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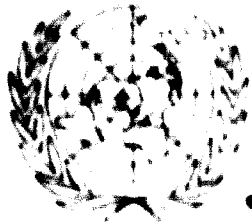
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Expert Group Meeting on
Soya Bean Processing and Use
Urbana, Illinois, USA, 17 - 21 November 1969

ANALYSIS OF THE UGANDA EXPERIENCE
BASED ON AFRICA BASIC FOODS INC.

by

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Kampala, Uganda

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United Nations Industrial Development Organization

Expert Group Meeting on
Soya Bean Processing and Use
Peoria, Illinois, USA, 17 - 21 November 1969

SUMMARY

ANALYSIS OF THE UGANDA EXPERIENCE
BASED ON AFRICA - AFRICAN DEVELOPMENT ✓

By
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Kampala, Uganda

Commercial High Protein Food Program

1. The need for a high protein diet

The most crucial problem in developing countries or in any country today is the problem of optimal nutrition and adequate health education for all of its citizens. The single most important and indispensable resource in every country is its people. The physical, mental and spiritual (ethical or moral) development of each citizen is the only real wealth a nation possesses.

The basic issues in the life of a nation, political stability, education, industrialization, food production, housing etc., are all primarily dependent on the total health of each citizen.

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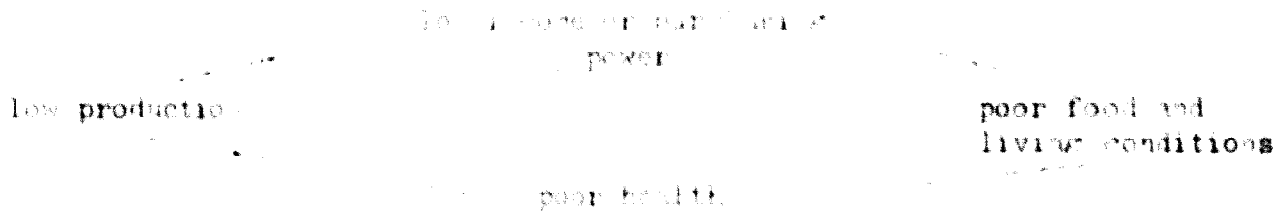
Africa's main food crop has been established to contribute to this crucial need. The country's efforts are directed towards three main objectives:

- (i) Agricultural production development of fundamental food cash crop primarily for the rural farmer;
- (ii) Production of a protein of high quality, low cost high protein foods;
- (iii) Maintaining the food for the rural family.

Two vicious circles of undernutrition in the rural area (many more others)

(i) The food to produce a vicious circle of the vicious circle

Often the rural farmer's income is only 50 to 100 shillings. He is caught in a vicious circle:



There can we logically break into this vicious circle? We must start by improving the soil himself, with better food. We can produce quality food (especially protein) at a cost the farmer can afford with his present purchasing power. Only with better food can the farmer hope to gain the mental and physical strength necessary to produce more, and break this vicious circle.

(ii) The pre-school child death rate

The pre-school child death rate is appalling and the basic cause is malnutrition. Polio (the crippling type) is serious. Measles, malaria, pneumonia - all of these diseases are serious & widespread, due to widespread malnutrition. The most basic need is better nutrition. This is more important than hospitals, vaccinations and immunizations. A child's brain reaches 90% of its full adult weight by the age of 4 years. Without adequate protein in these early years, the brain and the body are permanently damaged. Vaccinations are necessary, but cannot help the brain to grow.

The establishment of Pre-School day clinics for healthy children to meet this problem is a must. These preventive medical centres serve as part of the foundation for any sound preventive disease program or plan. If a child's (or a nation's) physical health is faulty, all else is limited in its meaning.

The establishment of the commercial high protein food factory

1. Market Study

This study is essential to determine many important problems: the per capita income; the scope and degree of the problem; the eating habits of the people; the educational level of the people; the cultural goals of the people, the present commodities being purchased and used in the homes; the seasonal incomes of the people; the various areas of the market; the living conditions of the people, village, rural or urban, market testing; market development. All of the problems listed above have been considered, and it was decided to start with a pilot plant because the market, although quite large, would be very limited at first and difficult to establish because of the very serious limitations due to lack of purchasing power of the consumers. This lack of money was obviously in the groups most in need of better quality foods.

This study revealed that several protein crops or foods were available:

1) Dry Skin Milk (D.S.M.); 2) cotton seed; 3) fish meal; 4) certain seeds such as sesame and other oilseeds; 5) cruciferates; and 6) soybeans. Soybeans were chosen because of the good crop available, the extensive amount of worldwide knowledge on the use of soya foods, and the fact that it is a good cash crop.

2. Plant Development

This was done in two stages. The first stage following market development with imported foods, consisted in establishing a pilot plant with a minimal investment. Initially only a one-ton capacity soy processing machine, a small hammer mill, hand sealing and hand packaging equipment were secured. A small factory was built. Two vehicles were used. Beans were obtained directly from farmers and wholesalers. Steps were immediately taken to begin research work on varieties, yields and nutritional content of the soybean.

... This health education effort, in addition to policy promotion, this pilot plant was used as a demonstration of a food bank program. Goods were sold to health care organizations, hospitals, day care centers, and health stores, and through, health care organizations, and health stores.

The pilot plant was operated with the consistent help of an experienced food technologist, and with the assistance of a qualified marketing manager. The operation was not successful in the long run. As a physician with limited business experience, the operator could not pilot plant in 1965, and consequently the plant had to be closed. The plant had been used local personnel had been hired for the operation, and the result was a financial loss of approximately \$10,000. The plant was closed because of the lack of a qualified help and a lack of a marketing manager.

A food technologist with 12 years experience was secured for a 6-month period. All products were prepared in a separate kitchen. The business was carefully analyzed in the light of revenue from various levels of income. A year's experience was secured from the factory, and then food processing. Another year's experience was secured from a business school as business manager. A marketing manager was hired to handle the marketing. By the end of the year, the plant was closed as full time, and after a few months, the plant was closed. The pilot plant had a capacity of about 100 to 150 pounds per hour, and it was used to sell to the schools. This was done in a separate kitchen, and the plant was used to sell to the schools. This was done in a separate kitchen, and the plant was used to sell to the schools. This was done in a separate kitchen, and the plant was used to sell to the schools.

The plant had a capacity of about 100 to 150 pounds per hour. The following equipment was added to the plant: a semi-automatic filling machine and a container for the product; a semi-automatic weighing machine; a debiller; a flour mill; a flour mill; a flour mill; a flour mill (about 1000 pounds to 1500 pounds per hour, crushing capacity, and the 7-25 pound extruder soy processing machine. The latter extruder processor has a capacity of about 900 to 1000 pounds per hour, and it produces a better tasting product at a lower production cost. The initial production was very low, according to the usual dry heat processing method used in the manufacture of the product, with about a 1-ton per day capacity. The above was added over a period of 6 to 12 months. An oven was

developed locally to process soya nuts and produce bakery goods. The plant's bakery was primarily intended to teach the baking of various special soya bakery goods to local persons working in schools, colleges, etc., and help in setting up village bakeries.

Our wet processing equipment was also installed. This was used for producing soya beverages and soya cheese. The equipment consisted of several soaking tanks, a bean grinder, a pressure cooker, filter basket, a press, a dehydrator, hand bottle-filler, retort sterilizer, and a line cooler. In addition, equipment, including bottle cleaners, air cooler and automatic bottle-filling equipment will be secured when the marketing potential is defined. It was decided to test and develop the market with local bulk sales of soya beverages and soya cheese; the hand bottling equipment was not commercially viable, so was used only for market testing.

