical assistance required for the establishment and start up of the Centre has been proposed separately.

The second stage: It is identical with the first one. It includes the research of higher-level techniques for food processing and introduction of commodity and product control for their nutritive and medical characteristics. Respective solutions have been indicated. Yet no financial evaluation and technical assistance requirements have been stated, as it would be reasonable to proceed to the second stage of the project implementation once the circumstances and requirements have surpassed the scope and potentials of the Centre as determined by the first stage.

The third stage: The organization of regional centres has been proposed, according to the already existing concepts worked out by individual ministries.



## II. FINDINGS

The basic objective of commodity processing is to secure the long-lasting use of a given commodity. Processing is conditioned by the:

- a) kind and quality of output commodities
- b) proficiency of personnel and their working habits
- c) availability and/or accessibility of mechanical equipment, utilities and other market requirements.

From this viewpoint, the present stage of organization and personnel policy, as well as the commodity resources and the existing food processing have been examined.

### A. General

#### Organization and personnel

At present, there have been only about 5% of total population concerned with the food supply. The quick expansion and extreme population growth, especially in urbane regions, require the establishment of food processing industries so as to reduce the deterioration of nutritive products and cut down the import of commodities and/or food.

While planning, great attention has been paid to the development of commodity resources and food processing.

The ministries stated below are directly or indirectly responsible for food processing:

- Ministry of Agriculture,
- Ministry of Animal Resources and Fisheries,
- Ministry of Cooperative and Marketing,
- Ministry of Health,
- Ministry of Commerce,
- Ministry of Planning and Economic Development.

The latter coordinates the work of all ministries.

For certain activities in this field, there are sub-departments and sections within individual ministries. For instance, the Ministry of Health incorporates also the Section for Food and Nutrition. Yet no results have been noticed by now.

The Ministry for Agriculture incorporates also the Department for Promotion of Villages. They were rather successful in imparting a certain knowledge on food preservation and food processing to the interested people in villages in 18 districts (the UNICEF Programme) by demonstrations and lectures. Now, the department has been left to itself. There is no progress in work, as there are no necessary transport means available, the financial resources are minimum, and the technical knowledge available leaves to be desired.

Also the Department of Fisheries, integrated to the Ministry of Animal Resources and Fisheries, was founded with the aim to promote the fishing and other activities in order to ensure better market supply with these commodities. Yet, in the existing circumstances the work of the department is of no relevance, failing to achieve results.

In strictly professional terms, there is no special service for the food processing industry. The Centre for Food Processing Industry that should act as a development centre for East African countries was dissolved. The Uganda Development Cooperation is a commercially and financially-oriented organization entrusted with the implementation of the already adopted individual projects.

In order to carry out the research and development work, there are several district research centres within the Ministry of Agriculture. But their activities are limited to the promotion of the primary food production in their region. There is also a similar research division within the Ministry of Animal Resources and Fisheries. In the future, a special development centre for fisheries shall be responsible for the promotion of fishing and improvement of the existing methods of processing, as well as introduction of new products and by-products. The government have decided that this Centre should replace the former research organization, the East African Fresh Water Fishery Research Organization, that was not successful in its work. The scope of activities, the necessary equipment and the technical assistance required for the new development centre have already been determined.

The demonstration centres for promotion of food processing and food storage in villages (farms, facilities and rooms) can be considered as a development institution in the field of food processing. There are about 18 demonstration centres working in individual districts under the auspices of the Ministry of Agriculture.

The Faculty of Agriculture and Forestry of the University of Makerere co-operates in finding solutions to research and development problems. Nevertheless, this co-operation is limited to the primary food processing, with exception of fodder production. There is no Chair of Food Technology within the Faculty though it is considered necessary.

The work of research institutes has been co-ordinated by the Committees of the National Research Council of the Ministry of Planning and Economic Development. Yet the committee for food processing industry does not exist.

There are no local regulations, standards or legislation on nutritive commodities or products. The Ministry of Commerce incorporates the Department for Measures and Weights, as well as the Office for Standards. However, the latter is not being active. There are but few regulations referring chiefly to measures and weights. This situation is conditioned by the lack of technical knowledge and/or professional suggestions on how to set the possible and appropriate quality criteria.

According to the original conception, the necessary activities should be conducted by the African Regional Standard Office for Kenya, Tanzania and Uganda. The Office does not work.

The food, water, commodity and product control virtually does not exist, because there are neither regulations nor executive organs available. Control has been carried out to a very modest extent by the laboratory that belongs to the Ministry of the Interior, the Ministry of Health and the Ministry of Industry. The laboratory is not adequately outfitted. There are neither chemicals nor enough skilled personnel available. In general, the control is limited to the control of weight and volume. Chemical analyses are practically not being carried out. Microbiological control does not exist at all.

The lack of quality control entails, on the one hand, less qualitative commodities and products and, on the other hand, quicker deterioration of food (for instance, not sufficiently dried cereals - mustiness ; not sufficiently degreased soya for flour - rancidness, etc.).

The Ministry of Health has already worked out the plans for the central control laboratory for chemical and biological testing of commodities and products, as well as a concept of and a programme on the establishment of regional and district laboratories for the same purpose. Due to the shortage of means, the realization of the plans has not been started yet.

There is adequately specialized graduated staff available in the country. Most of them studied in India, United Kingdom, and in Kenya recently. Professional and/or technical staff remains mainly unemployed. Since basic working conditions are not provided for (adequate rooms, devices, literature etc.), there are but minimum potentials of work. The thus limited potentials of work are being additionally hampered by bad organization whose main feature is the scattered and non-informed staff.

There is no medium-skilled staff available to support the work of graduated staff. Besides, the basic knowledge and/or education of the population is rather low, as the country is still fighting illiteracy.

Because of bad communications (post, phone, transport), there is minimum co-ordination of work, co-operation and inter-information of responsible services. The activities of individual services depend more or less on their own ambitions, faculties and potentials, and are mainly centered on preparation of researches, studies, plans etc. The situation is even worse as regards the inter-linkage of institutes to the processing industry. (The research institutes remain mainly unknown; mutual needs and interests, and potentials of co-operation among different food-processing industries have not been recognized yet). This is also the reason why the research is not being applied in practice to a larger extent.

B. Commodities

Uganda is basically an agricultural and cattle breeding country. The basic nutritive crop is matooki representing the staple food in the South and West of Uganda. Other more important nutritive commodities are: cassava, maize, millet, sorghum and a special sort of potato.

Because of specific microclimatic conditions, there are various basic commodities available in individual regions. While cassava and potato can be found all over the country, the northern regions are specially known for millet, earthnuts, simsin and certain beans. In the eastern part of the country, that is very similar to the northern one, there are good conditions for growing cereals and rice. The production of the latter has already been introduced. In southern and central Uganda, fruit (oranges, mango, ananas, passion fruit, pawapawa), vegetables (cabbage, carrot, tomato, onion, matooki), maize and some beans represent the main commodity.

In spite of the specificity as regards the commodities it can be stated that the production of maize is extremely spread. This commodity makes a commercially interesting product. Production of rice and cereals has been given priority in eastern regions of the country by which an increase in production of these commodities has been secured. Great quantities of fruit, ananas in particular, and vegetables will be available in the southern regions within a few years as a result of cultivation in plantations.

The commodity trade that is conducted by the Ministry of Cooperative has been organized for cereals and beans, whereas the trade in vegetables, fruit and spice remains practically non-organized.

Commodities such as coffee, tea and cocoa, which are mainly intended for export, are purchased in greater quantities.

Quicker development of commodity production is being hampered by undeveloped marketing, insufficient storage facilities, insufficiently developed processing methods and, consequently, inadequate quality.

Stock production relies chiefly on individual stock breeding (especially milch cows, goats and sheep) and is limited by quantity. A slight surplus of production is made available for sale in inurbane regions of the country. Various diseases represent a serious problem in stock production. Therefore there is practically no commercial poultry farming. The situation is a little bit better as regards the piggeries. A slight increase in pig production has been noticed.

Livestock trade is being carried out by smaller authorized dealers, who are buying the livestock in inurbane regions and selling it in populated centres.

Milk and honey production, supplementary to the livestock production, is being developed. In some regions of the country, there are collection centres for both commodities. Bad communications and a lack of transport and processing facilities prevent greater expansion of this kind of production.

Fishery being limited to fresh water resources (lakes and rivers) is an almost exclusive domain of individual fishers. Unfortunately, they have no modern fishing-gear available. All the boats are built in a conventional way that does not allow to introduce up-to-date methods of fishing by which greater quantities of fish were secured. Neither can they provide the necessary spare parts. For these reasons, the fishing has extremely declined.

Fish trade is mainly left to the fishers. They usually live in remote settlements and are virtually isolated from consumer centres. An organized marketing service that would be properly equipped practically does not exist. Therefore, the basic and prior objectives of the country are the promotion of fisheries and improvement of fish processing in accordance with the commodity resources.

Except of coffee, tea and minor quantities of cocoa and pepper, which are the main export commodities, all other commodities are intended for local consumption.

The entire region is characterized by the:

- insufficient basic commodity production in terms of quantity

- inadequate quality of commodities and/or by-products
- lack of appropriate storage facilities
- insufficient distribution channels
- lack of knowledge and/or skills and shortage of means to apply the knowledge.

Reasons for and consequences of the above statements are interlaced to such an extent that it is difficult to distinguish among them.

C. Food processing

The existing food processing does neither comply nor cope with the potential commodity resources. The existing food processing has been examined with respect to the:

- food processing in inurbane settlements,
- industrial food processing.

1. Food processing in inurbane settlements

The existing food processing in inurbane settlements involves the:

- drying,

that is mainly based on solar energy. The drying is mainly carried out by using very simple devices. Procedures for drying cereals, vegetables, especially truffles and leguminous plants, are being applied.

