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REPUBLIC OF MALAWI

Technical report: Meat processing and cold storage facilities*

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

Based on the work of E. Essof, consultant in
meat processing and cold storage facilities

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Explanatory Notes

A) Currency

Malawi Kwacha - MK - 100 Tambala (T)
US\$ - 2.55 Malawi Kwacha

b) Abbreviations

ADMARC	Agricultural Development and Marketing Corporation
ADD	Agricultural Development Division
CSC	Cold Storage Company Limited
DANIDA	Danish International Development Agency
EEC	European Economic Community
ESCOM	Electricity Supply Commission
FAO	Food and Agricultural Organization of the United Nations
INDEBANK	Investment and Development Bank of Malawi
LPMU	Livestock Production and Marketing Unit - Ministry of Agriculture
MDC	Malawi Development Corporation
MITI	Ministry of Trade, Industry and Tourism
PTC	People's Trading Centre
SEDOM	Small Enterprises Development Organization of Malawi
SUCOMA	Sugar Corporation of Malawi Limited
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization

ABSTRACT

Title: Meat processing and Cold Storage Facilities

Project Number: DP/MLW/88/018

UNIDO approved and agreed to support a request from the Malawi Government, on behalf of Agrofresh Limited to appoint a consultant to undertake a study of the livestock and meat industry in Malawi and to formulate a proposal for the improvement of the meat processing facilities to service the rural community.

The duration of the assignment was one month, commencing on 12 December 1990.

The main conclusions and recommendations are that:

- a) The livestock industry is not commercialized and is dominated by the small-scale producer who owns ninety percent of the cattle.
- b) Government through its various agencies needs to provide adequate services and incentives to increase and improve livestock production.
- c) The slaughtering of livestock and processing of meat is dominated by the CSC in the urban centers. The facilities, particularly in Blantyre are extremely poor and the company needs to improve the facilities and services.
- d) A project be supported to establish a pilot plant - slaughter and cold storage facility at a rural service center to improve the distribution and marketing of meat in the area and complement the services of the CSC.
- e) Technical and financial support be considered for the establishment of the facility, provision of equipment and machinery and the training of staff.

INTRODUCTION AND BACKGROUND

Malawi is a landlocked developing country with an estimated population of 8.4 million. It is bordered by Tanzania to the north, Mocambique to the East, South and South-West and Zambia to the West. It is approximately 901 kilometres long, with varying width from 80 to 161 kilometres, covering a total area of 118,425 square kilometres of which 30,000 square kilometres is fresh water - Lake Malawi and minor ones - Lake Chilwa, Lake Malombe, Lake Chiuta, and Lake Kazuni.

Malawi's economy is predominantly agriculture with an increasing manufacturing and industrial sector. Agriculture accounts for 43 percent of the total GDP and provides jobs for approximately 25 percent of the country's population. Agricultural products mainly tobacco, tea and sugar account for 90 percent of the country's exports and the growth rate of the economy is largely dependent on the performance of this sector. With the agricultural sector there are two sub-sectors: small scale farming and estate farming. Small scale farming accounts for almost 80 percent of all agricultural production and meets the country's demand for staple foods (maize, beans, groundnuts, sweet potatoes and rice) as well as providing some raw material (cotton, sun and flue-cured tobacco) for the domestic industry and export. The estate sector contributes 20 percent of the agricultural production but accounts for two-thirds of all exports in the form of flue-cured and burley tobacco, tea and sugar.

Until very recently the Malawi Government has always directed its efforts to crop production with very little attention on the livestock sector. Of late livestock production has increasingly received support aimed at increasing output as well as improving the quality of stock.

In September 1990, the Ministry of Agriculture disclosed that Malawi has embarked on a five year National Livestock Development Project estimated to cost K46.1 million to develop and boost livestock production in the country so as to meet the rising demand. This project would contribute substantially to the improvement of the welfare and income of the small-holder producer who owns ninety percent of the national stock of cattle in the country. The livestock sector in Malawi has large untapped potentials for development and the government is therefore keen on developing the small-holder producing sector. Present day policies strongly favour commercialisation and privatisation within the sub-sector but amongst the constraints limiting progress in the livestock sector is the lack of a reliable network of marketing infrastructure and an absence of commercial slaughter houses in certain areas. Government has also made a call to improve the country's industry by better utilization of crop residues and agro-industrial by-products fed to animals and the provision of an efficient veterinary and extension service. This is a UNDP funded programme.

Several other programs funded by the European Community (EC) and the World Bank places emphasis on the agri-rural sector development both in terms of improving :

- (a) Food production and ensuring food security and self sufficiency, both at household and national level.
- (b) The rural agricultural marketing infrastructure and help increase rural incomes by supporting the government to encourage private sector participation in agricultural trade.