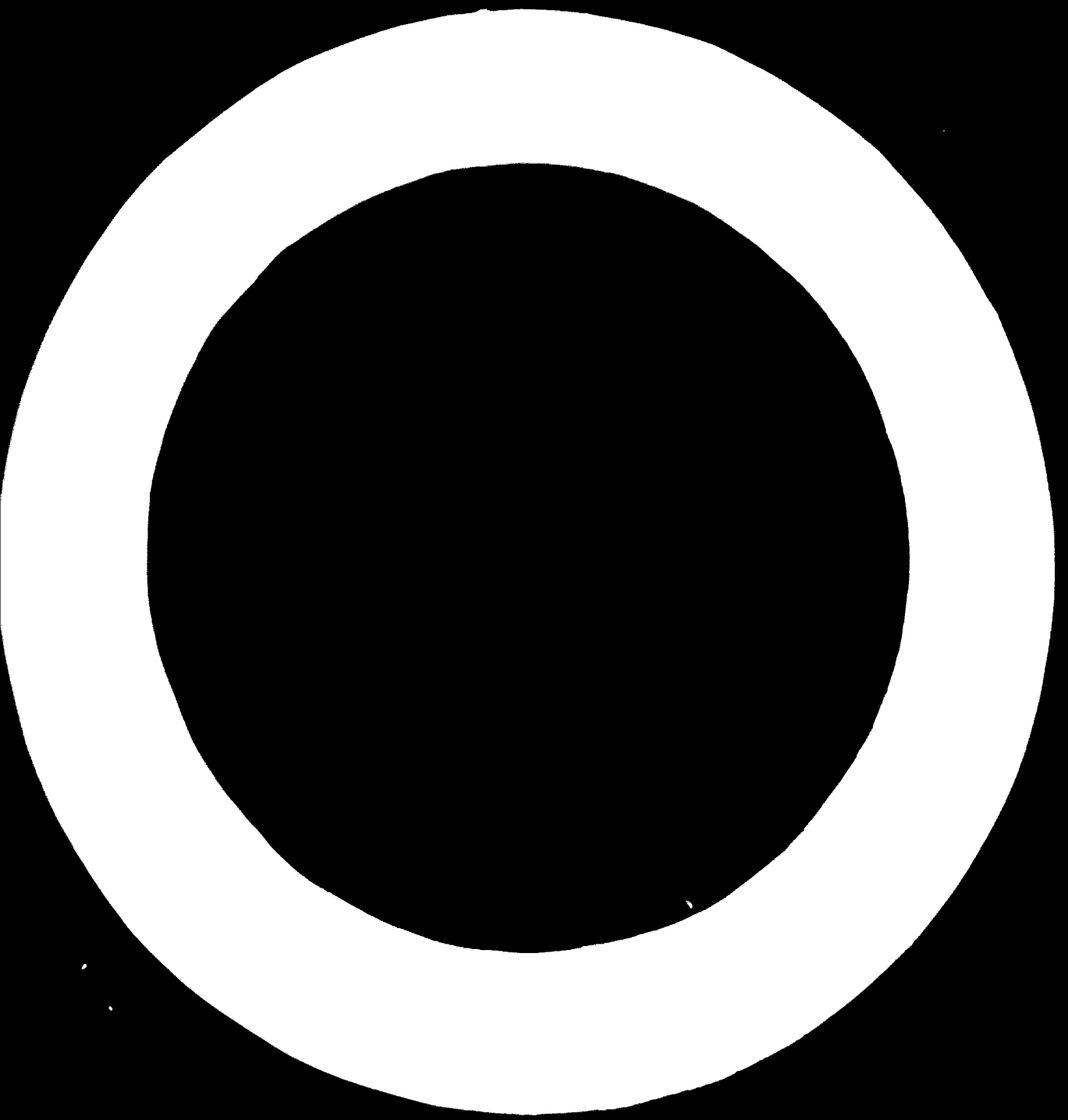
3. Financing

The usual money sources, including the U.S.A. Development Corporation, declined to invest. Their reasons being that this involved high risk capital, and return on capital invested would be marginal or nil because of the very low income of the people most needing the foods. Their views were shared by local and USA money sources. So it was decided to secure capital from foundations and charitable sources. The humanitarian goals were clearly stated, but commercial viability was the clear-cut objective. Contrary to usual bank loan capitalizing, the financial structure provided for growth but only marginal or no return on invested capital. Only by doing this was it possible to price the foods low enough to reach those in need. The funds are invested by charitable organizations (charities, foundations, etc.) and world bodies in basic profit earning humanitarian business in the only manner to raise living standards in developing countries. These businesses should be operated by the same type of people who are motivated to enter church work, etc. The business may be viable, pay good salaries, but should not return dividends to investors. Its aim should be to increase the purchasing power of the consumer. This is a sound commercial objective.

Products produced - 1. soy flour

Our first product is soy flour. It was decided to market soy flour in a form that is easy to use. The flour will be sold for use in soups, stews, casseroles, etc. The flour is rich in protein and other nutrients. The flour is also suitable for use in a wide variety of soy products. The first two products are soy school porridge, soy porridge and soy cake. The first two products are made with the flour and sugar. The first two products will be marketed in packets with the products. Acceptance may be expected. The first product is primarily for use in the education of children. The first two products are for the major reasons for the early success of the country. The first two products are soups, casseroles, etc. The flour and the first two products, if not directly produce sales, but they establish the reputation of the flour. In this low income subsistence group, the flour are for use in the early stages of subsistence living. The flour are developed that solely through health education and direct group demonstration.

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We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.

The most crucial issue in developing countries or in any country today is the problem of optimum nutrition and adequate health education for its people. The single most important and indispensable resource in every country is its people. The physical, mental and spiritual (ethical or moral) development and prosperity of each citizen is the only real wealth any nation possesses.

The basic issues in the life of the nation, i.e. political stability, education, industrialization, food production, housing, etc. are all primarily dependent upon the physical and mental energies (health) of each citizen.

Africa Basic Foods Inc. has been established to contribute to this crucial need. This company is expending its efforts in three crucial areas:

- (i) Agricultural economic development of an important food cash crop primarily for the poor farmer;
- (ii) Production and marketing of the necessary low-cost, high-protein foods;
- (iii) Health education for the family.

To achieve goal number (i), this company in 1965 asked the Ministry of Agriculture and the Makerere University Agriculture Department to do research work on soya bean production. Through these two institutions three years of research work have been done for us, and high quality soya bean seeds are now available for the small farmers. This will provide them with a new food-cash crop. Promotion of this crop by ABF Ltd. is being carried out entirely with small farmers, who mostly need the increased purchasing power, and the low-cost protein foods. The total living standard can be raised only with increased income, to provide adequate food, clothing, shelter and education.

To achieve goal (ii), a food factory was built only 4 miles from Kampala. Now, high-protein foods are produced, and marketed throughout Uganda, especially in hospitals, schools, government institutions, etc.

... (Waves and City), ... (ill shows, food demonstrations, etc. have ... the family. This work has ... the Ministry of Health, the Ministry ...

... an overall background in the ... (See also ...)

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The ... of malnutrition is in the pre- ... countries with ... growth (age - ... milk is ... the growth (age - ... Africa (a ... in the developed ...

The ... of child's health has been ... growth curve. Several very serious ... of early childhood ...

... of its full adult weight by the age of 4 years. ... the intellectual development ... during the ... than ...

A ... factor is ... childhood mortality rates in ... this high ... rapid physical growth ...

Several important steps were taken by ABF Ltd. to combat the low health standards generally, and specifically this problem of childhood malnutrition. The quickest and most direct solution was to make available commercially low-cost high-protein foods acceptable to the entire family, and particularly for the pre-school child. The problems encountered have been many.

COMMERCIAL PROBLEMS

Sales Promotion

First the village or rural mother and many of the urban mothers are not aware that a special protein food is necessary for infants. This problem was met by establishing a programme of health education. We concentrated on protein nutrition; this obviously promoted the sale of our protein foods. We found a favourable response, depending on the education of the persons we were dealing with. The more educated the parents were, the quicker they understood what protein foods were, and made an effort to obtain them. Our approach to the mothers less well educated was often based on their eating the foods and liking them. Many demonstrations were made, and each member of the audience tasted the foods prepared. It was found that food demonstrations were the best way to approach the rural individuals.

Pricing

A second problem was that of pricing our foods where they would reach the maximum market. Baby foods imported cost 7/- and 8/- per pound. For the average family this is a price completely out of the budget. Almost every duka carries cans of Parax and Nestan (baby cereals), in spite of the fact that very few are sold over a monthly period, because the average village family cannot afford imported baby foods. A study of the purchasing habits in urban and rural areas indicated that the indigenous population in the lower income class bought things generally in small quantities sufficient to last for only a day or so. Most often goods were bought in quantities of less than a pound, costing around a shilling.

World wide studies of the pricing of high protein foods in developing countries established a market price of 1/- to 2/- as a marketable average, costs thus running from 20% to 30% of the costs of imported protein feed. The final price was to be considered as the cost of production, administration and the distribution of the feed. Obviously a commercially viable operation would be the only meaningful one. The above costs put the price of the food between 1/- and 2/- per pound. Considering the low income of the consumer, it was further decided to eliminate most of the marketing costs, and sell the foods for prices between 7/10 p and 1/10 p per pound.

A fourth consideration was taken into account, and that was what were the other protein foods that would be competing with. The other protein foods ordinarily available were: whole milk, top-ski milk, goat, fish and eggs; in the vegetable group in fact there were beans and nuts (mainly groundnuts). A study of the above foods indicated prices averaging about 1/- or above per pound.

The figures arrived at for the costs of our soya foods were at an average price which met well the criteria listed:

1. The costs were about 20% to 30% that of imported protein foods, thus being in the range of spending for the lower income group;
2. Wholesale prices were commercially viable sales prices for the company (ABF Ltd.), and left very little margin for promotion;
3. The whole sale cost of all selling prices of the new high-protein soya products were substantially lower than the prices of competing commodities - whole milk products, beans, nuts, and imported protein cereals, baby foods, etc.

Market Income Levels

The third major commercial problem to be considered is the income level of the specific market areas. The following market areas were identified:

1. The very poor rural people living mainly on subsistence farming and having only a very small yearly cash income;
2. The much smaller group of wage earners (also very poor) working and living occasionally in rural areas, and urban factory workers;
3. The small group of poor urban office workers;
4. The poor institutions - primary and secondary schools, nurseries, hospitals and clinics;

5. Moderate income institutions - training colleges, universities, government institutions, prisons, army units, etc.;
6. The middle and upper class retail market - mainly supermarkets, restaurants, bars, hotels, etc. (including teachers, executives, better paid business and government employees, etc.)

Our job was to sell to all of these various income levels. This objective has been achieved through the methods outlined in the section on "Market Testing and Development". The first year's list above reserve further comments.

1. The Very Poor Rural Market

This is one of the areas of greatest need and is also difficult to educate and sell to. The people being very poor and generally uneducated, do not readily try new foods. The food sales promotion achieved the following results:

- (a) Radio and Newspaper Advertising: this sort of media in selling the foods known and establishing them as recognized and acceptable. However, this would not sell the food or persuade this class to buy;
- (b) Direct contact methods and community involvement through clubs brought our best sales. This was accomplished through the church clubs, the Ministry of Community Development Clubs, YWCA, YWCA, and other national or local women's clubs;
- (c) Club lectures and food demonstrations giving opportunity for tasting the foods, seeing them prepared, and asking questions, produces sales. This must be done monthly for many months, gradually increasing the sales through the local village stores. Additional community lectures, film shows, etc. should be held through these local organizations;
- (d) Pre-school clinics (baby clinics) offer one of the most viable ways for contacting this group, where the need is the greatest. I feel this is of vital importance, so it is described in detail in the supplement "The Pre-School Clinic".