For storage of dried products, simple graneries have been built. They mainly prevent rodents from access to the products but do not meet the conditions to maintain the quality of products.

- preparation of baby food "multimix",

that is based on locally available crops, mainly maize and soyabean. The baby food is being prepared in a simple way by using the simplest devices, for the needs of households.

- fish processing,

that is practiced in fishing regions consists of the production of:

- dried fish,
- salt fish,
- smoked fish.

The method of drying fish by using solar energy has been introduced for partly salted fish of smaller size.



There is practically no difference between dried and salted fish, as salted fish are dried as well.

Smoking of fish, mainly fish of larger size, proceeds in simply designed chambers by using the locally available wood.

According to our estimation, this kind of fish processing covers about 60 % of catch, thereof 45 % are being smoked and 15 % dried or salted.

To develop food processing in inurbane regions, especially the processing of agricultural commodities, a Section for Economic Development of the Country within the framework of the Ministry of Agriculture and Forestry has been organized. The activities of the Section are based on the UNICEF programme.

This programme consists of providing educational and consultancy services to the widest classes of population. On the basis of the thus acquired knowledge they should be able to improve their standard of living. The programme includes consultancy services pertaining to the primary food processing and further processing. They have been carried out in the form of courses which take place in demonstration centres. These centres are specially equipped for this purpose.

There are about 18 demonstration (promotion) centres in different regions of the country. At the beginning, tremendous results were achieved by the transfer of know-how. The number of drying facilities tripled within a few years. The number of ameliorated graneries increased, the baby food production was actually introduced in all regions. Because of shortages of material means there was no progress in development of demonstration centres.

For the same reason, and because of lack of professional knowledge in addition, the quality of work in the already established centres regressed.

With regard to the food processing, the basic problem they are facing now is the inappropriate drying of

- soyabeans - rancidness,
- cereals to the required moisture content - mustiness, flavotoxins.

There are also other simple methods of commodity preservation that have not been included into the programme of activities yet.

At the present stage, this kind of food processing is more or less left to women. As it ensues from various documentation, extremely few men take part in this activity. The total processed and preserved food individual households prepare is almost entirely intended for their own consumption needs. Further development of this activity has been impeded by the lack of communication, storage and transport facilities, as well as by the lack of knowledge. Man labour has not been stimulated to take greater part in the food processing.

## 2. Industrial food processing

Grain and produce

### Mills

In different regions of the country there are operating numerous mills of smaller capacity grinding sorghum, maize, wheat and rice. They provide services more or less for local needs.

#### Uganda Grain Milling Co. Ltd., Jinja

This is the greatest industrial mill. It is very well equipped and includes also the installation for preliminary drying of cereals. It operates at 40 to 50 % of installed capacity, due to the shortage of and low-grade input material consisting mainly of maize and soyabean.

As a reason for the above inadequate quality, unsuitable storage facilities available (in general, stores intended for storage of coffee and cotton are being used), and inappropriate drying have been stated. They miss professional co-ordination of work and better information on other producer's requirements and/or needs for their products. They also miss suggestions as regards the composition of new mixtures for bakery products wherein at least a portion of imported commodities would be substituted for those locally available.

### Bakery products

Local bakeries supply bread, biscuits and cakes. The ingredients such as: wheat flour, yeast, sugar, vegetable fat, salt, eggs and essences are imported, for they are either locally not available or of improper quality.

#### Bakery Grain Milling Co., Jinja

This is a bakery with a great production capacity with regard to the market requirements. It operates at about one-third of installed capacity. This is caused by the shortage of commodity supplies, on the one hand, and, by the failure of finished product consumption, on the other hand.

#### Mukisa Food Ltd., Kampala

This is a well-maintained and well-managed plant for production of biscuits. The installation has not been utilized to capacity, as the production entirely depends on import of commodities, even those that could be partly supplied by the local market (quality).

Since minor adaptations and annexes would make possible the product-mix to be enlarged by supplementary assortment, a corresponding development policy has been adopted.

#### Africa Basic Food Ltd., Kampala

This is a small private firm mainly processing soyabeans. The basic product is baby food: a mixture of soya and maize flour or soya flour alone.

The quality of products does not satisfy the requirements because of a very short lifetime of products (3 months at maximum). They are in extreme need for consultancy services because they have not their own technical staff available.

### Sugar production

There are 3 sugar factories in Uganda with a capacity of 195.000 tons/year. Sugar is not refined, mostly too wet, and, consequently, not suitable for further processing (Pepsi Cola, cakes, biscuits etc.).

Madhvani Sugar Ltd., Jinja

The factory runs at 50 % of installed capacity at maximum because the machinery is used up. Necessary spare parts are not available , the capacity of the steam boiler does not suffice. Due to the shortage of sugar supplies in the market, all the quantities of sugar available are accepted regardless of its quality. The experts employed have been studying other potential products.

Meat and meat products

There are two meat processing plants. The Meat Packers Limited, Kampala, is a slaughterhouse with a kill capacity of 95,000 head of cattle per year. The other factory is the Sorti Meat Canning Factory. A slaughterhouse, a meat-processing plant for sterilized products and a plant for meat canning are integrated into this factory. All the capacities installed are adjusted at the daily processing of 400 head of cattle. The factory is out of operation because of shortages of cattle supplies and incomplete or damaged mechanical equipment.

Dairy products

Dairy production is limited to the collection of milk. The milk production is mainly carried out by the Dairy Industry Corp. in Kampala, with the milk collection centres in Mbale, Mbarara and Entebbe.

Edible oils and fats

Vegetable oils are obtained from cottonseeds, earthnuts, simsin and soya-bean. Edible oil is produced by small plants that are located in different places in the country.

The oil production plant within the Madhvani Sugar Ltd. does not work because of shortages of cottonseed supplies and technologically incomplete installation. To their opinion and estimation, the oil production from sunflower seeds would be too expensive in the existing circumstances. Cottonseed is not available in the surroundings. Besides, it would be too expensive taking into account the collection and transportation costs from more remote places.

## Fish and fish products

At the present stage, the industrial fish processing practically does not exist. Fish processing is limited to small quantities of cooled up or frozen fish. The existing installation for ice production at Sorota and Jinja is not in operation because the equipment is incomplete. Only the plant in Kampala was partly re-built. Beside ice production, they are also cooling and/or freezing fish. The scope of production is low because of lack of commodities and non-existence of distribution network to launch this kind of products.

## Beverages

### Beer

There are two breweries in operation. Uganda Breweries Ltd. in Kampala uses, beside the imported commodities, also locally available sorghum to a smaller extent as a substitute for imported malt.

The basic production problem is that all the materials required (commodities, packing material, desinfectants etc.) need to be imported. Besides, the bottling facilities are worn out. For the aforementioned reasons, the brewery operates at 30 % of installed capacity, limited to fermentation and aging of beer.

The bottling facilities available in the brewery at Jinja are not utilized to capacity because they are limited by the production capacity and storage facilities.

### Spirits

Locally obtained alcoholic products consist of a mixture of spirit, sugar, essences and coloring material. The production is carried out in small-size distillation plants located in the country.

Uganda Waradi in Kampala is a bigger processing plant. By the time being, the production in this plant is dropping due to the import of qualitative spirits that are of considerably better quality in comparison with their own aromatized products. Due to the lack of knowledge, they cannot start the distillation of aromatic fruits they have available.

The main processing industry in this region is the Lake Victoria Bottling Co. in Kampala. Their production of Pepsi Cola, soda and orangeade (essences, sugar, acid) is based on the licence of and carried out under the control of Pepsi Cola.

#### Fodder

Within the framework of the Grain Milling Co. at Jinja there is also a plant for fodder production. The overall production is intended for poultry and pig feed.

Apart from the aforementioned plant there is also a small processing plant for production of fodder (on the basis of maize) within the framework of the experimental piggery of the University of Makerere.

3. Planned food processing

Growers Cooperative Union, Masako District

They are setting up a new factory for ananas cannig. The mechanical equipment required has already been imported, as well as the commissioning of process lines provided for, yet without know-how. According to the expectations the factory will have been completed by the end of the next year.

Kigezi Vegetable Growers Union

It is located in the Southwest of the country. The growing of cabbage, carrot, onion and potato on plantations has already been organized. It is expected that the vegetable production in the 5 coming years will be as high as to require industrial processing.

The food processing plants are running far below the installed capacity because of used up machinery and/or failure of maintenance, shortage of or insatisfactory quality of commodities. The products of food processing industry do not meet the requirements in terms of quality.

Professional staff has a considerable impact on the efficiency of food processing industry. They occupy to a modest extent key or management positions. Furthermore, the qualification structure of other workers is entirely insatisfactory (foremen, guides of groups, workers).

### III. CONCLUSIONS AND RECOMMENDATIONS

During the mission in Uganda, the objectives of the project have been discussed with the representatives of governmental institutions that are directly or indirectly involved in the strategy of food production and food processing. Some food processing plants were inspected in order to obtain a better picture of industrial food processing.

Conclusions and recommendations result from discussions on and visits of industrial plants. They include also the data stated in individual studies, programmes, projects, short-term or long-term plans that were submitted and obtained during the mission in Uganda.

#### A. Conclusions

##### 1. Commodities

Owing to the microclimatic specificities of individual regions, the commodities available vary considerably. Individual regions differ with regard to the attained level of development and to their connection to the urban areas.

In general, commodity resources as a basis for food processing have not entirely been opened up with regard to the potentials of the country and its natural resources. Some commodities, however, are supplied in commercial quantities. Among them the agricultural products such as: maize, soya, millet, sugarcane, and shortly rice, fruit and vegetables. Fish and cattle do not represent a market surplus of such an extent that it would be reasonable to reckon with greater industrial processing by the time being.