A. Project Proposal

In line with Government policies for the development of the livestock sector, Agrofresh Limited undertook a study of the meat industry in Malawi and found an opportunity for the establishment of small scale meat processing and cold storage facility, particularly in the more populated areas of the Southern Region. On the basis of these findings, Agrofresh Limited submitted a brief project concept to the Industrial Operations Department of the United Nations Industrial Development Organisation (UNIDO), Vienna, Austria, in May 1989 for technical and financial assistance. A copy of the project document was sent to the Ministry of Trade, Industry and Tourism (MITI) of the Government of Malawi. In July 1989 the Government indicated their support of the project and advised Agrofresh Limited that it had forwarded an official request to UNIDO for assistance. As an initial step, the request was formulated to facilitate a feasibility study which could form a basis for the establishment of a small scale meat processing and cold storage plant.

As a result of the above, a short term (one month) consultancy was undertaken by Mr. Ebrahim Essof (a Meat Technologist) to make a study of the meat processing industry in Malawi. Subject to the outcome of this study to recommend appropriate schemes for :

- (a) the establishment of a small meat processing and cold storage facility (pilot plant);
- (b) the provision of technical and financial assistance.

The assignment commenced on the 12th December, 1990, and completed on the 9th January, 1991, involving meetings, and consultation with various persons, organisation and institutions. It also involved visits to livestock production areas, processing and market centres particularly in the Southern Region of the country where the project is likely to be located (Annex 3).

The original objectives as set out in the Job Description (See Annex 1) has not been altered but the short duration of the assignment did not allow for a much more detailed study on the :

- (a) Marketing, pricing of livestock and meat and meat products.
- (b) The local availability of equipment and approximate procurement costs.

In the main, the objectives have been attained and recommendations are made on the basis of the present status of the industry and the projected plans for the development of the livestock industry as enumerated by the Government of Malawi recently.

1. ACTIVITIES

A. Survey of the Livestock Industry

The livestock and meat industry in Malawi has not been developed or given impetus to the same extent as has been in the case of agricultural products, namely tobacco, sugar and tea which accounts for almost 90 percent of the country's exports, and the staple foods (maize, beans, groundnuts, potatoes and rice).

In general terms and unless specified otherwise, "livestock" refers to cattle, which species is of commercial importance. Small stock (sheep, goats, pigs, chickens) play an important role at the local level in the traditional level economy.

The livestock industry is dominated by the small scale producer who owns approximately ninety percent of the national stock of cattle in the country. Similarly the small holder producers also holds the major share of the small stock, namely sheep, goats and pigs.

Livestock data available from various sources is variable but statistics from the Department of Animal Health and Industry appears to be fairly reliable. Up to date statistics are not available and livestock numbers by type (1978-1987) are shown in Annex 4. Reliable sources indicated that these figures are representative and should not be any different today, except for pigs. Due to an outbreak of swine fever, the pig population has decreased very substantially as experienced by the shortage of pigs available for processing and supply to the local market. It is quite obvious that during the last decade there has been no growth in this sector, hence government's efforts to embark on a national Livestock Development Project over the next five years at an estimated cost of K46.1 million to improve production in this sector.

Though statistics for livestock numbers by region are given, statistics by District were not available. Indications are that the livestock population are concentrated in certain areas within the region e.g. Lower Shire area in the Southern Region, due mainly to readily available grazing. The region has approximately 241,000 head of cattle and 586,500 head of goats and 38,400 sheep.

Due to an outbreak of Foot and Mouth Disease (FMD) in the very north and south of Malawi the veterinary authorities have applied very stringent measures for its control. Besides annual vaccinations, the authorities control the movement of livestock in and out of the affected areas. Similarly, East Coast fever is prevalent in the northern half of the country and the authorities have applied control for the movement of stock from the affected area to the south.

As the project under this mission is to be located in the Southern region, major emphasis has been placed to obtain detail information in this region as far as marketing of livestock and the distribution and selling of meat is concerned. Throughout discussions with the various authorities and persons concerned with the industry, it has been confirmed that the methods and systems adopted in the region are the same as in the rest of the country.

B. Cattle Producing Area - Lower Shire

To the south of Blantyre is situated an important livestock production area and is the main source of livestock for slaughter purposes in the Southern Region of Malawi.

The ownership of livestock is mostly in the hands of the small scale farmer who traditionally grazes his stock during the day and herds them at night. The cattle are of the traditional Zebu type, small in size. Goats are also in abundance in the area.

Foot and Mouth Disease (FMD)

The Lower Shire area, south of Chikwawa, along the Thyolo escarpment to the south-east, and the Game Reserve to the West, is quarantined because of the FMD outbreak about five years ago. The disease is under control now and there has not been an outbreak since. There are several checkpoints on the main road to Chikwawa manned by police and veterinary department staff.