2. Factory and Estate Workers (Very Poor)

Here again the methods of promotion apply as above. These people live in the poorest sections of the city, usually on inadequate diets. On the estates they also have a poor quality diet. The income is inadequate to provide sufficient protein, and other basic family needs. Generally they live on their usual high starch diets. The employer may supply some midday starch meal. Sales promotion is difficult because the income is low and the people isolated and uneducated. Some estates have programmes for upgrading the general health including nutrition; however, this is again difficult since low-cost protein foods are

generally not available, especially low-cost baby foods. Here again, direct contact methods are most successful. Few sales are made on the estates because of the poverty and ignorance and often the indifference of the employer. This is one of the areas of major nutritional need.

3. The Poor Urban City Worker

The income in this group is barely adequate for survival. Education is usually primary school and some secondary school. Adequate facts on proper home nutrition are lacking, and so their families suffer from malnutrition etc. Here radio and newspaper advertising have an initial effect. However, the most effective methods are direct contact via clubs, church groups, etc. There is a great deal of marginal malnutrition in this group, which is interested in better health for their families and so will respond when contacted directly. However, very limited and inadequate sales result from radio and newspaper advertising alone to this group.

4. The Poor Institutions

Primary and secondary schools, nurseries, hospitals and clinics are institutions which offer a good potential market, because they are operated generally by educated individuals who are aware of the nutritional problems and are looking for low-cost protein foods to give a balanced diet. Health lectures to the teachers or medical personnel and the students or patients bring good results. The major problem is the lack of sufficient money. However, with sufficient co-operation from the directors of these institutions, diets adequate in protein content could be worked out with the limited income. The major problem here is failure to obtain full co-operation, and a sustained effort to solve the problem. These institutions offer the opportunity for regular year-round programmes of health education, and the influence of such an effort would have a wide effect.

5. Moderate Income Institutions

Training colleges, universities, government institutions, prisons, army units, etc. This is a good market and is best reached with direct contact sales methods. Here again government awareness and co-operation is essential to open

up opportunities for health education programs and direct sales to these institutions. This kind of co-operation is difficult to get, because of the government's many commitments to medical care, and its reluctance to co-operate in this area, since the seriousness of the problem is not recognized and no sound organized approach to the problem is in operation.

"Moderate Income Institutions", with the "Poor Institutions" listed in Section 4 must form the foundation for establishing financial or commercial viability of the company. With government co-operation (there is no need for government financial participation if it is not available) these institutions offer a viable market immediately with a minimum of sales promotional expense. Without this government and institutional co-operation to immediately establish commercial viability for this basic industry, I feel any company heading to produce low-cost protein foods should seriously consider not attempting the job.

There are several basic reasons for this view:

- (i) This nutritional problem as explained in the first few paragraphs of this paper is basic to the survival of every nation, so the government has a positive responsibility to see that quality food is available for all, rich and poor alike: proper food is a basic human right and need;
- (ii) The educational, cultural and economic problems to be overcome in reaching all of the people (especially the masses of rural poor) are time-consuming and difficult; it can only be accomplished by working from a solid base of financial viability. Investment and working capital will most likely be exhausted before the point of viability is reached if the 'poor' market is the initial primary consideration;
- (iii) The margin of profit in this type of enterprise is limited by the very nature of the market one is trying to reach, and the already established protein foods (animal proteins) one must compete with. The market in need of low-cost protein foods is this "very poor" market in categories 1 and 2; their cash income limits the retail price and their educational and economic situation makes sales promotional slogan unprofitable for a very long time. In time for the volume of sales to this poor but very large market will make it financially viable. Well established "institutional" sales can quickly and easily provide commercial viability, while the long slow job of getting to those most in need proceeds gradually to the point of profitability.

Our chief concern in this entire exercise is to bring a solution to the devastating malnutrition that blights the lives of two-thirds of mankind; so at this point we can profitably insert our broad view of the positive economic steps that must be taken to reach this two-thirds of mankind burdened with poverty

and malnutrition. In our efforts to encourage entrepreneurs in developed countries to invest in protein food schemes, we point towards profits to be made; and the investor comes on the principle that high risk areas demand higher percent return on investments over a short period of time. I wish to point out that this view is false. The market at this stage is not profitable, and to demand high percentage returns over short periods of time only promotes exploitation, which is the cause for underdeveloped countries being high risk areas, healthwise and investmentwise. In other words, the two specific policies or views mentioned above, which are followed by developed countries investing in underdeveloped countries, are perhaps the cause for the fact that developing countries are high risk areas healthwise and investmentwise.

The first step in eliminating poverty, malnutrition and its train of ill effects must be to increase the purchasing power of the consumer to achieve:

1. Economic Physical Viability:

to ensure enough income to provide adequate food, clothing and shelter to "stay alive"; most of the "Third World" lives below this level;

2. Economic Social Viability:

sufficient income to provide education, medical care, roads, etc. - basic needs which ensure survival;

3. Economic Profitability:

where one can invest and make a profit. In the first two stages, the investor must put his earnings back into the economy; and secondly, grant money must be used to "boost" the economy.

Obviously every developed country has passed through these stages in reaching its present affluent standard of living.

SUPPLY OF RAW MATERIALS

A. Soya beans

1. Availability:

In 1955, when our nutrition scheme started, the yearly production of soya-beans was about 1,000 tons per year. Almost 100% of the crop was grown on small plots averaging not more than a few acres or less, grown by the subsistence

farmers. There were two main seasons, however, the beans could be purchased throughout most of the year.

The soya bean was introduced in Uganda from America and South Africa in 1938. Within a few years various varieties were tested and the crop distributed to the farmers. The crop increased in production as the demand from overseas grew due to the wartime shortage of proteins in England.

The highest acreage achieved during the Second World War was about 35,000 to 40,000 acres. After that time (about 1945) the acreage gradually dropped, due to lack of demand, to only a few thousand acres under cultivation by 1965.

Since 1965, ABF Ltd. has been actively promoting the growth of soya beans. First, the Ministry of Agriculture initiated variety trials. Then in 1966 the University of Makerere Department of Agriculture started variety trials with over 50 varieties available. The crop production has grown very rapidly as the farmers heard of a local demand, and the price of 25 cents per pound (US\$ 3¹/₂). In 1968 about 13,000 to 15,000 tons were produced. A large share of this was used locally by the oil milling industry. Ordinarily the oil millers crush cotton seed for oil, but the supply of cotton seed is never more than enough to keep the mills running 3 to 6 months per year. They were advised to try soyabans and there was a ready market for the soya cake. The costs and yields per ton were about the same as for cotton seed.

Soyabean production is still over 90% in the hands of the small subsistence farmers, who need the income from this new cash crop. We are following a policy of encouraging only the small farmers to grow the crop. Aside from the oil millers, there is an animal feed plant now operating in Uganda since about 1967, as well as our human food plant. The consumption from these two plants is small, about 352 tons and 120 tons respectively.

As a result of world wide increases in demand for protein foods, there has been an increasing demand for Ugandan soya beans on the world market. Over 50% of the local production is perhaps exported.

2. Method of Purchase:

Beans are purchased directly from the farmer or from local wholesalers. Beans are sold in 200-pound bags.

3. Quality:

Excellent varieties are not available. The recommended variety is called Suk-lasa IV. The average yield per acre is around 2000 pounds. This variety gave a protein content of 12% and a fat content of 20%.

4. Price:

The cost per pound ranges from 24 to 29 cents E.A. (about 3 to 4 US¢).

5. Maize:

1. Availability:

Maize is grown locally and is adequate in amount, and is of fair quality. It is available throughout the year.

2. Method of Purchase:

It is purchased directly from the farmer or wholesaler.

3. Price:

The price will average from 12 to 20 cents per pound or an average of 15 cents per pound. It is sold in 200-pound bags.

6. Sugar:

1. Availability:

Sugar cane is produced locally and white sugar is available locally. Also, many jaggery factories are present locally, which produce jaggery for alcoholic beverages.

2. Prices:

White sugar sells for about 65 cents per pound, and jaggery for 30 to 40 cents per pound, depending on the producer and how clean he has been in producing it. The supply of clean edible jaggery is not reliable, so much of the time white sugar must be used.

D. Dried Skin Milk

1. Availability:

This is produced in large quantities in Kenya and is readily available in Uganda as an import item.

2. Price:

It is about 1.65 shillings per pound (US\$ 23).

I. Soy Flour Production

A. Processing:

1. Cleaning - at 3rd line.
 - a) Machine - "Cococo" cleaning and grading machine, capacity 50 - 60 bushels per hour;
 - b) Manual.
2. Roasting - Soyatron machine.
 - a) Roasting at 250°F for 7 minutes;
 - b) Enclosed box method - maintaining a temperature of 220°F for 20 minutes;
 - c) Cooling.
3. Dehulling - "Cococo" dehuller, capacity 50 bushels per hour.
4. Winnowing - locally made machine.
5. Grinding - hammer mill - locally made machine.
6. Packing - USA made automatic filling and sealing machine.
Sacks: 1 lb. polythene bags, 5 lb. paper bags, and 50 lb. paper bags.

B. Cost of Materials:

1. Soyabean cost 27 shillings per 100 lbs.
2. Less 15% - cleaning, dehulling and roasting.
3. Final cost - 0.33 shillings (1.9 US¢) per lb.