##### 2. Food processing

In urban regions have already been included into the process of food processing according to the commodity resources they have available. The basic knowledge on food processing and food storage, adapted to the local requirements, is being conveyed to the people interested in by the demonstration centres. Nevertheless, the development does not keep up with the requirements because of



lack of technological knowledge and professional guidance to be carried out by professional services in charge of these activities. (Therefore, it would not be recommendable that new Community Food Processing Centres be established and, on the basis of a set model, organized by regions at the moment).

To accelerate the development of food processing and, herewith, to fulfill the long-term goal of this research, i.e. the economic and social development of the country as a whole, attention should not be exclusively paid to the technological development in food processing in inurbane regions. The sale of commodities and by-products for further processing would be doubtlessly of a greater impact on the development of these regions.

At the present stage, the food processing plants operate far below the installed capacity of their machinery. This is caused by the used up machines and/or bad maintenance of installations, shortages in commodity supplies and inadequate quality of commodities.

The processing industry almost entirely depends on the import of commodities - with exception of the primary food processing - although at least a portion of these commodities could be provided in the country: either by exchange of or partly substitution of the imported commodities for the locally available commodities (for instance, in production of bread, cakes etc.) or by improving the quality of the existing semi-products so as to meet the required quality standards (for instance, sugar). The present circumstances are partly conditioned by the lack of technological knowledge and/or failure to direct the respective industry, and partly by the income structure of individual organizations.

### 3. Organization - personnel

The absence of respective regulations and standards entails inappropriate quality of commodities, semi-products or products. There is virtually no local legislation owing to the absence of suggestions on necessary and possible criteria as to quality. The quality control has practically not been introduced, for there is no corresponding legislation available. Neither is there an institute that would be adequately equipped with apparatuses, chemicals etc., with skilled personnel.

Graduated staff that is specialized in this branch of industry has been trained abroad. Though well-trained and well-educated to secure a successful work, this staff remains unemployed as a consequence of the non-organization and lack of working and financial means. The absence of medium-skilled labour and low educational level of other labour, as well as the undeveloped working habits, additionally aggravate the present situation.

In spite of a comparatively great number of services responsible for nutrition security, both administrative and technical staff, and in spite of many studies, programmes, proposals etc. that have been prepared, the results achieved are rather modest. Among others, the reasons for it should be sought in the complicated organization of the services in charge. Furthermore, there is no organ responsible for professional co-ordination and direction of activities that are necessary to upgrade the nutrition security.

The situation is even worse because of bad communication systems. There are practically no telephone connections. There are but modest transport facilities available. The post does not operate regularly. Consequently, there is low exchange of information, and the co-ordination of work of all other members is rather difficult.

The existing organization and the low professional level of some labour structures (medium-skilled labour, unskilled labour) do not allow an accelerated development of food processing.

The non-existence of packing material industry represents a great hindrance to the development of the food processing industry.

### RECOMMENDATIONS

In order to improve and promote the food processing in the widest sense, and, thereby the social and economic state of the country it is recommendable to:

- organize a special service to be responsible for co-ordinate development of food processing that is carried out either in inurbane settlements or in industrial processing plants,
- organize quality control of commodities and products (the information on commodity quality and required product quality is pre-requisite for a well-designed process),
- secure adequate structure of personnel and impart working habits by education (schools, courses, on-job-training). This can be achieved by establishing and starting the activities of a Food Processing Centre.

Besides the necessary material basis and the personnel required for a successful work of the Centre, it is necessary to define the status of the Centre and to adopt such a form of organization and system of work that allow the required information flow.

The existing circumstances require the project to be implemented gradually:

- The first stage: Organization and starting the Central Food Processing Centre
  - basic food processing to be carried out in a pilot plant,
  - testing of commodities and products for their organoleptic, basic physical and chemical characteristics,
  - provision of information in the form of courses and workshops.

- The second stage: Expansion of the activities of the Centre
  - more requiring food processing in the pilot plant,
  - commodity and product testing for their microbiological and nutritive characteristics,
  - provision of information in the form of organized engineering and consultancy services.

- The third stage: Establishment and starting of Regional Development Centres

These centres will be specialized in the processing of individual commodities and quality control according to a pre-set concept.

It is necessary to organize a central service for the reasons stated underneath:

- inefficiency of work of numerous research and other services responsible for food processing. At present, their work is split up and chiefly concentrated on preparation of studies and researches,
- absence of a professional service to be responsible for the transfer of know-how (training of personnel) and, herewith, for the development of food processing in a wider sense,
- inefficiency caused by failure of co-ordination of work and exchange of technical information,
- lack of funds requiring a rational approach to the problem. The latter can be solved by concentrating the funds and knowledge.
- the still limited commodity resources are being developed. The thus gradually obtained commercial surpluses of commodities will require further processing.
- present situation: the required secondary industry does not exist (packing material, cleaning material etc.), limited market and transport potentials etc.

Basic goals and main long-term activities of the Centre:

- to improve the existing techniques of food processing both in inurbane settlements and in industrial plants and secure, herewith, the economic and nutritive value of the product. This can be achieved by:
  - providing technological consulting services to the food processing industry interested in (services for promotion of food processing in the province, industrial plants, state institutions etc.),
  - training the personnel to run the processes and/or individual phases of process (attendance to and maintenance of the installation).
- to accelerate an economic processing of locally available commodities on the existing installations and to set up new capacities respectively by:
  - examining and co-ordinating the work of the existing regional research centres,
  - suggesting new techniques in food processing and introducing new economically interesting products that are based on own commodity resources,
  - proposing the development of other secondary industries that are required by the food processing industry (packing material, cleaning materials, desinfectants etc.),
  - providing the transfer of know-how and training of personnel,
- to secure a specialized technical information and documentation.

With regard to the actual situation (in economic and technical terms) it would be advisable to secure the following short-term activities of the Centre:

- commodity and product control by providing technical suggestions on local legislation and regulations as to quality of commodities and products,
- product and commodity testing.

Regardless of the stage of the implementation of the project, it is recommendable to design the Centre so that the individual stages - though each of them representing a functional unit - be continued in order to form a well-rounded whole in the end.

The proposed activities of the Centre enable its independence in terms of finance. The Centre should operate on the basis of its own resources and/or revenues from its work.

A. Establishment and starting of the Central Food Processing Centre -  
1st stage

The basic goal of the first stage is identical with the short-term activities of the Centre. It is the aim of the Centre to eliminate and/or reduce the consequences of insufficient technical knowledge and lack of transfer of know-how in the field of:

- food processing,
- food control,
- information services,

within the framework of the activities as required by the existing situation.

In order to organize and start the activities of the Centre, the following should be provided for:

- material basis, i.e. construction of a pilot plant, laboratory for physical and chemical testing (services to be provided for domestic and external customers), necessary space and working devices needed to carry out the basic studies and administrative work,
- technical assistance.

1. Material basis

Pilot plant

To materialize the basic goal of the Centre, it is necessary to foresee primarily the process lines and technological equipment for processing cereals, fruit and vegetables.

Each of the above commodities can be processed on specific technological lines. Yet with respect to the finished product to be obtained, the same machinery can be used for processing several sorts of commodities.

For instance, the process line for sterilized fruit and vegetable production is practically identical with the process line for sterilized meat and fish production. Therefore we have foreseen also the processing of these commodities regardless of their specificity.

The existing circumstances, the present food processing and the need for development of commodity resources require mainly the following processes:

Process	Commodity	Finished product
- drying (baking)	cereals, vegetables	bread, biscuits, dried vegetables
- smoking	fish, meat	dried fish, dried meat, preserved meat products
- concentrating	fruit vegetables	jam, marmalade, fruit concentrate, tomatoe concentrate
- sterilizing, pasteurizing	fruit vegetables meat fish	stewed fruit vegetable in vinegar, preserved vegetable canned meat canned fish

Process lay-outs for the above-mentioned processes (Annex 1 - 4) serve as a basis to the determination of the required mechanical equipment:

The following pilot facilities are proposed:

- drying chamber,
- oven,
- smoking chamber,
- mixing-cutting machine,
- extruder with attachments for shaping,
- peeling-cutting machine,
- fruit grinder,
- strainer,
- steam-jacketed kettle,
- closer for glassware, manual
- press with connections,
- centrifuge,



- filter,
- heat exchanger,
- vacuum concentrator,
- semi-automatic can-closer,
- autoclave,
- cooling chamber,
- mixers,
- grinders,
- pumps,
- measuring devices (thermometers, scales),
- vessels and tableware,
- indoor transport facilities,
- steam boiler up to 200 kg steam/hr,
- tools for maintenance of the installation,
- fittings, attachments etc.

The above pilot plant facilities are estimated at

U.S. \$ 210,000. -

The space requirement for the pilot plant has been determined on the basis of the lay-out of each process line (Annex 5 - 8). The arrangement of the machinery takes into account the functional material flow within the process with special reference to the multi-purpose use of some appliances.

Taking into account the dimensions of individual machines, working areas required for handiwork and the space required for handling and storage, with water, steam and electricity connections, the

space requirement of the pilot plant is:      300 m<sup>2</sup>

To secure the flexibility of the pilot plant, only the machines that are absolutely necessary for the operation shall be installed. Such a solution allows better economy of space and quick adjustment to the needs in terms of space requirement and processing.

Within the pilot plant, there is also a commodity store, where the basic fruit and vegetable processing takes place (washing and cleaning). It accomodates also the store for packaging materials and other necessary means of work.

A smaller power station is built separately. The power station is located so as not to impede the construction of an additional hall (2nd stage). Another greater room is foreseen at the power station: a workshop for maintenance of the installation and the entire building.

#### Testing laboratory

Testing of commodities and obtained by-products is an integral part of each processing. Otherwise it would not be possible to establish the appropriate technological parameters.

The carrying out of chemical analyses depends on the outfit of the laboratory. The latter remains practically the same regardless of the number of analyzed samples. If many analyses are carried out, the difference is in the consumption of chemicals and worktime.