Chikwawa

Chikwawa, approximately 30 kms south of Blantyre, is a District centre and houses many Government and Local Administration offices. The market is small and comprises temporary shelters. A slaughter pole is situated near the market and is rarely used. There is no water available at the facility. The CSC has a small shed for the collection and drying of hides and skins. Hides and skins brought to the depot are marked to identify ownership and payment is made after one or two months when collections are made. There are two temporary meat outlets and the retail price is K1.80 per Kg.

Farther south of Chikwawa along the main road to Ngabu are the SUCOMA Estates. Livestock are in abundance in the area, and grazing is very scarce. The general condition of the stock is poor. There are several livestock sale pens in this area to assist local producers in selling their cattle.

Feedlot Facilities

Around Ngabu are situated three feedlots of varying size. These are :

- Cattle Feedlot Company - the feedlot would have 900 head of cattle on feed at any one time and all slaughter stock is sent to the CSC.
- Guirawekha Cattle Ranching - established in late 1988 and has about + 500 head of cattle on feed at any one time and delivers slaughter stock to the CSC at the rate of about 36 head per week.
- A. W. Siddiqi - recently established a feedlot.

Purchases of Cattle for the Feedlot and Performance

Feedlot operators purchase cattle of reasonable condition from the auction sales conducted by the LPMU. The preferred weight for feeding purposes is over 270 kgs but a varying range is bought and prices would range between K1.20 to K1.35 per Kg livemass. Cattle are inducted to the feedlot after deworming and fed a farm formulated ration consisting mainly of whole Cotton Seed, Urea, Molasses, chopped grass, and minerals/salt on an ad lib basis for a period of 90 days during which period livemass gain is 1.2 kg per day. On a selective basis, cattle are sent for slaughter and the carcasses generally qualify for the Top grade.

General Comments:

A tremendous effort is being made by few commercial livestock producers to improve the condition of livestock and improve the productivity of cattle. Regretably as mentioned previously, the retail meat market is extremely price sensitive. The price and the demand for top grade cattle is limited to the urban centres for a selected population group, (middle and higher income groups).

It would appear that there is an anomaly in the prices offered by the CSC for slaughter stock particularly for the top grades (i.e. K5.50 per Kg cdm) considering the value of live cattle, the input costs for feeding and management and transport. Similarly, the price for low grade carcasses (i.e. K3.15 per Kg cdm) is not in keeping with the prices offered for live cattle at the auction sales (K1.15 to K1.25 per Kg livemass). It seems that this discrepancy in producer prices offered by the CSC could be one of the reasons for the extensive differences in meat prices between the urban and rural market centres which needs to be addressed.

C. Marketing of Livestock

The general system of marketing of livestock is such that the livestock producers can decide how best to dispose of their stock. Under traditional systems in developing countries, owning of livestock is considered a sign of wealth and also gives the individual status in the community. Livestock will only be sold when necessary to satisfy a need, and slaughterings may take place at the time of a traditional or customary function or celebration.

The selling of slaughter livestock may take several forms :

- (a) by private agreement between the producer and buyer who generally would be a local butcherman. The price is negotiated and agreed upon between the parties concerned. Most of the small stock (sheep and goats) would also be marketed in this manner;
- (b) through formalised auction markets organised by the Livestock Production and Marketing Unit (LPMU) of the Ministry of Agriculture. Mainly cattle are marketed in this manner by the producer and these are mainly purchased by the Cold Storage Company Limited (CSC), butchers, and feedlot operators;
- (c) direct sale by the producer to the Cold Storage Company Limited.

1. Location of Markets in the Southern Region

The LPMU, is authorised by the Ministry of Agriculture to organise sales throughout the country. There are a total of twenty-one (21) markets in the region of which fifteen (15) are in the Lower Shire areas spread between Nsanje and Chilwana. The names of the markets in the Region are listed in Annex 5; and the main ones are shown on the map, Annex 6.

2. Auction Sales

The LPMU schedules and conducts sales in the Region and these are held at least once a month at each sale pen unless numbers presented at the sale are low. Sales are publicised on radio and are generally patronized by butchers and the Cold Storage Company Limited, and feedlot operators.

2.1 Price of live cattle: Cattle are sold on the basis of liveweight and grade. The floor price is fixed by the Ministry, as detailed below :

Cattle Grade and Floor Prices (T per Kg Livemass)

	Grades	Price
Slaughter Grades	Standard	55
	Commercial	45
	Inferior	30
Feeder Cattle	Feeder A	60
	B	54
Breeding & Young Stock		45

The prices quoted are unrealistic and generally the floor price being offered at present for cattle is between K1.15 to K1.35 per Kg livemass. Bidding starts at the floor price.

2.2 Selection of Cattle

In order to assist with the improvement of production of livestock there are certain restrictions applied on the sale of cattle. The selling of young stock unless for breeding purposes is not allowed. Slaughter stock must exhibit not less than four permanent incisor teeth and be not less than 360 kg livemass, unless they are full mouth i.e. eight permanent incisor teeth.