C. Food Value:

1. Protein - 3.5%
2. Moisture - 10%

II. Maize Flour Production

A. Processing:

1. Cleaning and Grading.
 - a) Machine - "Cococo" cleaning and grading machine.
 - b) Manual.

2. Retorting at 240^oF for 30 minutes.
3. Cooling.
4. Grinding - Hammer mill.

B. Cost of Materials:

1. Price cost: 15 shillings per 100 lbs.
2. Less 3% - cleaning and re-sting.
3. Final cost - 0.15 shillings per lb. (US¢ 2.3).

C. Food Value:

1. Protein - 3.5%
2. Moisture - 10%

III. Soy Milk Production - adapted from H. H. Miller's (H.D.) method:

A. Raw Materials and Supplies:

1. Soybeans (detailed).
2. Sugar - locally made cane sugar.
3. Salt - locally available salt.
4. Bottles and caps - locally available items.

B. Processing:

1. Wash beans in cool water several times.
2. Soak beans in water for 4 hours at 60^oF.
3. Grind - horizontal stone mill - add small amount of water while grinding.
4. Add water - ratio of 1 lb of beans to 7 lbs. of water.
5. Cook at 240^oF (14.5 lbs. pressure) for 15 minutes.
6. Separate pulp from milk - using hand press and filter bag.
7. Formulation.
8. Filling and capping milk.
9. Sterilization - retorting at 240^oF for 30 minutes.

C. Material cost:

1.	<u>Ingredients</u>	<u>Amount (lb.)</u>	<u>Price per lb.</u>	<u>Total</u>
	Dry Milk	20 lbs.	0.30	6.00
	Sugar	3 lbs.	0.28	0.84
	Salt	1 lb.	0.50	0.50
2.	Practice - 20 gallons of milk.			
3.	Cost = 0.73 multiplied by 20 = 14.60 (14¢ 7.3).			

D. Food Value:

1. Protein - 1.5%
2. Fat - 1.0%

IV. Box Cheese Production

A. Procedure:

1. Soak 1 full 1/2 bushel of coal water (55°F) for 4 - 5 hours.
2. Break (stonemill) and add small amount of water.
3. Add water to ratio of 1 lb. of cheese to 7 lbs. of water.
4. Cook at 140°F (118 lbs. pressure) for 10 minutes.
5. Separate milk from curd with hand press and filter bag (cheese cloth).
6. Add salt (lean sodium sulphate): 100 lbs. of cheese to 6 lbs. of sodium sulphate.
7. Separate cheese from whey, filter a box lined with cheese cloth.
8. Mix cheese with other ingredients.
9. Pack in cheese (1" diameter).
10. Cook at 140°F for 20 minutes.
11. Cool in running water.
12. Keep in refrigerator.

B. Material cost:

1.	<u>Ingredients</u>	<u>Amount (lbs.)</u>	<u>Price per lb.</u>	<u>Total</u>
	Dry Cheese	30	0.73	30.68
	Practice 30 lbs. Milk (D.B.M.)	30	1.65	3.30
	Cheese Powder	0.3	8.00	2.40
	N.B.S.	0.5	12.00	6.00
	Salt	1.0	0.40	0.40
	Sugar	0.2	10.00	2.00

2. Cost: 0.45 shillings (US\$ 0.9) per lb.

C. Food Value:

1. Protein - 15%
2. Moisture - 15%

V. Soy Butter Production

A. Processing:

1. Mix soy flour and other ingredients in mixer.
2. Add antioxidant * and oil and mix thoroughly.
3. Add oil and vegetable shortening.
4. Mix for 10 minutes.
5. Pack - 10 lbs. in bags and 2 lbs. in tin cans.

B. Material Cost:

1.	<u>Ingredients</u>	<u>Amount (lbs.)</u>	<u>Price per lb.</u>	<u>Total</u>
	Soy flour	40.	0.45	18.00
	Antioxidant	1.00	4.40	4.40
	Salt	1.	0.40	0.40
	Vegetable oil	20.0	1.70	34.00
	Vegetable shortening	10.0	1.50	15.00
	Antioxidant	1.00	30.00	30.00
				<hr/>
				91.80

2. Cost per lb. 0.92 shillings (US\$ 1.4).

C. Food Value:

1. Protein - 25%
2. Moisture - 12%

VI. Soy Bread Mix

A. Processing:

1. Mix soy flour and other ingredients in mixer.
2. Pack into 10 lbs. and 50 lbs. paper bags.

* Antioxidant: Embonox No. 3 (BHA 13%, BHT 20%, Vegetable oil 62%).

B. Material Cost:

1.	<u>Ingredients</u>	<u>Amount (lb.)</u>	<u>Price per lb.</u>	<u>Total</u>
	Wheat flour	70.0	0.70	49.00
	Soy flour	10.0	0.66	6.60
	Salt	3.0	0.85	3.25
	M.F.M.	2.7	1.65	4.46
	Salt	1.5	0.40	0.52
	Yeast (separate packet)	1.0	5.00	5.00
				<hr/>
				68.83

2. Cost: 6.88 shillings (US\$ 10) per lb.

VII. Soy Maize Production

A. Processing:

1. Mix soy flour and other ingredients in mixer for 10 minutes.
2. Packaging: 1 lb. polythene bags, 5 lbs. and 50 lb. paper bags.

B. Material Cost:

1.	<u>Ingredients</u>	<u>Amount (lb.)</u>	<u>Price per lb.</u>	<u>Total</u>
	Wheat flour	70.0	0.18	12.96
	Soy flour	10.0	0.33	3.25
	Salt	1.0	0.40	0.40
	M.F.M.	1.0	1.65	3.30
				<hr/>
				24.91

3. Cost: 2.25 shillings (US\$ 3.6) per lb.

C. Food Value:

1. Protein - 17%
2. Moisture - 10%

VIII. School Permitt

- A. Processing - same as for Soy Maize.

B. Material Cost:

1. <u>Ingredients</u>	<u>Amount (lbs.)</u>	<u>Price per lb.</u>	<u>Total</u>
Wheat flour	53.0	0.17	11.84
Soy flour	10.0	0.55	5.50
Sugar	15.0	0.45	6.75
Salt	1.0	0.40	0.40
D.S.M.	1.0	1.00	1.00
			<hr/>
2. Cost: 0.30 shillings (US¢ 4.3) per lb.			2.74

C. Food Value:

1. Protein - 14.1%
2. Moisture - 11.0%

IX. Soy Porridge Production

A. Processing:

Same as for other porridge.

B. Material Cost:

1. <u>Ingredients</u>	<u>Amount (lb.)</u>	<u>Price per lb.</u>	<u>Total</u>
Wheat flour	36	0.17	6.28
Soy flour	15	0.75	11.25
Sugar	15	0.45	6.75
Salt	1.0	0.40	0.40
D.S.M.	1.0	1.00	1.00
			<hr/>
2. Cost: 0.35 shillings (US¢ 9) per lb.			34.93

C. Food Value:

1. Protein - 20.1%
2. Moisture - 11%

Income Forecast and Cash Flow

Income	30,000	%	40,000	%	40,000	%
<u>Expenses</u>						
<u>Production:</u>						
Raw Materials	1,000	3.0	10,500	36.0	11,000	36.0
Wages	3,000	10.0	3,000	10.0	4,000	10.0
Depreciation	1,800	6.0	1,800	6.0	1,800	4.5
Gas, Electricity and Water	1,000	3.0	1,000	3.0	1,600	4.0
Others	400	1.3	400	1.3	500	2.0
	13,800	46.0	17,300	59.0	22,500	56.5
<u>Administration:</u>						
Wages	1,000	3.0	1,500	5.0	1,000	4.5
Office Expt.	400	1.3	400	1.3	800	2.0
Office Rent	240	0.8	240	0.8	240	0.6
Others	400	1.3	400	1.3	600	2.0
	2,040	6.8	2,540	8.4	3,600	9.1
<u>Sales:</u>						
Wages and Commission	900	3.0	1,500	5.0	2,000	5.0
Petrol	1,000	3.0	1,500	5.0	2,000	5.0
Depreciation (vehicles)	940	3.1	940	3.1	940	2.35
Upkeep (vehicles)	300	1.0	900	3.0	1,200	3.0
Promotion and others	500	1.7	1,200	4.0	1,600	4.0
	3,640	12.1	6,040	20.1	7,740	19.35
TOTAL	19,880	66.1	27,380	90.9	33,980	84.44
Gain	300	1.0	2,620	8.7	6,020	15.5

Note: Present Income Statement with all equipment in use excluding the X - 25 Wenger mixer.

A F R I C A B A S I C F O O D S I N C .

P. O. Box 3740
Kampala Uganda

BALANCE SHEET: 30 September 1967

<u>Assets</u>	<u>£</u>	<u>Liabilities and Net Worth</u>	<u>£</u>
<u>Fixed Assets</u>		<u>Liabilities</u>	
Factory building	3,000	Current Liabilities:	
Land	2,000	Transportation costs on	
Machinery	3,500	Soy Milk equipment	300
Scyatron	1,200	Sugar purchases	200
Flour Mill	500	Soybeans	150
Soy Milk Equipment	1,600	Motor Vehicles	250
Scaler	100	Scyatron	1,000
Miscellaneous	500	Total Current Liab	3,100
Motor Vehicles	2,400		
Total Fixed Assets	19,300	Long Term Liabilities:	
		Dr. D. W. Harrison	3,000
<u>Current Assets</u>			
20 bags of Soy	200	Total Liabilities	6,100
10 bags of Flour	50		
Ton of Sugar	100	<u>Net Worth</u>	7,300
Cash in Bank	240		
Accounts Receivable	900		
Total Current Assets	1,500		
		<u>Total Liabilities and Net Worth</u>	17,600

I certify that the above is a true and accurate statement of the assets and liabilities of Africa Basic Foods Inc. as of 30 September 1967. This Balance Sheet does not contain diminishing operating loss - 1 July to 30 September

Dr. D. W. Harrison, President

NOTES ON BALANCE SHEET

1. Initial Investment about \$11,000

Pilot Plant - Stage One

2. New Machinery in operation by January 1969 for expansion into Stage Two:

(i) Automatic Filler and Sealer	\$1,850
(ii) Mixer	\$3,645
(iii) Cleaner and Grader, and Dehuller	\$2,390
(iv) Hammer	1,500
(v) Large Flour Mill (hammer type)	2,700
(vi) Flour Sifter	\$2,700

3. In October 1969 a Wenger X-25 Extruder Soy Processor will be installed, completing the second-stage expansion. Cost: \$30,000.