Therefore it has been suggested that the Centre should provide testing services for external customers as well. It is foreseen that the control service carries out the minimum control of commodities and products, ie beside the organoleptic evaluation also the establishment of the basic data on the content of:

- total dry substances,
- moisture,
- sugars,
- proteins,
- fats,
- pH-value
- ash.

To promote the already existing export of coffee and tea, it would be advisable if, beside the basic quality control of components, also the specific quality control according to the international criteria were followed.

The space requirement stated below has been calculated for a laboratory of a medium-size and outfit, allowing the proposed physical, chemical and organoleptic testing.

The testing laboratory space requirement is estimated at: 130 m<sup>2</sup>

including the room for chemical analyses (60 m<sup>2</sup>), physical laboratory (25 m<sup>2</sup>), tasting room for organoleptic evaluation of components (20 m<sup>2</sup>), and storage for glassware and chemicals (25 m<sup>2</sup>).

The investment cost for the above-mentioned testing laboratory is estimated at:

U.S. \$ 95,000. -

thereof for the:

- equipment U.S. \$ 80,000. -

- work tables,
- stove,
- refrigerator,
- tableware for the tasting kitchen,
- analytical balance,
- dryer with a thermostat,
- moisture tester,
- burning oven,
- distillation apparatus,
- laboratory refractometer,
- manual refractometer,
- polarometer,
- spectrophotometer,
- kjeldahl, conventional,
- extractor Soxhlat, conventional

- pH-meter,
- digester,
- weighing table,
- vibrator - screening,
- microscope,
- viscosimeter,
- apparatus for determining the melting point,
- laboratory grinder,
- water thermostat,
- mixer,
- turbomixer,
  
- glassware U.S. \$ 7,000. -
  - goblets,
  - erlenmayer,
  - burettes,
  - pipettes,
  - pots,
  - measuring glass,
  - water bath,
  
- chemicals U.S. \$ 8,000. -

Documentation and information services

The basic goal of the above activities is to:

- organize the documentation on the work of the Centre,
- record the work of similar institutes and follow the results and recommendations arising from researches on food security concerning the work of the Centre,
- keep informed on technical literature,
- impart the findings, reports, expert documents to the people interested in,
- secure the transfer of know-how by organizing the training of workers on individual process lines.

For the information services of the Centre the total area of 270 m<sup>2</sup> has been foreseen, thereof as follows:

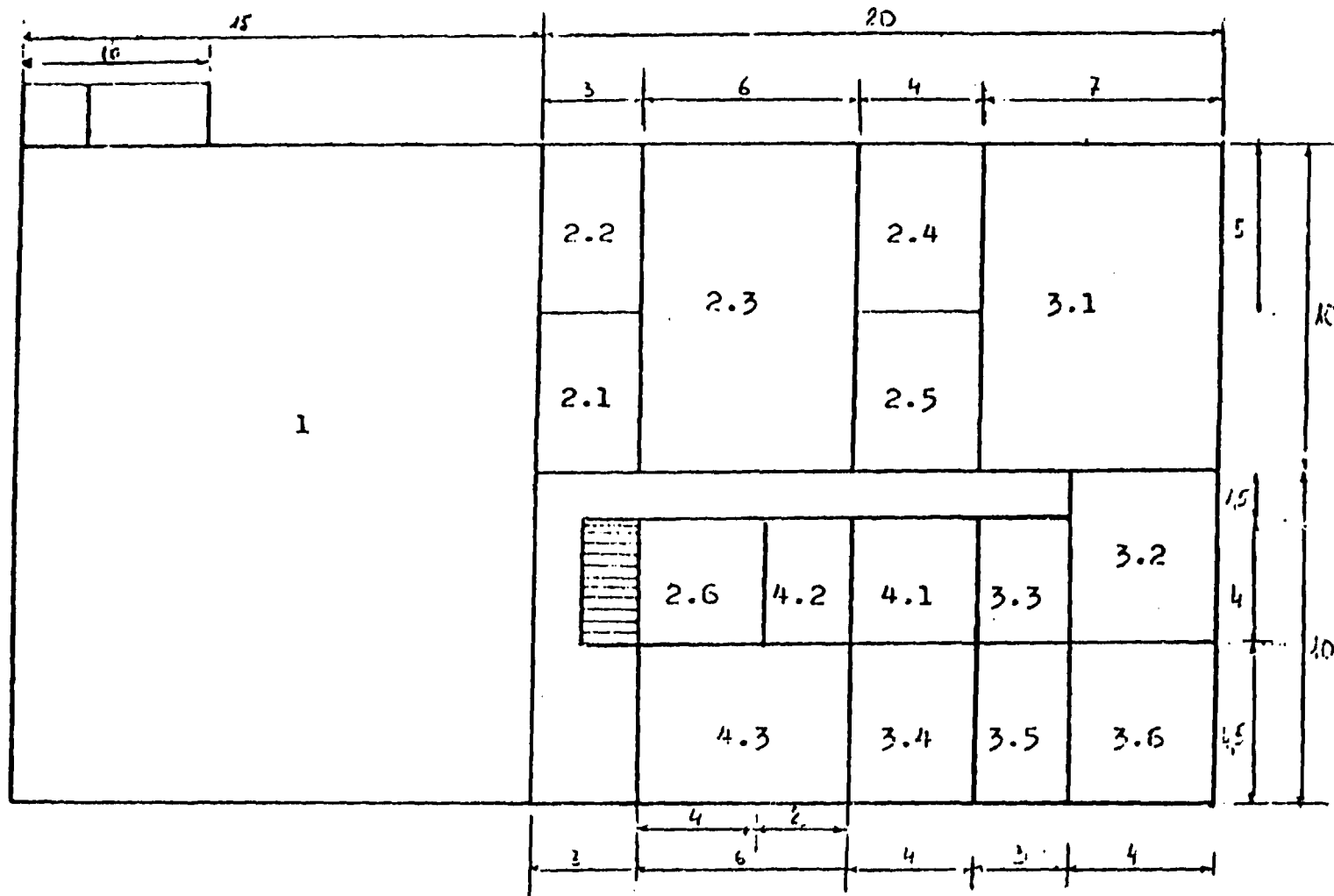
total area	270 m <sup>2</sup>
- library, in the 1st stage as a reference library (workshops), and a conference room	70 m <sup>2</sup>
- office of the head of the Centre, and the secretary's office	34 m <sup>2</sup>
- offices for technical and administrative staff of the Centre	80 m <sup>2</sup>
- auxiliary rooms	86 m <sup>2</sup>

The equipment of the above rooms including the purchase of typewriters, telephones and a car is estimated at:

U.S. \$ 30,000. -

FOOD PROCESSING CENTRE - 1st stage

1 : 100



Legend

1.	Pilot plant	300 m <sup>2</sup>
2.	Physical-chemical laboratory	
	2.1. Administration	15 m <sup>2</sup>
	2.2. Head of administration (archives, documentation)	15 m <sup>2</sup>
	2.3. Chemical laboratory	60 m <sup>2</sup>
	2.4. Physical laboratory	20 m <sup>2</sup>
	2.5. Chemicals and glassware store	20 m <sup>2</sup>
	2.6. Tasting kitchen	16 m <sup>2</sup>
3.	Studies and administration rooms	
	3.1. Library - reference library, conference room	70 m <sup>2</sup>
	3.2. Head of the Centre office	21,5 m <sup>2</sup>
	3.3. Secretary's office	12 m <sup>2</sup>
	3.4. - 3.6. Technical staff offices	45 m <sup>2</sup>
4.	Auxiliary rooms	
	4.1. Lavatories	12 m <sup>2</sup>
	4.2. Cloakrooms	8 m <sup>2</sup>
	4.3. Canteen	54 m <sup>2</sup>
5.	Power station and maintenance work- shop	50 m <sup>2</sup>

2. Technical assistance

It is advisable that technical assistance of consultants should be provided for the activities relating to the establishment and start of the Centre.

The activities and the technical assistance required will, in general, center on the:

a) final determination of the Centre:

(scope of activities, organization of the Centre - both internal and external linkage, location, construction, detailed programme, technical assistance etc.)

in order to define the project assignment.

The above services shall be performed by the personnel of the Centre assisted by consultants for:

	Man	Time
- processing and testing	1	8 weeks
- organization of work, documentation	1	2 weeks
- construction, installations etc.	1	2 weeks

total 10 man/month - 2,5 man/month

b) technical documentation

(drawings, investment evaluation, time schedule of the project implementation, personnel etc.)

including the preparation of the feasibility study and main projects, to be carried out by a designing company.

c) construction of the building

(not dealt with)



d) starting the work of the Centre

	man	time
- training of the personnel abroad		
adequately educated experts for analytical control (to be trained in similar laboratories)	1	6 months
adequately educated experts to run the process lines (to be trained in similar full-scale industrial plants)	1	6 months
adequately educated experts for economic evaluation of products and processes	1	6 months
- total 18 man/month		
- starting the activities of the Centre with the assistance of consultants:		
organization of the Centre and documentation services	1	2 months
starting the laboratory work	1	6 months
start-up of the pilot plant	1	6 months
- total 14 man/month		

e) total

- assistance in the country: 46,5 man/month
- training of personnel abroad: 18 man/month

Recapitulation of the 1st stage:

Space requirement	750 m <sup>2</sup>
thereof:	
- pilot plant with appertaining stores	300 m <sup>2</sup>
- laboratories	130 m <sup>2</sup>
- library, offices and auxiliary rooms	270 m <sup>2</sup>
- power station and a workshop	50 m <sup>2</sup>

The planned buildings are the:

- ground-level central building with the dimensions of	35 x 20
- annex for the power station and the workshop with the dimensions of	5 x 10

The building has a different height as follows:

- for the pilot plant: 4 m at the floor space of	15 x 20
- for offices/laboratories: 2.8 m at the floor space of	20 x 20

With regard to the proposed implementation of the 2nd stage of the Centre, the building should be designed so as to allow the superstructure intended for the offices and laboratories (microbiological laboratory, consulting services) with an inspection corridor along the pilot plant. It should also permit the construction of another pilot plant as a mirror picture of the first one.