Similarly Feeder Cattle must have less than four permanent incisor teeth and Class A feeders should be more than 230 Kg livemass. Females generally, exhibiting less than six permanent incisors are sold for breeding purposes only unless they are culled because of physiological problems.

3. Movement of Livestock and Meat

Because of the Foot and Mouth Disease (FMD) in the area, the movement of livestock from the auction sale is controlled by the LPMU staff. All movement to and from the sale pen must be supported by a Movement permit issued by the Veterinary and LPMU staff. When moving cattle to the sale, ownership of cattle must be established and confirmed by a veterinary assistant. Similarly cattle bought at the sale are identified by ear tag number and paint brands.

3.1 Movement of cattle from the Sale Pen:

All cattle from the sale pen unless for feeding and breeding purposes, are destined for direct slaughter: to the works of the Cold Storage Company Limited, Blantyre, only.

Cattle to be relocated i.e. feeders and breeding stock, must be quarantined for a period of 28 days at holding grounds at Bangula and Mpemba. Due to the prevalence of East Coast Fever in the Northern and Central Regions of Malawi, movement of livestock to the South is prohibited unless quarantine measures are adhered to.

3.2. Transportation of Meat:

There are restrictions on the transportation of meat and meat products from the Lower Shire area to the north in an effort to prevent the spread of FMD.

3.3 Mode of Transport:

Cattle from the sale pen are normally trekked to Bangula and then railed or moved by road transport owned by the LPMU and the Cold Storage Company.

3.4 Cost of Transportation:

The transport cost for moving cattle is borne by the buyer and the current charges are :

Trekking	-	K4.00 per head
Rail	-	Not available
Road	-	7 tonne vehicle K2.35 per Km 5 tonne K1.86 per Km.

D. The Slaughtering and Meat Processing
Facilities in Malawi

The slaughtering and meat processing facilities are very limited. The lack of development in this sector could be due to :

- minimal promotion for the growth of the livestock industry in terms of extension services and advice
- lack of markets for livestock, because the production areas are situated away from the main urban centres
- lack of incentive to sell livestock
- high cost of meat

The slaughter facilities that exist in the country are those owned by the Cold Storage Company Limited, located in Blantyre and Lilongue. Other facilities are in the form of slaughter slabs and slaughter pits located at various rural markets and under the control and supervision of the local council and Veterinary Department.

1. Cold Storage Company Limited (CSC)

The Cold Storage Company (CSC) was established in Malawi in 1959 and operates abattoirs in Blantyre and Lilongue.

The CSC is wholly owned by ADMARC and is mandated to run on an economic basis. Responsibility for day to day operational management and control rests with the General Manager who reports to a Board appointed by the ADMARC management.

1.1 Function of the CSC:

The primary function of the CSC is to operate and provide slaughter and processing facilities for livestock and wholesale meat/and meat products to the local retail outlets situated mainly in the urban centres. However, since CSC has to operate on an economic basis, there has been a shift of emphasis to areas of operations that are economically viable. The CSC, therefore concentrates its efforts on the purchase, processing and marketing of hides and skins for the export market. The CSC purchases slaughter stock directly from the producers and from the rural livestock markets organised by the LPMU.

1.2. Slaughtering and Processing Facilities:

The CSC operates abattoir and processing facilities in Blantyre and Lilongue and all meat and meat products emanating from these facilities are inspected and graded.

1.2.1. Blantyre:

This facility was constructed in 1959 and designed to slaughter :

- 150 head cattle per day
- 120 head pigs per day
- 30 head sheep/goats per day

The factory services the Southern Region. The plant is very old and in its present state is inefficient and very costly to operate.

In addition, the refrigeration, steam, hot water and electrical systems are all in a extremely poor condition requiring very extensive replacement and upgrading. The processing plant is very old, and unhygienic. Within the entire plant the hygiene is of an unacceptably low level. This plant is probably operating at fifty percent capacity. There is no scope for redesign and refurbishment and any expenses incurred on this plant will not be justifiable. This plant needs to be replaced if the CSC is to be of any service to the industry.

A small goods production facility is attached to the main plant. The condition of this facility in terms of hygiene, production flow and general handling of product leaves much to be desired. The equipment and the facilities in general are unacceptable for good manufacturing practice.

1.2.2. Lilongue:

This facility was constructed in 1970 to service the Central Region of Malawi. This plant was not visited and through discussion, indications are that it is in fair condition and with the provision of additional refrigeration equipment (compressors) it should cope. The plant has a capacity to slaughter :

100 head cattle per day
20 head pigs per day
30 head sheep/goats per day

Discussions are presently taking place between the CSC, the Malawi Government and a donor agency for the design and construction of a slaughter facility at Mzuzu that would service the Northern Region.