APPENDIX I

THE VITAL ROLE OF THE COMMERCIAL HI-PROTEIN FOOD FACTORY

IN THE PRE-SCHOOL CHILD HEALTH PROGRAM

I. The Need

The critical period of growth in which malnutrition is now playing such a vital role is between the age of weaning (about 6 months to one year) and 5 to 6 years. The lack of protein during this period often results in permanent physical and mental damage. At present about two-thirds of the 680 million children in developing countries of pre-school age are suffering from lack of food in quality and/or in quantity.

This sets the stage for the vital need or role of hi-protein low-cost foods in the form of porridge, milk, breast - some form to serve the specific needs of the pre-school child. Milk is universally acceptable because all children start life on milk. However, throughout developing countries milk is not adequate in quantity and too expensive for this segment of the population. So throughout developing countries, these children are weaned on starch foods.

On the commercial market, the available high protein foods are milk (inadequate in quantity and high in cost) and imported porridges. The porridges cost 4 to 6 times what these mothers can pay. Consequently they are not used in this segment of the population (the poor subsistence farm families).

II. The Commercial Answer to the Problem

There must be local or indigenous production, processing and the usual commercial distribution, of low-cost high protein foods. They must be available in every rural and village store just as the soft drinks, cigarettes, salt and sugar are available now.

Such a food is now on the market in Uganda, produced by Africa Basic Foods. This commercial production has been sponsored by UNICEF, Meals for Millions, the Washington D.C. Public Welfare Foundation and several

interested United States investors. USAID has acted as advisor. Milk made from indigenous soy beans is produced to sell at half the price of cow's milk. Perridges selling at one-fifth and one-eighth of the price of imported products are being produced and sold.

The crucial problem involved is as follows:

- (1) In spite of the low cost as indicated above, it is still above the price range of these mothers. The foods, in order to reach them, must be a certain percentage of their income proportional to the percentage of income spent by the mother or family in developed countries to feed her child. This means that the price must be only 10% to 20% of the cost in developed countries, at least in the initial stages.
- (2) The second major problem is that the vital connection between food and the child's health is completely unknown to this large sector of parents. It requires months of regular visible health education and demonstration to make them aware of this fact. Only then will the mother modify her feeding of the pre-school child and achieve good nutrition in this group.
- (3) The national income is less than \$100 per head in 36 countries, and about 25 of these countries are in Africa. So the quantity of money available to be spent on food is very small. Also, much of the food is grown in a family garden.

III. Two commercial approaches to solve this financial and educational problem are listed in (A) and (B) below:

A. The Linear Approach

The pre-sensitized protein foods are subsidized for the child's first year of life at 80% to 90% of their actual commercial cost. The mother is seen in a clinic and given a month's supply of protein baby food along with the routine examination. All of this is given for only 1 or 2 shillings (14 to 20 US cents). The weight-age curve being the essential criteria for nutritional status. The second year, the food is subsidized at only about 50%. The same routine health clinic plan is followed.

The third year or so the food is sold at the full price. A proportion of the mothers obviously will not continue to secure the foods, but a large nutritionally intelligent foundation group will be produced.

During the above period, it is hoped that the economy of the population will be going up.

B. The Parental Approach

For the child's first year of life, the food is subsidized at 50% or 90% as above. In the second year or so, the foods are sold at their full commercial price.

This will result in about 35% of the mothers continuing with their children in the clinic and about 60% or so will no longer come because of lack of finances, not because they did not clearly understand that health is not possible without proper food.

IV. Results of several Pilot Projects in this above commercial approach:

Forty-five clinics operated by the CBS (Catholic Relief Service) are in operation in Kenya, feeding and treating about 44,000 children. Others are in S.A. and Tanzania. For one shilling, a month's supply of food plus the examination and health education is given at weekly intervals. This cost is a fair percentage of the family income, as the mother comes reasonably faithfully to the clinic. In approximately a year's time, the mother sees and understands the relationship between protein foods and her child's health. Within this time, it was found that many mothers, having understood and being able to afford other protein foods, begin to buy low-cost protein foods. Thus the commercial market is developed, the mother is educated, and the child is fed properly. In one clinic (Thika) in Kenya, about 25 miles from the capital, there are 10,000 children attending the clinic regularly. This has been achieved because the foods are given or sold at a subsidized price.

V. Some problems with other approaches to the pre-school child:

1. It was first contended that all clinics should do health education, particularly nutrition education. This was tried but found not to solve the problem because:
 - a) The sick child coming to the clinic receives injections and other medicines. The mother is also worried about her sick

child. Therefore it is not possible to explain to her that nutrition influences the child's health, once drugs have been given.

- b) The pre-school child comes to the clinic only infrequently prior to school age (which is the critical period). This period covers approximately the third to the fourth year of life. If nothing is done within this period, either the child survives and comes to school, where he will benefit from other health schemes, or he will die of malnutrition.
- c) The mother's period of caring for pre-school children covers only 10 to 15 years. After this time she is often already a grandmother, or all her children are at school.
- d) It was found by medical experts in this field that the following criteria must be achieved to reach the pre-school child:
 - (i) The mother must be well, and not worried, and must bring a healthy child in order to learn how to keep the child well;
 - (ii) The child must be well. (20% of the children coming to the Child Welfare Clinic should be healthy children;
 - (iii) The mother and child must come once a month during the pre-school period. This will average about 6 to 8 times per year. Some families will come 10 to 12 times in the year;
 - (iv) A high-protein pre-school child food (which may be used by many in the family) must be sold to the mother at a price within her budget. This means an 80% to 90% subsidized price in the first year, increasing the price as the educational factor affects and the economy of the family improves;
 - (v) The mother should receive simple nutritional education and a month's supply of food at this once-a-month visit. The food at this price encourages her to come, and allows the education to take effect, and also immediately gives the pre-schooler the food he needs before he either dies or his body is permanently damaged;
 - (vi) This should be a food that is also commercially available so that as the mother becomes aware of the relationship between food and health she can begin to purchase the food in her own village store at the regular price, when she can, and then she should not have time to get to the clinic.

This offers an already proved immediate answer to the pre-school child malnutrition problem. This is the simple, most important food problem which our generation faces. As yet I am not aware of this full plan being carried out.

At present the factory producing the food in East Africa is in operation, and the clinics are in operation, caring for thousands of pre-schoolers successfully. These UNR clinics, however, are using AI and UNICEF donated foods, and charging a reduced price. The obvious next step immediately desired is for the commercial factory to co-operate with them. This ABE is willing to do them the honor of subsidizing the clinic food purchases for the remainder of the year if available.

The above subsidized marketing to children opens up a market of some 650 million children, and brings an immediate answer to the almost overwhelming problem of malnutrition at this very crucial age. This is the major problem facing our generation.

APPENDIX II

DEPARTMENT OF NUTRITION AND HEALTH EDUCATION

COMMERCIAL PROTEIN FOODS

(Uganda - 1964 - 1965)

I. In December 1964, Dr. D. W. Harrison was hired by the Uganda Government, Buganda Region, to serve as Director of Nutrition and Health Education. Particular attention was to be given to the problem of commercially produced (local production) high protein foods to aid in solving the very pressing problem of protein-calorie malnutrition so common in the pre-school age group. Attention was to be focussed on the local protein foods available, potential of these foods, local processing facilities, local distribution facilities, the financial strength of the local market, and of vital importance, it was proposed that if at all possible, the individuals most in need of better nutrition should produce the foods or raw materials for the proposed high protein food, thus giving them the major share in the potential of this new cash crop or crops. This last factor was felt to be of the utmost importance since the people in need of better food are also the ones in need of more money to buy more and better food, and an improvement in their general living standards must accompany the nutritional improvement if any real lasting benefit is to be achieved.

After a careful study of the local situation, five foods were found to be available for possible commercial answers to our problem:

1. Cotton Seed:

Protein from this source is satisfactory and adequate amounts are available, but there are still technical problems of production to be solved commercially and nutritional experiments are still in progress. Furthermore, local industrialists approached on the subject were not yet ready to venture into producing cotton seed protein for human use.

2. Groundnuts:

These are available and nutritionally acceptable; the problem of adequate storage to control the alfa-toxin would have to be solved before

groundnuts could meet the commercial need

3. Dried Skim Milk:

This is available, but the present production level according to the experts in the field, (referring to the IFFCO symposium on international high protein conference held in 1957 at Harvard University, Cambridge, Mass.) is not high enough to meet the major protein demand. Even if there is need to buy it, it, this conference brought out the fact that only with a vegetable protein could the protein be derived, outside of the use of fish meal, which was too cheap to be compared vegetable protein

4. Fish Meal:

This protein is adequate nutritionally and would be commercially acceptable if the production was at an adequate level. At present, there are no government plans in this specific direction.

5. Soy Beans:

Nutritionally this food has been adequately tested all over the world over many generations. Local production is adequate. At present 11% of the soy beans being grown are not being used as well as they should be. Most is used for fuel, and this is not in line with the commercial potential or income from developing this as a commercial crop. Also, since this food was highly recommended by international health workers and others, it was decided to explore the potential.