The necessary funds for the 1st stage have been assessed on the basis of the purchase value and/or the approximate fees for consulting services (man/month). The required funds amount to:

U.S. \$ 574,250. -

The cost breakdown:

- final determination of the Centre 10 man/week - 2,5 man/month x U.S.\$ 6,100	U.S.\$	16,250. -
- feasibility study and main projects		15,000. -
- construction (not assessed)		-
- equipment and installations of the pilot plant		210,000. -
- equipment and chemicals for the control laboratory		95,000. -
- starting the work of the Centre		
- training of the personnel abroad 18 man/month x U.S.\$ 6,500		117,000. -
- assistance of consultants in starting the activities 14 man/month x U.S.\$ 6,500		91,000. -

B. Expansion of the activities of the Centre - 2nd stage

The second stage of the Centre is identical with the first one. At this stage of the development of the Centre, some supplementary activities for further development of food processing industries have been foreseen. This will depend on the development in general ( development of commodities, better standard of living, better qualification of personnel with respect to the proficiency and working habits.).

The work of the Centre in the second stage is identical with the work in the first stage. Apart from this, the following programme should be carried out:

- examination of high-level technological procedures,
- testing of commodities and products for their medical and nutritive characteristics.

1. Material basis

Pilot plant

Potential process lines in the 2nd stage:

Process	Commodity	Finished product
- cooling or freezing	vegetables	frozen vegetables
	meat	frozen meat
	fish	frozen fish
- lyophilizing	vegetables	dried vegetables
	meat	dried meat
	fish	dried fish
- pre-cooking	cereals vegetables fruit	instant products
- extracting	spices tea coffee meat	extracts

The final decision upon and the gradual introduction of individual technologies depend on the development of distribution channels and potentials of product placement.

The technology provides many possibilities. By proper combination, it is possible to secure the widest assortment. Therefore, it is possible and reasonable to start the second stage of the Centre once the circumstances and market requirements have overgrown the capacity of the Centre as determined in the first stage.

Neither process flow sheets nor lay-outs, showing the arrangement of the equipment, have been worked out, as the development of technology and process techniques progresses very quickly. It is however possible to presume that by the construction of another plant of the same size ( 20 x 15), basic conditions were met permitting the installation of some of proposed process lines.

The complementary energy source (compressor station and some other energy suppliers) will be accommodated in the extension to the existing power station. In the first stage, the power station has been designed and located so as to allow further extension if required.

The commodity and packing material store will be housed in the new pilot plant as well.

#### Testing laboratory

In view of the more requiring processes, and more delicate finished products, the testing and/or control of basic components and the organoleptic evaluation do not suffice anymore. The products by themselves, and a successful management of proposed process lines require the expansion of the commodity testing under consideration of the medical viewpoint. This can be achieved by carrying out microbiological assays and determining the nutritive value of components (substances).

Apart from this, the proposed extension of control is required by and in accordance with the growing interest and potentials for commodity and food export.

Therefore, the followings should be provided for in the second stage:

- microbiological laboratory  
space requirement incl. the apper-  
taining rooms 100 m<sup>2</sup>  
  
with specific equipment, glassware and  
chemicals as required by this type of  
laboratories,
  
- laboratory for chemical analyses  
gas chromatography, spectrophotometry  
space requirement 60 m<sup>2</sup>  
  
with necessary equipment and  
chemicals,
  
- tasting rooms for organoleptic evaluation,  
and rooms for preparation of laboratory  
samples  
space requirement 60 m<sup>2</sup>  
  
with necessary equipment and chemicals.

Documentation and information services

In accordance with the increased scope of activities, the information services are more requiring , too.

The activities foreseen are the same as in the first stage. Yet additional rooms should be provided for the library and the offices for the technical staff. A separate room for che library must be available in this stage.

For the planned activities, the area of 180 m<sup>2</sup> has been foreseen.

Recapitulation of the 2nd stage

total space requirement	700 m <sup>2</sup>
thereof:	
- pilot plant with appertaining stores	300 m <sup>2</sup>
- microbiological laboratory	100 m <sup>2</sup>
- laboratories for chemical analyses	60 m <sup>2</sup>
- tasting rooms	60 m <sup>2</sup>
- library, offices, auxiliary rooms	180 m <sup>2</sup>

During the second stage, the following should be built:

- pilot plant equal to that built in the first stage,
- structure above the building set up in the first stage, where offices and laboratories are located.

2. Required funds and technical assistance

Funds required for and technical assistance in the implementation of the second stage have not been defined since neither the duration nor the contents of the activities can be determined.

In principle, the Centre should operate on the basis of its own revenues from the first stage on. Yet it cannot be foreseen whether there will be sufficient funds available for the extension of the activities. Neither it is possible to foresee the technical assistance requirement. Notwithstanding it would be most probably recommendable to provide some consultancy services in order to promote the development of the Centre.

C. Establishment and start of Regional Development Centres - 3rd stage

The development of Regional Development Centres depends on the development of the country in the widest sense.

The activities of Regional Centres shall be based and carried out on the basis of the already existing concepts that individual ministries have prepared. In compliance with the policy of the Ministry of Animal Resources and the Ministry of Health, the regional centres shall specialize in processing of commodities that are mainly available in the region.

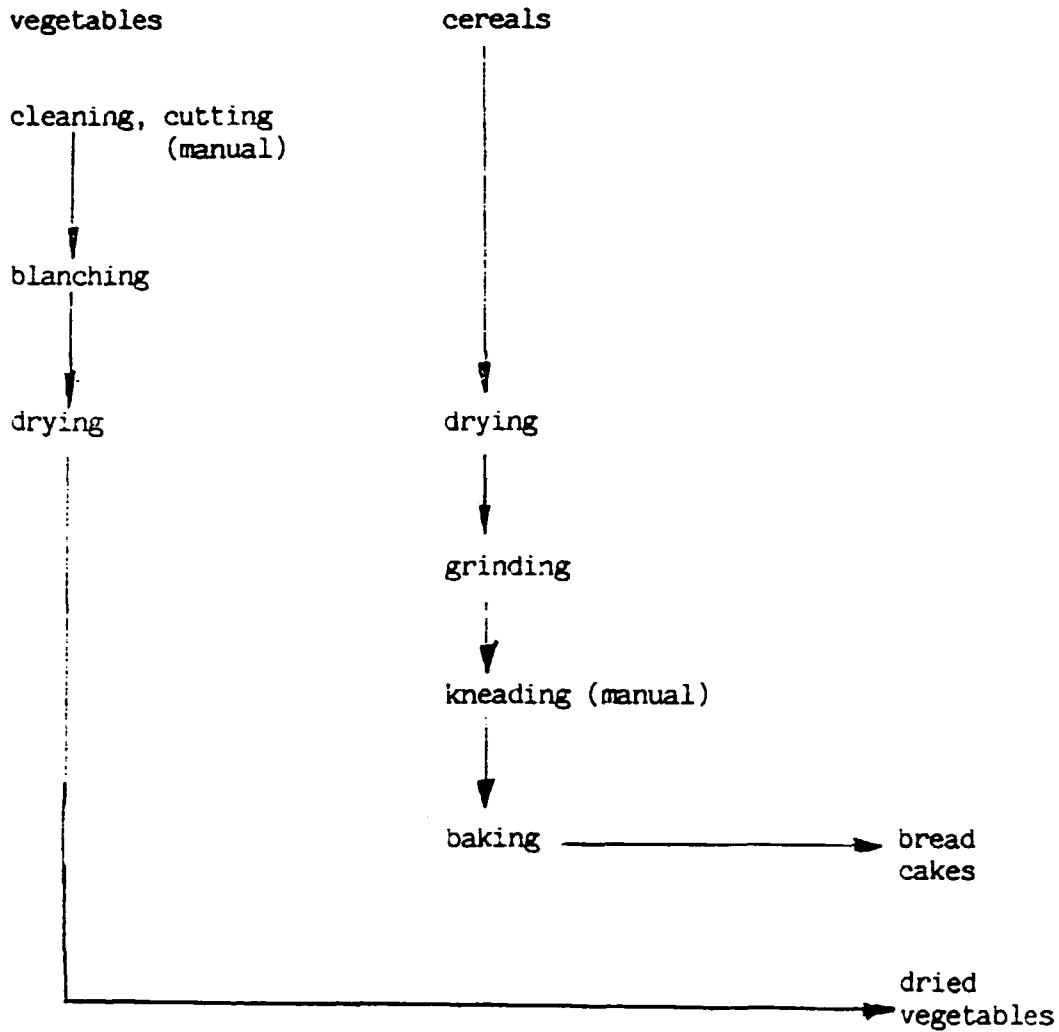
Since the control of commodities and semi-products will be undertaken by the Ministry of Health, the Centre for Development of Food Industry will be relieved in its work. The processing of fish and meat shall be left off as well.

Regardless of the development of specialized regional services, the Centre will continue to use the already installed equipment, as it will specialize in processing of agricultural commodities, i.e. fruit, vegetables and cereals. It will work under the auspices of the Ministry of Agriculture and Forestry. The Centre will be also able to provide engineering and consulting services for the branch of industry the Centre is specialized in.