1.3 Services:

In addition to the purchase of livestock directly from producers at fixed prices and at the auction sales, the CSC provides a service-slaughter facility for butchers in the urban centres who purchase cattle from the auction sale. It is regulated that butchers operating in the urban centres must purchase their supplies of meat from the CSC or have their animals slaughtered by them. A slaughter fee of K30 per head is levied for this service.

1.4 Purchase and Wholesale Prices:

The current purchase price paid for carcass beef by the CSC and the wholesale prices charged for a selected range of products is detailed in Annex 7. The new wholesale prices were effective from 1 November 1990. Recommended retail selling prices for selected items are made by the CSC and it is not clear whether retail prices for meat and meat products are controlled. The economy has been liberalised and from brief observations it appears that meat prices vary from place to place.

1.5. Cattle Slaughtered by CSC (Blantyre and Lilongwe)

The slaughter performance of the CSC during 1989 and 1990 is detailed in Annex 8. It is quite evident that the CSC is not performing the function it was established for because the slaughter of cattle is well below capacity. During 1989, fifty-three percent of the total cattle slaughtered were for butchers. There is decline of 35 percent in cattle slaughters, 36 percent in sheep/goat slaughters and a 188 percent increase in pigs slaughtered between 1989 and 1990.

Nationally it is estimated that approximately 100,000 hides are collected for sale on the export market and of these less than twenty percent emanate from the CSC indicating that large numbers of cattle are slaughtered in the rural areas (both legally and illegally) under very poor conditions. Similarly it is estimated that more than 60,000 goat and sheep skins are collected annually and only a fraction come from the CSC.

1.6 General Observation at the Operations of the CSC

The Cold Storage Company Limited was set up to provide a market and processing facility for livestock, and to supply meat and meat products to the urban centres in Malawi. Though it slaughters livestock and processes meat, its capacity is severely limited due to the present status of its facility in Blantyre, which is characterised by old equipment, deficiencies in manufacturing and processing technology, plant capacity and a lack of trained personnel. Furthermore, since the company is expected to operate on a sound economic basis, its operations is now concentrated on the purchase and export of hides and skins.

The general services provided at the level appropriate to each institution intended and where appropriate to be generally disseminated to the question of service and product offered by the company. The meat industry at large, is plagued with a lack of knowledge, appreciation of sound hygiene and good manufacturing practices, and dissemination selling practices at all market levels. There is a general lack of control of rural slaughter slabs and markets.

Despite these problems the GOC management one of the critics that the company has a role to play in the development and support of the livestock industry, provided it is given the support and the slaughter and processing facilities are renewed and updated.

The company's immediate needs are :

- (a) Procurement of refrigeration equipment (compressors) and
- (b) Procurement of technical expertise (Meat Technologists) for meat goods manufacture
- (c) The training of staff in slaughter practices, hygiene and sanitation and meat processing technology
- (d) The training of staff in slaughtering services

In addition to the above, the replacement of the Butchery facilities and provision of a facility at Mwanu needs to be expedited. Financial and technical support is required for all these projects.

Rural Slaughter Facilities

Small Slaughter facilities exist in the country in various forms. The location of slaughter poles/stalls in the Southern Region are listed in para. 6.

Controlled Slaughter Slab/Pole

A Slaughter Slab/Pole under the control of the local council and the Veterinary Department, is suitable to offer services close to an established rural market. The Veterinary Assistant in the area carries out the inspection of carcasses slaughtered at the facility.

Local butchery, operating at the market being viable and good for slaughter at the slab.

The facility visited at Lunzu (about 20kms from Blantyre) is poorly constructed and run down. Water supply is limited, drainage is very poor and all slaughtering operations are performed on the floor under extremely unhygienic conditions. The meat and offal is then carried to the market and efforts are made to sell it on the same day because of the non-availability of refrigeration. In very close proximity of the slabs, local residents salvage the head and pieces of meat for their own use or for sale.

2.2 Uncontrolled Slaughter

Throughout Malawi particularly in the rural and peri urban areas, slaughter of livestock takes place either for personal consumption or for sale. At many places visited, it was very common to see small outlets established under the shade of a tree with freshly slaughtered carcasses offered for sale.

At one particular centre, (Ngumbe) approximately 12 kilometres from Blantyre, a thriving business established under a tree, has been in existence for some time and is patronised by residents from Blantyre. Another one at Njuli, operates from a wooden shelter on the side of the main road to Liwonde.

It is also a very common practice in the urban centres for residents to purchase small stock (goats, chickens) and slaughter in the back yard under crude conditions. The meat is for personal consumption but is uninspected and can be a health hazard.

Providing education and creating a general awareness of the dangers of these practices may assist in curbing these unhealthy practices. Equally important it is necessary to provide and make available facilities that are readily accessible to the community that will make meat and meat products available at affordable prices.