II. The following steps were taken to develop the commercial high protein food plant:

A. Feasibility Study:

This was done by Glaxo and Co. The cost of the entire operation, machinery to be used, break-even point in commercial operation etc. was thoroughly studied. This study was presented to the United Development Corporation and the Lugard Investment Corporation and was thoroughly studied by each group.

It was felt that it was desirable that the project was financed by contributions from the Government, the United States, and because of the nature of the work, the nature of the work was better financed by contributions from the World Health Organization. The Government of the United States has indicated that they would contribute a sum of \$100,000 for the project. It was estimated (especially since the Director of the project, who is employed by the Government, has a net income of \$12,000 per year) that the project would be self-sufficient, because of the project's financial aid, following shortly after the decision.

However, the project will be self-sufficient for various reasons, including the fact that it is self-sufficient with the development of the food program.

The feasibility study indicated the following:

1. Local production of the principal raw material was adequate. The one 2-1/2-ton portable power generator (small unit X-25) was used 100 hours per year, but local production was at least double this per year. All of the power is produced by small farmers.
2. The local price of the principal raw material is 25 cents per pound. Production of the principal raw material will be at prices from 4 to 10 cents per pound, which is 50 cents per pound; this is the same level of price as is paid for the principal raw material. It will be 10 cents per pound. The principal raw material is selling at 4 to 5 cents per pound.
3. The machinery (large equipment X-25 plus Alpine Power Mill) would cost about \$100,000 per year. This would be needed for operation of the project. In order, some method must be followed to raise the money for the purchase of the equipment before this major investment would be made. This could be done by importing the principal raw material, or by putting in a small plant with a capacity of about 1 ton per day.

It is recommended that the project be started as early as possible and that the project be self-sufficient.

B. Market Test

This will be supplied with imported foods. Part of the food was contributed by UNICEF, Mexico for children, and part of the food was purchased from the companies.

At this stage it was necessary to set up a special committee to handle the entire operation, and both local and foreign participants were concerned. However, it is not desirable to have a large number of foreign experts except as a part of a special program, and special facilities. At this point, Africa was established as a non-profit organization, and the Director of the Department of Health Education Department, who is also the president of the corporation, was in charge of the operation. The operation of this corporation was carried out by the local firm (as the local firm), and the local firm was proved that it could produce a high-protein soybean feeds.

The methods, areas covered, etc. of the present testing are covered in detail in the accompanying report. The results of the present testing indicated the following:

1. The feeds were easily accepted by the test people. They could be incorporated into the local diet and local food pattern quite easily;
2. The price was low enough for the local market to buy;
3. The farmers are a variety of kinds of soybean production because of the high yield of the crop for export. All of the seeds of present crop were still planted, and, poor farmers, the commercial firms. The seeds of the new crop would be used for the local market;
4. The Department of Agriculture has accepted the feeds because they are a good source of protein. The Department of Agriculture has also entered into the present program. The program of research to improve soybean production and varieties of soybeans;
5. The Federal Bureau of Investigation of the University of Michigan has also accepted the feeds and work with their Michigan farms. Their results have been reported briefly, they found that the feeds give comparable results to milk protein;
6. The problem of present local primary school feeding is a very special situation. There are no proper production facilities, which cost are also very high. The institutions

could afford, or the facilities available were very inadequate. The flour which is locally produced, and those with milk (if available) would solve the problem and eliminate the necessity of obtaining cooking facilities. The buns were highly accepted by the children, so it was decided to produce them locally. First trials with various powdered soy milk outlets.

C. Market Development:

Since market testing was successful, further quantities of foods were imported and the market was expanded. Also local production on a small scale using rented equipment was tried to test the potential for a proposed pilot plant.

A full report on local market development and present plans for a pilot plant are detailed in enclosures with this report.

APP. 10L 177

DEPARTMENT OF AGRICULTURE AND FISHeries, OTCANTO, CANADA,

AS. 1777A

Report on market testing and development of two products

I. Food Materials:

1. Soya Porridge received (May 1956)
Composition: Soy flour or meal
maize meal
sugar.
2. Full fat soy flour received July 1956.
3. Packed in the following sizes locally:
3 ounces, 1 pound; (received in 100 pound drums with
two bags of 50 pounds each).

II. Marketing Areas:

1. Medical Care Clinics
Ante and Post-Natal Clinics
Child Welfare Clinics
General Medical Clinics and/or dispensaries
Tuberculosis Clinics
2. Hospitals
3. Day Schools : Primary, Secondary and College
4. Boarding Schools : Primary, Secondary and College
5. Dukas (rural or village stores)
6. Urban Food Stores
7. Police Units, etc.
8. Clubs, Church units, Community Development Units, YBCA, YWCA, etc.

III. Marketing Methods:

1. Health Education:

This is our principle advertising media thus far. The basic information is the same but the educational methods will vary with the facilities and the audience. We are giving health education

to every level of the society, from the villages in village schools and clinics, to the college and churches.

- (a) Lectures are given with visual aids followed by food demonstration and tasting of the foods.
- (b) Film shows the preparation of food with movies on soil and color, covering nutrition, malaria, water, child rearing, etc. These have been prepared from local sources, etc. The film shows how to make our own soy milk for 5 or 60 people; these have been most popular because of the clarity of presentation and they are doing the best work, leading us to attack the problem from the angle of both individual and environmental health.
- (c) Through the local clubs we intend to establish local committees in the towns to have credit lines. Our department will teach these club groups how to prepare the foods and promote work more fully, with the various local responsible organizations.

3. Samples are given out freely.

Food demonstrations are held regularly in child welfare and health centers and in schools, large numbers of people eat the foods on these occasions.

3. Posters and handbills are being prepared for use in stores, clinics, etc.

4. Several radio programs have been produced; protein foods are promoted regularly on a weekly television program. This television program is not under our unit but the person in charge gives us close co-operation. This media for advertising is just beginning to be used.

IV Food Preparation Methods.

It has been found that the soy foods are acceptable to all of the three groups of people. We have incorporated our soy food into the local food habits so well that we have experienced little or no difficulties in acceptance.

1. Full Fat Soy Flour:

- (a) Made into soup or gravy and used on their main staple dishes: banana (a type of cooked banana), cassava, rice, meat, etc.

It is often used in place of or mixed with groundnut cravy.
This serves a great need because so often the above starch
is all that may be eaten.

Day Schools: Often the primary schools serve a mid-morning
meal of only cassava or a porridge of maize and banana, to
this we add soy flour (soya meal would serve the purpose and
be much cheaper) to give about 7 grams of protein per child
(this is equal to the protein in one egg and the cost is 1/7
the cost of one egg)

Buns containing about 4 or 7 grams of protein and costing
1/3 the cost of one egg are taken to many schools (produced
by a local baker - the largest bakery in the city - with our
soy flour)

(b) Soy Kibanda:

This is a local cake fried in oil and made of bananas and
cassava or white flour. We have taught them to make it of
bananas, whole wheat flour and soy flour - it is greatly liked
and is nutritious - it is about 1.3 soy flour.

(c) Soy flour bakery goods:

We have introduced soy flour to the local bakery industry and
we now have a number of basic products on the market - going to
schools, hospitals, etc.

1. White soy flour bread - 9 soya
2. Whole wheat soy bread - 17
3. Corn buns - 20 soya and 30 soya (per cent is based on
dry weight of flour ingredients)

The wholesale soy flour goes mainly to the rural stores where
the need is the greatest.

2. Soya Porridge:

This is a pre-cooked product in great demand this for children from
the ages of 9 to 12 months upwards - especially as a weaning food.
The only other products on the market similar to this are five
times the cost and lower in protein content. So this product has
fitted very well into the very pressing need for a low-cost high-
protein weaning food. It is well accepted.

Preparation: Hot water is added to give the desired porridge
thickness, hot milk can be added instead of water.

Finances:

1. All income is used in operating the nutrition project. The Government was given a full report on the finances required to develop a commercial sound nutrition scheme. They were interested and gave their approval, but were unable to contribute any funds because of over-commitment in medical care costs.

The Government, through the Uganda Development Corporation, suggested we seek foundation funds or grants and proceed with feasibility studies, market survey and market development. This we have done, and in all areas the results have been positive. This was made possible by the UNICEF grant, and the Public Welfare Foundation of Washington D.C. grant.

2. As Director of Nutrition and Health Education for the Government, I am in charge of developing this boy project into a commercially viable project. With this object in mind we set up our nutrition scheme on a commercial operation basis.

I and two of my Government departmental employees operate the entire scheme. Our salaries of course come entirely from the Uganda Government, so the Government to some extent (as much as they can) finances the project.

We have hired three other persons full time and one person part-time. They receive salaries from sales income. One is employed in packaging the goods, the other in nutrition education and food demonstration; one is our coach driver; the other part-time as bookkeeper. We also pay all operating costs for running our delivery truck - a large Landrover which was purchased for this purpose, without Government assistance.

About half of the food is given out free at demonstrations, acceptance tests, and clinical feeding tests (this is mainly done through our University Medical School contacts). The other half is sold for market testing and development, and to enable our unit to continue operating. Without these funds our unit would not have even started operating. Unless the food is sold and a market developed, the

entire project is meaningless. No permanent self-supporting answer to our nutrition problem can be reached except as we develop on a sound commercial basis, as we are doing.

3. The soy flour and soy protein are sold in 5 pound and 1 pound packages in all of our markets. Stores stock only the 1 pound size. The clinics use both sizes. The soy flour is given free as introduction and to those too poor to buy (especially children who are in most nutritional need). The price is based on a Feasibility Study done by Chess, and Co., further checked by the manager of the Bona Linda Food Company, and a local accountant, all at a cost of about \$3,500 (\$65 per pound). Our commercial retail price is 1/5 the cost of two similar (reported) products on the local market here. There is no other locally produced competitive product. This represents a commercially viable retail cost.