PROCESS DIAGRAM

Drying



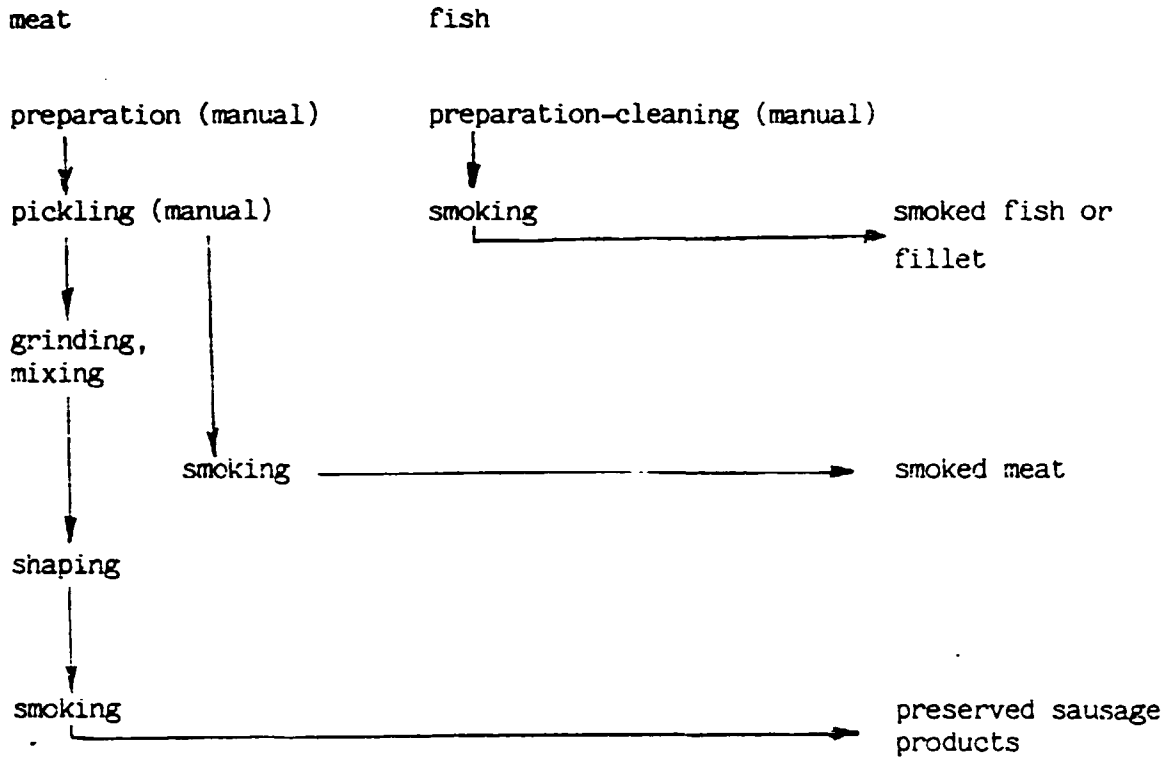
Utilities required: water, electricity

Packing materials required: polyethylene sacks, boxboard

Storage: normal conditions

PROCESS DIAGRAM

Smoking

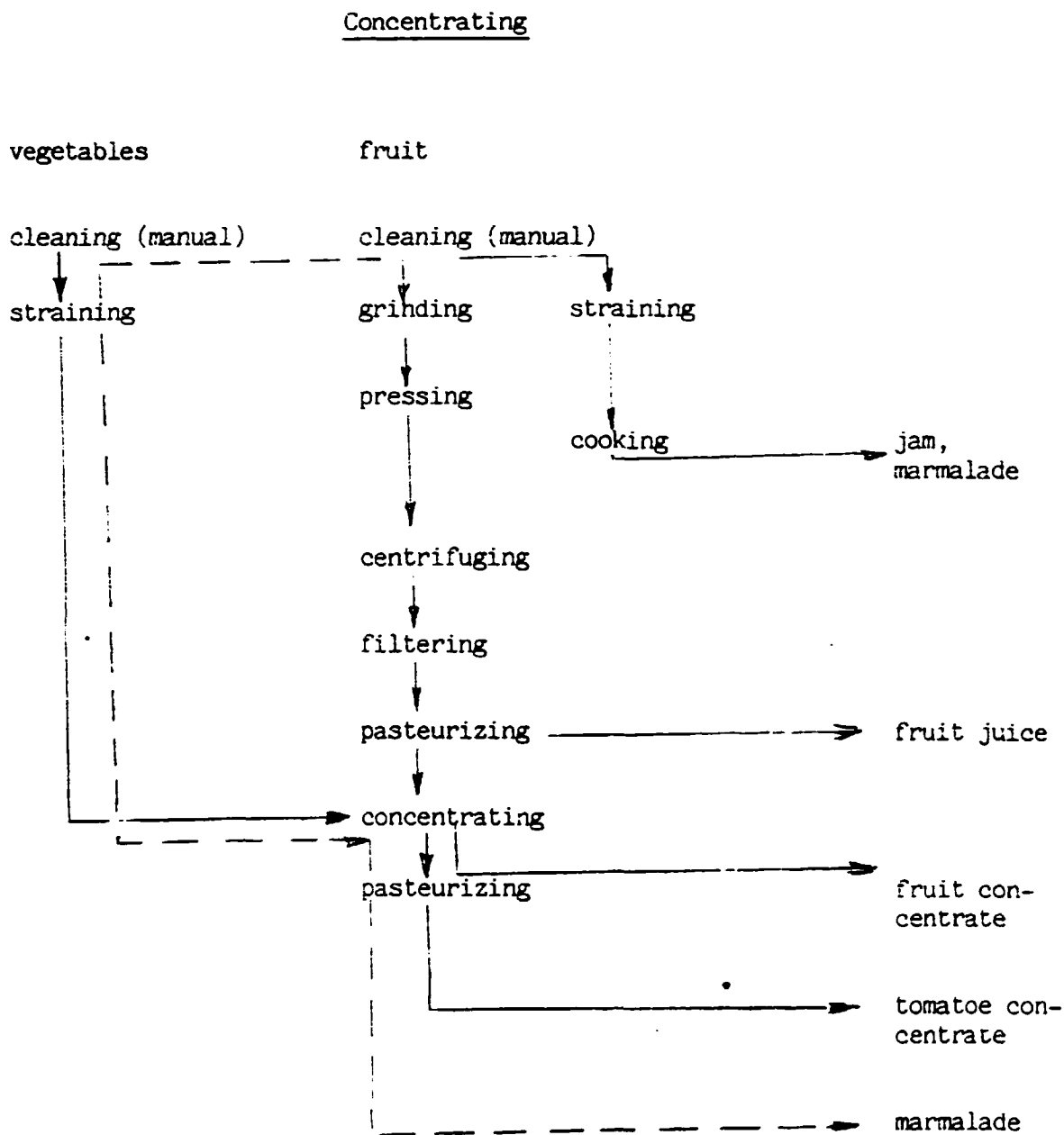


Utilities required: water, electricity

Packing material required: boxboard, natural or artificial casing for sausage products

Storage conditions: dry, about 20°C

PROCESS DIAGRAM



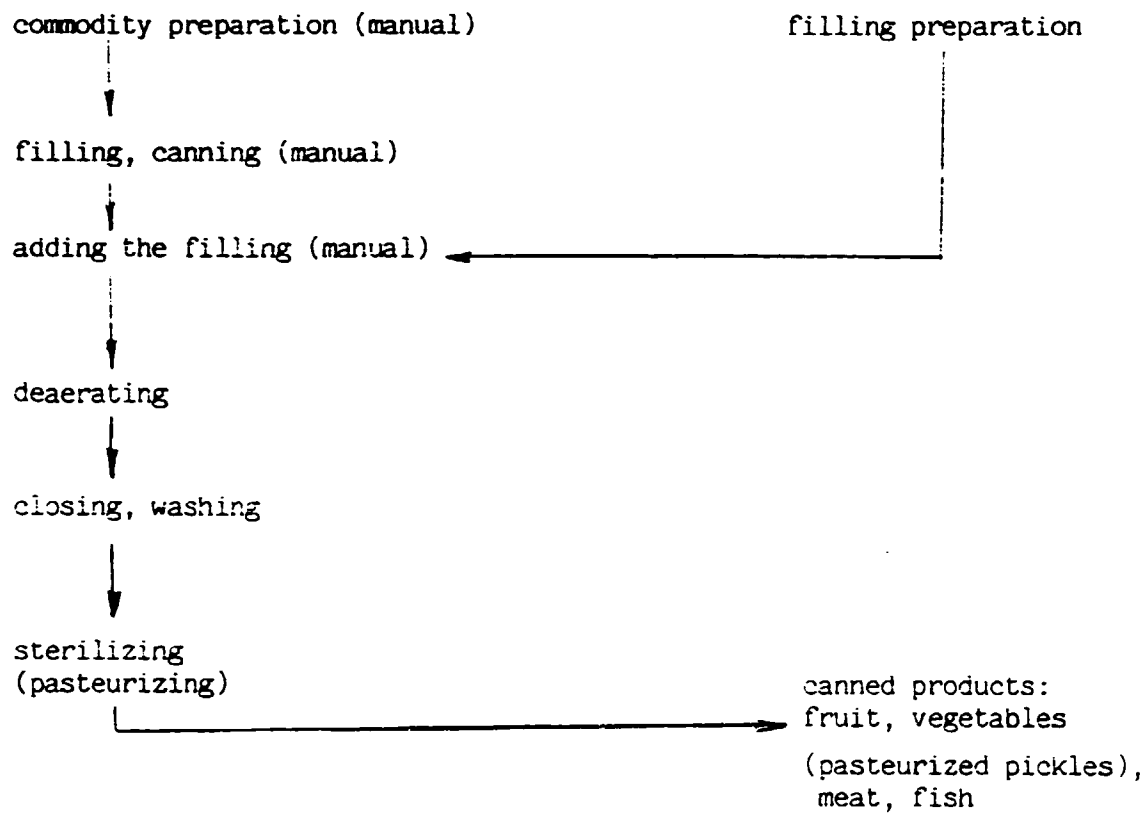
Utilities required: water, electricity, steam 2 atm (concentrator)

Packing material required: container glass or cans

Storage conditions: normal

PROCESS DIAGRAM

Preserving (Canning)