E. Retail Markets for Meat and Meat Products

The provision of meat and meat products to the retail market and finally to the consumer takes various forms. For convenience it is best to consider the retail markets in :

- (a) the Urban centres
- (b) the Rural areas

3.1 Meat Markets in Urban Centres

All meat distributed and sold in the urban centres (Blantyre/Limbe, Zomba, Lilongwe) must originate from the CSC and may be sold through one of the following outlets :

- (a) Produce markets
- (b) Butchery
- (c) Supermarket

3.1.1. Produce Markets

The local City Council in the urban centre have established produce markets at various places in the city for the sale of fresh produce, like fruit, vegetables, fish, meat, chicken, etc. The twelve (12) produce markets and six (6) mini-markets under the administration of the City of Blantyre is controlled by a Market Superintendent. At each of the produce markets there are small butchers stalls, rented to the meat trader at a monthly rental of K70 per month. The two (2) produce markets visited were situated in Blantyre and Limbe.

Low grade meat is preferred at these markets and occasionally hindquarters will be sold to the hotels located in the city. Retail meat prices at the produce market are displayed on a small board but irregular practices and overcharging does exist. Meat prices are detailed in Annex 10.

Blantyre Produce Market

The market is of recent construction and is fairly well maintained. There are ten (10) butcher shops, (approximately 3m x 3m) each having a counter and meat rail. No refrigeration facilities are available in the shop but a communal chiller is available to store unsold meat at the end of each day at a charge of K1.85 per side/day. The operators are not trained butchers and sell meat per se, unless a customer has a specific request which he identifies. Hygiene is generally very poor.

Limbe Msika Market

The market is extremely old and very congested. The general surrounding is very unhygienic. There are ten (10) butcher shops (approx 2m x 2m). There is no refrigeration facility at this market and the meat traders must attempt to sell everything by the end of the day. Hygiene and sanitation in the meat and fish section of the market is extremely poor.

3.1.2. Retail Butcher Shops:

This form of retail outlet is rare in the urban centres. Two shops were located, one attached to a restaurant. Both outlets had no chill-store facilities but used chest type deep freezers to store their meat. A band saw (butcher-boy) was used to cut the carcase, and some effort is made to prepare specific cuts. The retail prices charged for selected cuts are shown in Annex 10.

3.1.3. Supermarkets:

There are two large retail chain supermarket operations established in Malawi, namely :

- a) Kandodo - Import & Export Group of Companies
- b) PTC - Peoples Trading Centre Limited

Both these companies operate modern supermarkets in the urban centres and also provide fresh produce. Well equipped in store butcheries with refrigeration facilities have been established under the supervision and control of a trained butcherman. The preference is to supply top quality meat and to cater for the middle and upper income group.

Kandodo : Since the market requirement is for a consistent supply of top quality meat, the company is not dependent on the CSC who have failed to meet their requirements. The company has negotiated a supply contract with a feedlot company for approximately thirty (30) head of cattle per week. The cattle are delivered to the CSC on a service slaughter basis and the supermarket takes delivery of the carcasses. The company also imports processed meats from South Africa.

In the long term, the company is planning for the expansion of the butchery operations and increase fresh meat sales. The company provides opportunities for in-service training of staff, and there is a definite need to educate the consumers on meat and meat quality.

PTC : The Peoples Trading Centre Limited operates the PTC Supermarket and Kuiksave grocery outlets. The PTC Group is able to satisfy its requirements of approximately 30 head of cattle per week by purchasing directly from the CSC. Though the supermarket caters for the middle to upper income groups, it does prepare pre-packs of low value cuts for some of the Kuiksave outlets.

There is a general shortage of fresh pork and processed meats. The local price for processed meats is high and the company imports produce from Zimbabwe. There is a limited market for processed meats because of the high price and eating habits. However there is a need to ensure a regular supply of meat products to the hotels and institutions.

Future plans are to expand the butchery operations and provide reasonably priced meat to its customers. The company provides training for its staff.

3.2 Rural Meat Markets

Rural meat markets are located at most produce markets. They provide a readily accessible facility for the rural folk and can be frequented daily to buy their provisions.

The meat market is small and generally comprises a small stall (approx 1.5m x 1.5m). The Lunzu market has ten (10) stalls and the general condition is extremely poor. A rental is paid by the vendor to the Council. Animals are slaughtered at the nearby slab depending on the market demand. Normally each stall holder copes with one carcass per day and possibly two at week-ends. At the week-end business is brisk because residents from Blantyre/Limbe frequent the market to purchase cheap meat, since prices are lower than those in the city. Prices are given in Annex 10. As indicated previously, illegal meat markets are also found along the main roads and these generally flourish at week-ends.