D. W. Harrison, M. D.
Director, Nutrition and
Health Education.

APPENDIX

AFRICA BATTERY PROJECT, LTD.
PROFORMA FINANCIAL STATEMENT FLOW

		<u>1st year</u> <u>250 tons</u>	<u>2nd year</u> <u>300 tons</u>	<u>3rd year</u> <u>350 tons</u>
INCOME: 1/				
Institutions		201,000.00	250,000.00	743,750.00
Merchants		<u>270,000.00</u>	<u>270,000.00</u>	<u>333,000.00</u>
TOTAL INCOME		<u>471,000.00</u>	<u>520,000.00</u>	<u>1,076,750.00</u>
EXPENDITURES: 1/				
Raw materials	2/	135,125.00	210,000.00	299,375.00
Personnel	2/	113,300.00	131,700.00	137,700.00
Promotion	4/	31,219.00	67,144.00	120,140.00
Miscellaneous	5/	100,000.00	115,000.00	37,000.00
Amortization	1/	<u>101,000.00</u>	<u>485,000.00</u>	<u>172,000.00</u>
TOTAL EXPENDITURES		480,644.00	949,844.00	1,216,315.00
Net loss/gain from operation		(109,644.00)	42,516.00	358,435.00
Accumulative loss/gain from operations before taxes			<u>(71,372.00)</u>	<u>287,063.00</u>

BREAK-EVEN ANALYSIS:

Average revenue from sales: 2100,- per ton (see schedule 1)

Tonnage of production to meet annual expenses	220.0 tons	300.0 tons	380.0 tons
Tonnage required to break-even	ca. 373.0 tons	-	-

PROFORMA INCOME STATEMENT AND CASH FLOW

SOY BEANS

	<u>1st year</u>	<u>2nd year</u>	<u>3rd year</u>
<u>1/</u> Income:			
Retail prices:			
3 oz. bag - /25			
1 lb pkg 1/25			
Wholesale price:			
less 1% to institutions and Wholesalers			
less 5% more to Jobbers			
Institution Sales (less 1%)			
120 tons of 1 lb pk			
(2,120) - tons	235,000.00		
180 tons of 1 lb pk		38,500.00	
350 tons of 1 lb pk			743,750.00
Merchant sales: (less 1% , 5%)			
(3 oz. bags at 2,150/ton)			
(1 lb pkgs at 2,015/ton)			
60 tons of 3 oz. bags	129,000.00		
70 tons of 1 lb pkgs	141,050.00		
100 tons of 3 oz. bags		215,000.00	
120 tons of 1 lb pkgs		241,500.00	
200 tons of 3 oz. bags			430,000.00
200 tons of 1 lb pkgs			403,000.00
TOTAL INCOME	<u>525,050.00</u>	<u>897,000.00</u>	<u>1,176,750.00</u>

2/ Raw Materials:

Cost and mixture per ton:

1000 lb soy beans	212.75			
660 lbs corn meal	145.50			
<u>340 lbs sugar</u>	<u>183.25</u>			
2000	532.50	132,125.00	215,000.00	399,375.00

SOFT DUES

	<u>1st year</u>	<u>2nd year</u>	<u>3rd year</u>
1 Personnel:			
Proposed salaries and wages estimated at 1950-51 rates:			
General employees (100,000)	59,200.00	59,200.00	59,500.00
Skilled laborer (100,000)	15,000.00	15,000.00	15,000.00
Unskilled labor	14,000.00	20,000.00	20,000.00
Workers (200,000) - present	10,000.00	10,800.00	10,800.00
Others (100,000)	-	-	6,000.00
Contractor(s)	-	2,400.00	2,400.00
Workers' Benefits (retirement, holiday, insurance)	6,000.00	10,000.00	10,000.00
Long leave for 100,000 worker (held in reserve)	10,000.00	10,000.00	10,000.00
TOTAL FOR PERSONNEL	114,200.00	131,700.00	137,700.00

4/ Promotions:

Provision for advertising,
delivery, distribution, etc.
based on 1% of gross

5/ Miscellaneous expenses:

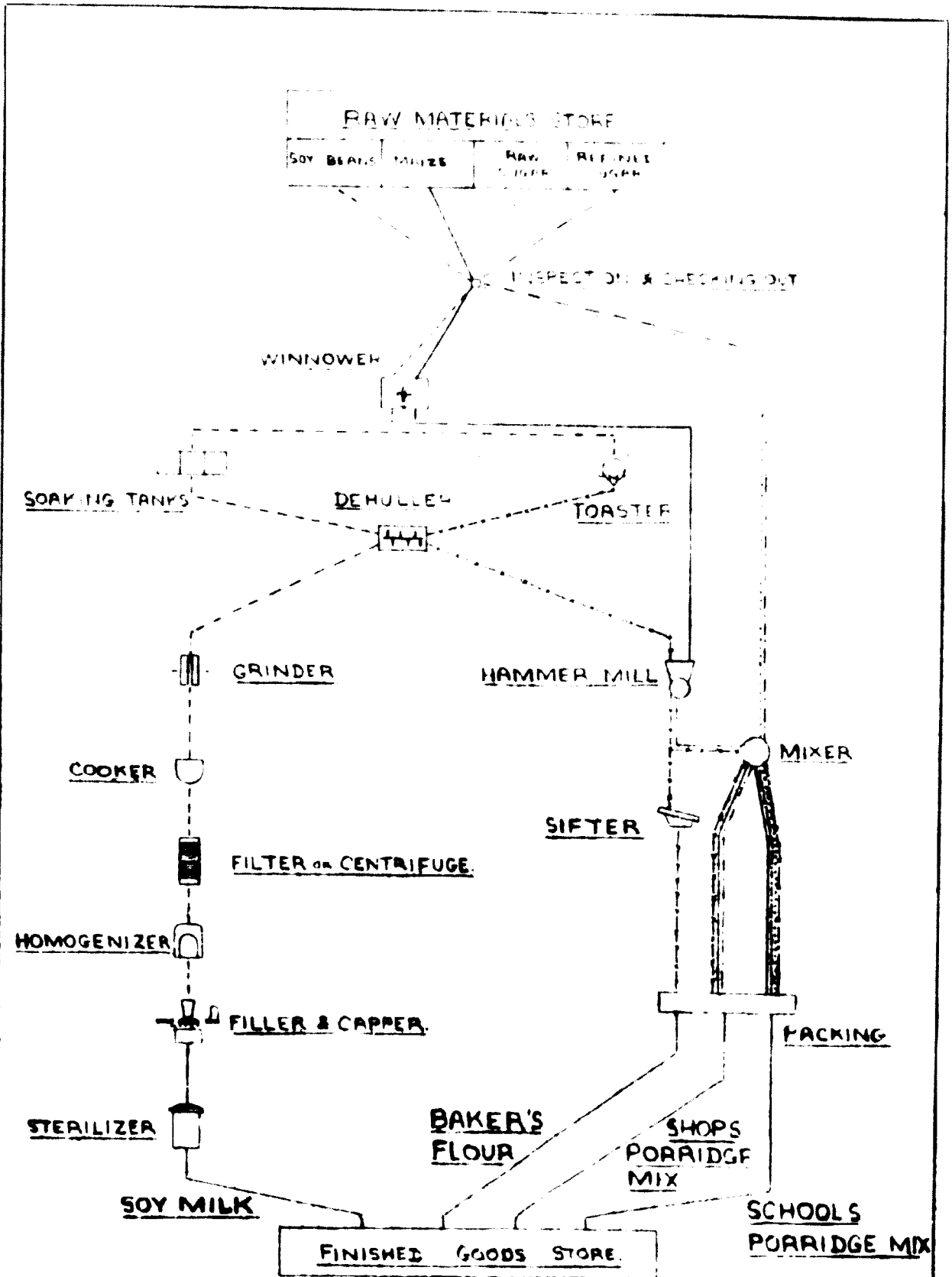
except where otherwise indi-
cated, based on 1950-51 pro-
posals estimates

Electricity	32,872.00	32,525.00	38,616.00
Steam	11,250.00	13,000.00	33,625.00
Prokary (100,000-ton)	60,000.00	110,000.00	210,000.00
Cost of projects (%)	20,000.00	20,000.00	20,000.00
Parts and lubrication	7,000.00	7,000.00	7,000.00
Alpine fuel	2,575.00	3,575.00	2,575.00
TOTAL MISCELLANEOUS EXPENSES	133,697.00	215,100.00	375,816.00

6/ Amortization:

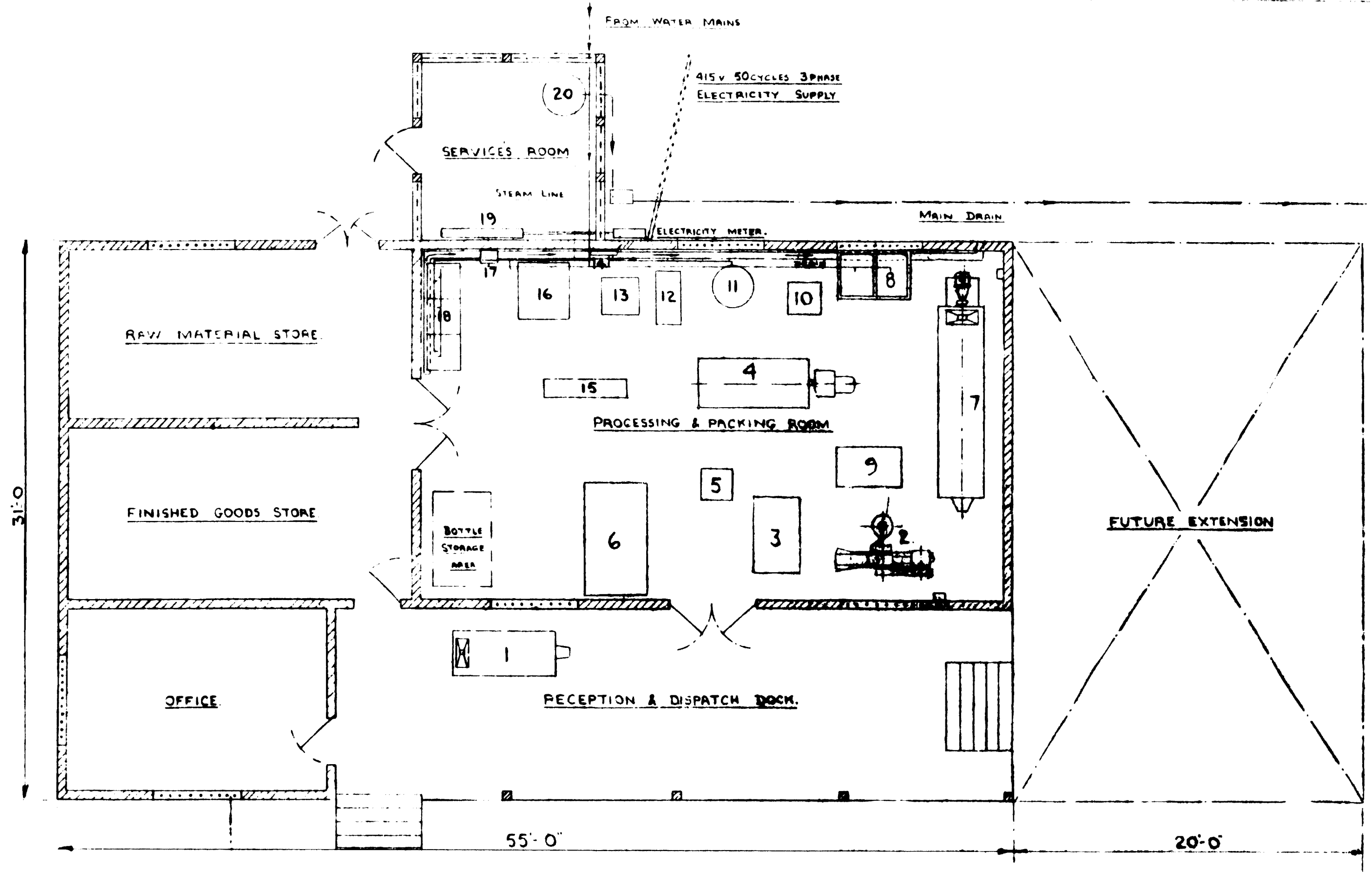
a. Depreciation based on 10 per centum of original in- vestment of 650,000.00	65,000.00	65,000.00	65,000.00
b. Amortization at 10 per centum of original loan of 700,000.00	70,000.00	70,000.00	70,000.00
c. Interest based on 1% of principal remaining	39,000.00	30,000.00	44,800.00
TOTAL AMORTIZATION EXPENSES	174,000.00	165,000.00	179,800.00

* This figure is preliminary, 7/50 - 1/50



FOR PROPOSED LAYOUT SEE UNICEF D^o N° A1008

		FLOW SHEET FOR AFRICA BASIC FOODS	
		SOY BEAN PROCESSING PLANT UGANDA	
2	7.9.67	ALL SOYA BEANS NOW TOASTED	DATE: 18.5.67
1	18.5.67		SCALE: -
ISSUE	DATE	REVISION	UNICEF FCS FAO/D ^o N° A1008



INDEX NO.	DESCRIPTION	TECHNICAL DETAILS	INDEX NO.	DESCRIPTION	TECHNICAL DETAILS
20	BOILER	CAPACITY 1000 lb OIL FUEL 2 HP 2 PH	10	GRINDER	CAPACITY 1 H.P. 3 PH.
19	SUB DIST. BOARD	CAPACITY 60 amps	9	DEHULLER	" 500 lb/hr 2 HP 2 PH
18	BOT WASH TANKS	" ?	8	SOAKING TANKS	" ?
17	HAND WASH BASIN	" ?	7	TOASTER	" 350 lb/hr GAS FUEL 1 H.P. 3 PH
16	STERILIZER	CAPACITY ?	6	FILLER & SEALER	CAP. 200-116 BAGS/hr 3/4 HP 3 PH 2-4 HP 1 PH
15	FILLER & CAPPER	"	5	SCALE	"
14	WASH DOWN POINT	"	4	MIXER	CAPACITY 5000 lb. in 10 min 5 HP 3 PH
13	HOMOGENIZER	CAPACITY ? 2 HP 2 PH	3	SIFTER	" 500 lb/hr 2 HP 2 PH
12	FILTER	" ?	2	HAMMER MILL	" 450 lb/hr 7.5 HP 3 PH
11	COOKER	" 80 lb/hr	1	WINNOWER	" 1000 lb/hr (PORTABLE) 2 HP 2 PH

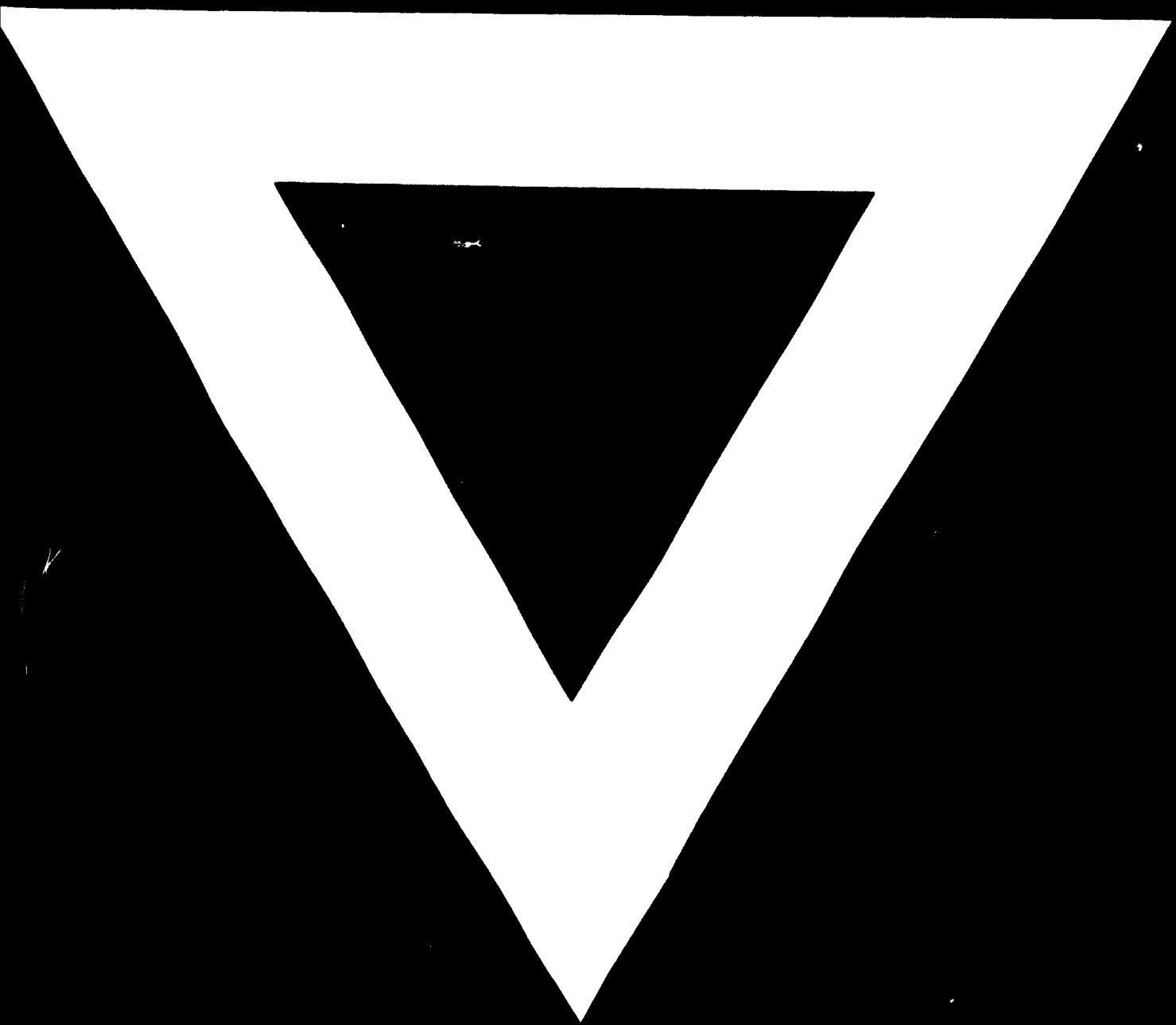
ISSUE	DATE	REVISION
2	7 9 67	MACHINES, MARK NO 1 TO 7 RELOCATED.
1	10 5 67	

MINIMUM HEIGHT OF ROOF IS 11'-0".
FOR DETAILS OF FLOW SHEET SEE DRG N° A1000

**PROPOSED LAYOUT OF AFRICA BASIC FOODS
SOY BEAN PROCESSING PLANT, UGANDA**

DATE: - 9 5 67 SCALE: 1/4" = 1 FOOT
DESIGN BY: *[Signature]*
APPROVED BY:

UNICEF FCS EAAO D^{NO} N° A1000



26 . 5 . 72