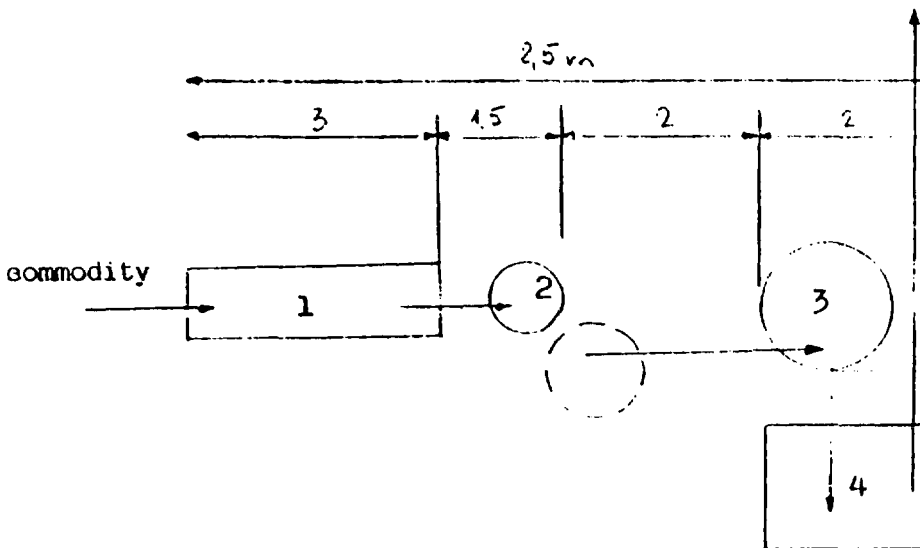


Utilities required: water, electricity, steam 2 atm (autoclave)

Packing material required: cans

Storage conditions: normal

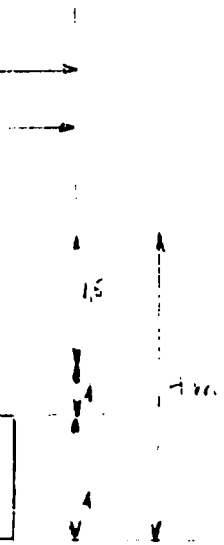
LAY-OUT: Drying



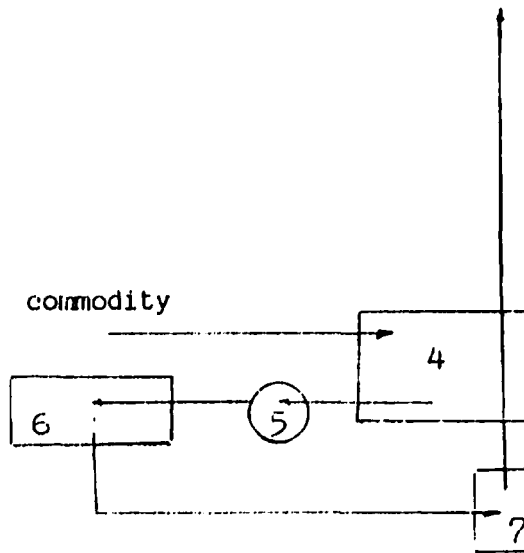
- 1 working table
- 2 peeling-cutting machine for vegetables
- 3 steam-jacketed kettle
- 4 drying chamber
- 5 mill, grinder
- 6 working area
- 7 baking

Annex V

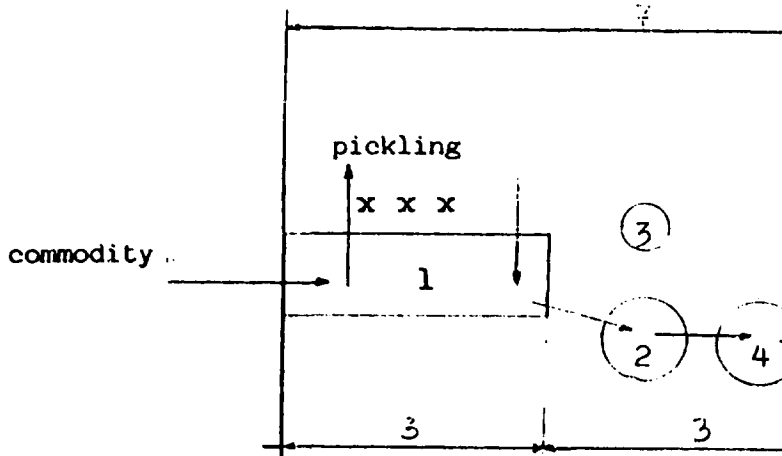
dried vegetables



bread. cakes



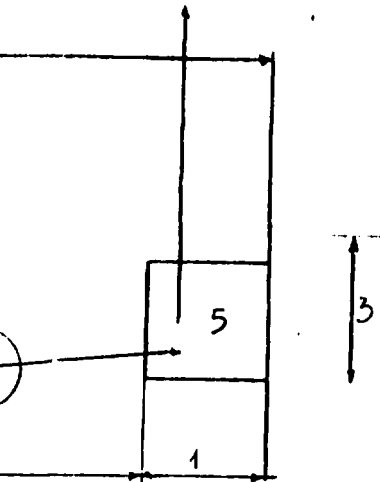
LAY-OUT: Smoking



- 1 working table
- 2 cutter, cutting-mixing machine
- 3 mixing vessel
- 4 mincer
- 5 smoking chamber

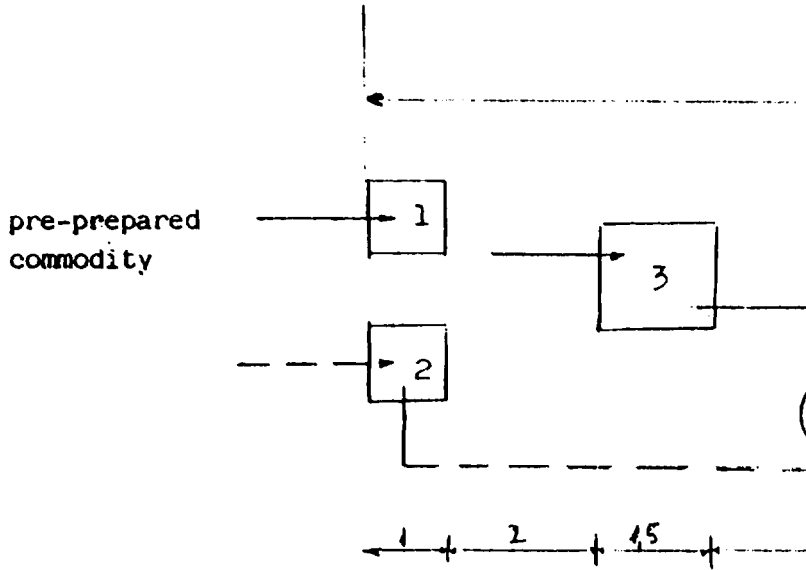
Annex VI

smoked products



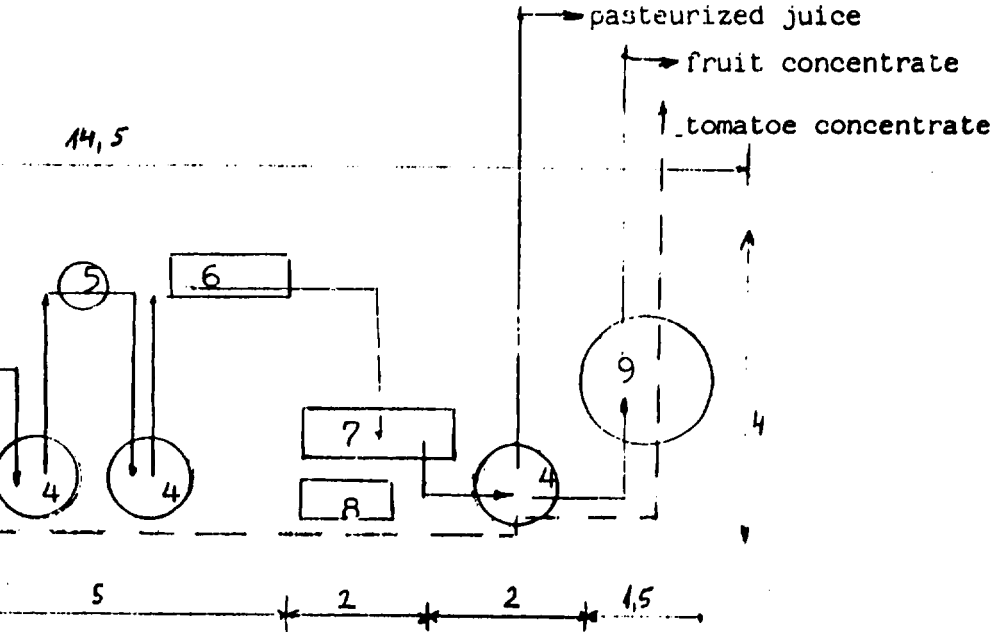


LAY-OUT: Concentrating

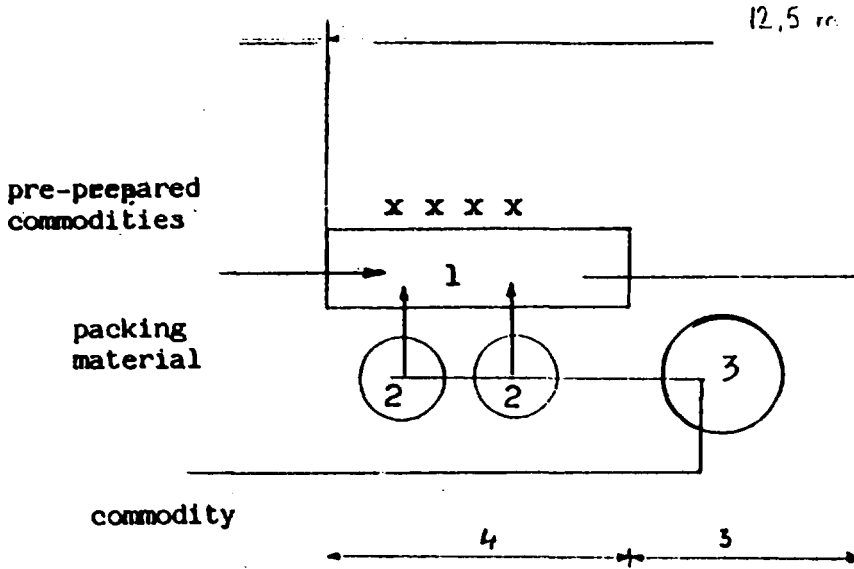


- 1 mill, grinder
- 2 strainer
- 3 press
- 4 intermediate tanks
- 5 centrifuge
- 6 filter
- 7 pasteurizer
- 8 hot water preparation
- 9 concentrator