3.3 Retail Meat Prices

Retail meat prices at the various outlets is detailed in Annex 10. The meat market is extremely price sensitive. The supermarket caters for middle and upper income groups, while the urban produce markets caters for the majority of the urban population. It is very common for urban dwellers who have access to transport to purchase their requirements at the rural markets or at the illegal vendors along the main road, without any regard to the origin of livestock and hygiene.

The lack of appreciation for quality meat is clearly evident and the consumer prefers to purchase quantity at the cheapest price. However, it is in the interest of the general public to make a very concerted effort to educate and create an awareness on the risk and hazards of consuming unhygienic and uninspected meat.

Due to past tradition and customs it might be difficult to enforce any changes but through a process of education, awareness can be created and it will assist in controlling the illegal slaughtering and selling of uninspected meat. At the same time an improvement of facilities is required that are easily accessible by the consumer.

F. Liwonde Tannery

The Liwonde Tannery started as a cottage scale industry in 1988. With the financial and technical assistance from UNIDO it has now established itself as a commercial tannery at a cost of K2.5 million employing some 50 persons. Liwonde Tannery Limited, when fully operational, is expected to process 100 cattle hides and 600 skins per day and it is expected that this capacity should be able to satisfy the country's leather requirements particularly for the shoe and leather goods manufacturing industry. UNIDO has provided equipment, technical assistance (short and long term) and has also assisted in the training of local Malawians. Hides and skins are generally obtained from the Blantyre/Liwonde catchment areas, and collection depots are being extended to other areas. The tannery is not dependent on the CSC for the supply of raw stock who base their selling prices on export parity. The tannery is committed to promote the improvement of the local hides and skins and pays an incentive for quality raw stock.

Current prices are: Cattle Hides	Grade 1 and 2	K15 each
	Grade 3 and 4	K10 each
	Skins	K1.50 each

The tannery would be very happy to co-operate with any venture that would assist in the procurement and supply of hides and skins and would provide a guaranteed market for raw stock.

Current estimates indicate that approximately 80,000 cattle hides and 60,000 skins are marketed by the CSC. It is also estimated that the number of cattle slaughtered is 100,000 head annually. If the CSC continues exporting hides and skins the tannery has to develop an excellent network for the collection of raw-stock.

2. MANPOWER TRAINING AND DEVELOPMENT

As indicated the meat industry and the consumer market in Malawi is not as well developed and sophisticated as in countries with a developed livestock sector. The demand is for "meat per se" and as long as the price is right it will be bought from any source, irrespective of the method of slaughter and processing.

Because of this unsophisticated nature of the meat industry, education and training of meat processing staff and the public at large has not been given any consideration whatsoever. There is a general lack of consideration of meat, meat quality and hygiene and sanitation in all areas of the processing, marketing and distribution chain.

The CSC have attempted to train their staff internally and externally. The training obtained at the FAO Regional Training Centre in Lobatse, Botswana was inadequate for their purposes and a greater emphasis on skills training is required. Some on-the-job training in meat cutting and merchandising is being offered to staff by the Supermarket chain of PTC and Kandodo.

In identifying training needs for persons engaged or likely to be engaged in the meat processing industry, the following areas should be considered:

(a) Operator Training:

Provide basic skills and training in slaughter procedures, flaying and dressing carcasses, meat cutting, hygiene and sanitation; and the handling and processing of hides, skins and by-products.

(b) Supervisory Training:

Provide education and training in technical matters as above but include meat science and processing, abattoir operations, by product processing, hygiene and sanitation. Include supervisory and management skills, and cost management and control.

(c) Management Training: (for middle and senior management)

Exposure to the livestock and meat industry, an appreciation on the technical aspects of livestock slaughter and meat processing. Man management skills, budget and cost management, marketing and public relations.

(d) Meat Inspection and Grading:

Training and Meat Inspectors and Graders.

(e) Technical Training (Engineering):

Provide training in abattoir equipment maintenance and repair, and refrigeration equipment maintenance.

Person should already have training up to artisan or journeyman level or be a Technician Engineer.

Training as outlined above is available within the region and through discussion, courses could be structured to meet specific needs. If necessary the following organisations may be contacted for assistance.

- FAO Regional Training Centre, Lobatse, Botswana
- Cold Storage Commission, Bulawayo, Zimbabwe
- Department of Veterinary Services, Zimbabwe

Sponsorship for any external training could be sought through various agencies including, UNIDO, FAO, British Council, DANIDA, Commonwealth Science Council and the EEC.

A. Pilot Plant - Training Facility

With the establishment of the Pilot Plant, it is possible to provide and extend training services to local persons associated with the meat trade.

Besides external training for selected middle and senior management staff, it is recommended that further training in slaughter and meat processing be offered locally by a trained Meat Technologist, with industrial experience, who could design training programmes to be implemented under local conditions. This approach would facilitate the training of an instructor (s), and would also cover a larger group of persons (including staff from CSC, the butchery trade and health department).