Annex VII

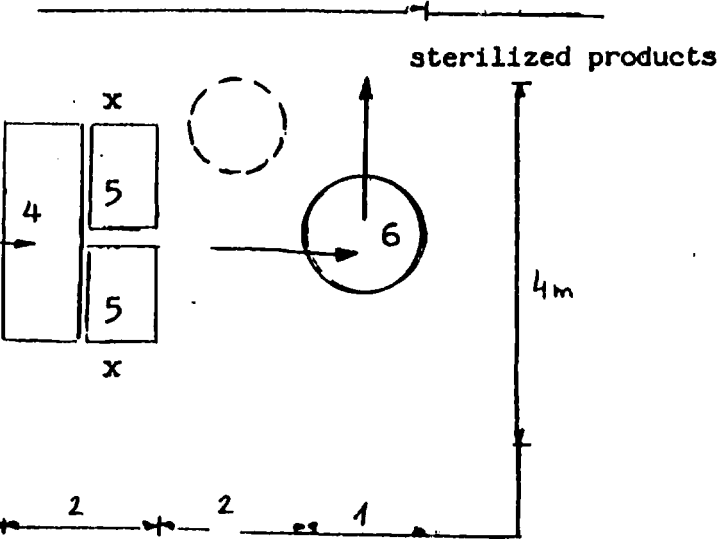


LAY-OUT: Canning/Preserving



- 1 working table
- 2 filling containers
- 3 steam-jacketed kettle
- 4 working area
- 5 semi-automatic closer
- 6 autoclave

Annex VIII



xxxx - workplaces

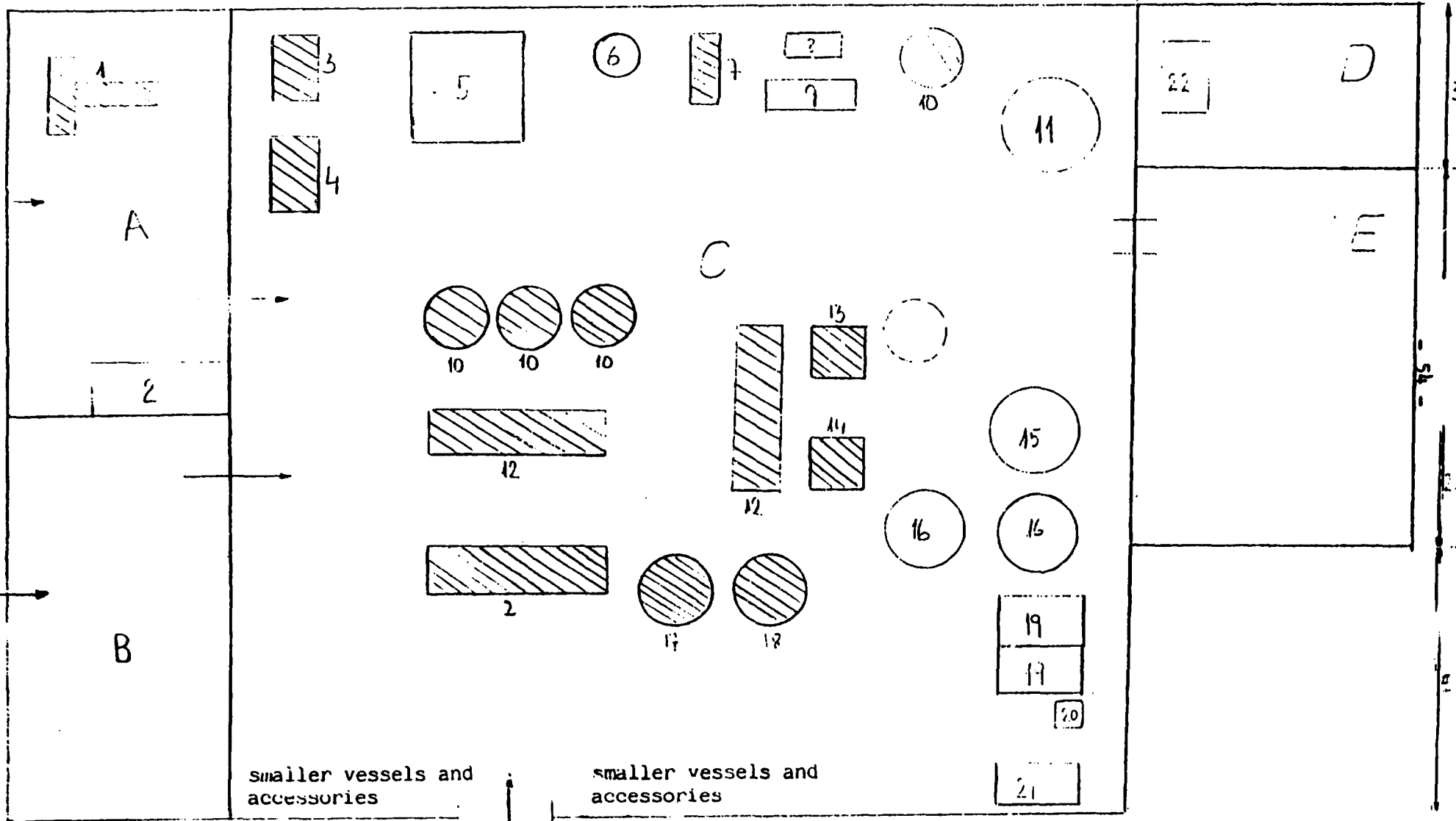
Arrangement of Rooms and Basic Lay-out

Annex IX

16

5

4



L e g e n d

A Acceptance and storage of commodities

1 washing bassin and sorting belt

2 cooling chamber

B Acceptance and storage of auxiliary materials

C Pilot plant

3 fruit mill

4 strainer

5 press

6 centrifuge

7 filter

8 water heater

9 heat exchanger

10 intermediate tank

11 vacuum concentrator

12 working tables

13 glass closer

14 can closer

15 autoclave

16 steam-jacketed kettle

17 mixing-cutting machine

18 extruder

19 dryer

20 stove

21 smoking chamber

22 steam boiler

D Power station

E Workshop

Note: Fixed installed appliances are not hatched.

LIST OF PERSONS MET

UNDP Office, Kampala

Mr. Fre Hiwet	Resident Representative Officer in Charge
Mr. Hassum Ceasy	Duty Res. Rep.
Mss Joan Magezi	National Programme Office

Ministry of Agriculture, Entebbe

Mr. Augustin Osuban	Commissioner of Agriculture
Mr. T. Kahaneirve	The Chief Agricultural Planning Economist
Mr. Willis A. Bagadira	Officer - Economist
Mr. Stephen E. Okvakol	Economist
Mr. Wamajje Danian	Food Technologist Serere Research Station
Mrs. Sarah Kyyingi	Senior Head Officer in Charge of Home Economic Section
Mrs. Dinah Kasangaki	Officer - Young Farmers of Uganda Programme

Ministry of Health

Mr. Wangola	Inv. of Health Control
Mr. Kyabagu	Assistant Director of Medical Services - in Charge of Primary Health Care

Ministry of Animal Resources and Fisheries, Kampala

Mr. T.S. Kanyike	Deputy Commissioner for Fisheries
Dr. K.M. Kinani	Permanent Secretary Ministry of Animal Resources and Fisheries
Aloysius R. Biribon Woha	Commissioner for Fisheries

Contd. 2

Ministry of Planning and Economic  
Development

Mrs. Hadija Gava

Head of Agricultural Section

Mr. Agaba

Ministry of Cooperative and  
Marketing, Kampala

Mr. T.A. Okodoi

Permanent Secretary

Ministry of Commerce

Mr. L. Ssekyaya

Weights and Measures Department,  
Ministry of Commerce

Kakina Ntambi

Bureau of Standards, Ministry of  
Commerce

Ministry of Industry

Mr. George Kasede Mukasa

Chief Economist, Ministry of Industry

Mrs. Jane Mambole

Acting Senior Industrial Officer

Mr. Martin Onyach Olaa

Industrial Officer

Makerere University

Prof. Joseph Mukiibi

Dean of the Faculty of Agriculture  
and Forestry of Makerere University

Uganda Development Cooperation,  
Kampala

dr. Kinyatta

Director of Projects and Research  
Development House



Contd. 3

Industry

Alfred Omara,  
General Manager

Mukisa Foods Ltd., Kampala  
(sugar and biscuit factory)

L.K. Egaru,  
General Manager  
Mr. Banarja Jaws,  
Production Manager

Lake Victoria Bottling Ltd., Kampala  
(Pepsi-Cola, orangeade, soda, water)

Joel K. Bakaawa, Sekabembe  
General Manager

E.A. Distilleries Ltd.,  
(East African, Uganda Waragi),  
Kampala

Mr. Okee,  
Production Manager

Uganda Grain Milling Co., Jinja

Daniel Kakunta,  
General Manager

African Basic Foods Ltd., Kampala

A. Makayi,  
Production Controller

Uganda Breweries Ltd., Kampala