The facility could provide on-job training for :

- slaughtermen
- butchermen
- retail sales staff
- hides, skins and by-product processing staff
- meat inspectors (practical experience)

This development will help improve the standard of hygiene and sanitation throughout the distribution chain and will further improve the method of slaughter, particularly at the rural slaughter slabs and poles, which number seventeen (17) in the Southern Region (Annex 9).

Training of butchers and sales staff particularly from the produce markets, in the methods of cutting meat, pricing, hygiene and sanitation will help improve the general standards and should over a period of time enhance the image of the meat industry.

The tremendous losses incurred due to the non utilisation of animal wastes needs to be addressed and an awareness needs to be created amongst slaughtermen to use simple technology to recover and process animal wastes. Similarly hides and skins which command a good value need to be flayed correctly and cured. This training for slaughtermen from the rural areas will complement the work already being undertaken by the National Expert (Hides and Skin Improvement) under the UNIDO sponsored programme.

A facility for providing practical experience for Meat Inspectors responsible for slaughter slabs/poles can be incorporated with the assistance of the Department of Veterinary Services. In ensuring a regular throughput, the meat inspectors will have an adequate exposure not only in performing their meat inspection duties but in general hygiene and sanitation as well.

The Pilot Plant has the potential of playing a very key role in improving and developing the meat industry. In the long term, it would also satisfy the Government's objectives to improve the livestock and meat industry.

As mentioned previously, it will be necessary to formalise the training with the assistance of a trained Meat Technologist. Training programmes can be designed and implemented under the local conditions. For continuity, a senior staff member can be trained as an instructor to ensure that all future on-job training is undertaken and that standards of instruction are maintained.

3. SITE LOCATION - PILOT PLANT FOR A MEAT PROCESSING AND COLD STORAGE FACILITY

In an attempt to select a suitable site for the establishment of a Pilot plant for a meat processing and cold storage facility, discussions were held with the Regional Planning Officer (South), Department of Town and Country Planning, Blantyre.

As part of the Government's policy towards rural development, efforts to decentralize activity from the urban centres is promoted and as part the Rural Growth Development Programme key service centres in the Southern region have been identified for development. Areas of high population density have been given priority for development and these include :

- (a) Luchenza - an important road and rail link serving the tea growing region.

- (b) Bangula and Ngabu -
These two centres are situated in the Lower Shire area and are important areas because they are within the cattle production region.

Bangula has a road and rail link and is the service point for transporting livestock to the north from the sale pens in the region. It is also close to Beira in Mocambique but this line is not used because of the current security situation in the region.

Ngabu is serviced by road and is an alternative to Bangula for development.

- (c) Chikuawa - is an administrative centre situated about 30 kilometres south of Blantyre. There is little economic activity but it is situated in a cattle producing area and is reasonably close to Blantyre.

In the northern area of the Region two centres have been identified as potential growth centres. These are :

- (a) Zalewa - Though not developed at present, it has been identified as a key terminal centre because of the road link with the northern corridor to Lilongue, and to Blantyre in the south. To the west the road passes through Mwanza leading to Mocambique and Zimbabwe.

Due to a lack of services and infrastructure Zalewa will take time to develop.

- (b) Lunzu - Situated about 20 kilometres north of Blantyre. Lunzu is within the Blantyre District and is well serviced by road and has electricity and water supplied. Efforts are being made by the District Council to develop and plan the centre because it is envisaged that Lunzu will eventually become a satellite town for Blantyre. Lunzu is serviced by a hospital, a secondary school, a shopping centre and an active rural produce market.

The two sites that are most favourable because of their close proximity to Blantyre and their future potential for development are Chikwawa to the south and Lunzu to the north of Blantyre.

- (a) Chikwawa

Agrofresh Limited had made applications to the District Commissioner, Chikwawa for a suitable site for the reconstruction of the pilot plant. A suitable site has been identified together with the Town and Country Planning Department (South), in close proximity of the market. Because of the FMD in the area authority had to be sought from Veterinary Department for the movement of livestock in this area and for the transportation of meat and processed meat to commercial markets outside Chikwawa.

The Chief Veterinary Officer has confirmed that animals slaughtered at an approved facility within the FMD area can be sold locally or transported to areas outside the zone. Similarly animals from the FMD zone can be transported for direct slaughter at an approved slaughter-house.

- (b) Lunzu

A suitable site at Lunzu has been identified together with the Regional Physical Planning Department. The recommended area has been zoned for industrial use on the Lunzu Urban Structure Plan. The area is behind the produce market near the present slaughter slab. (See drawing - Annex 11).

4. PROPOSAL FOR THE CONSTRUCTION OF A PILOT PLANT -
SLAUGHTER AND COLD STORAGE FACILITIES

Introduction

In many rural areas and small townships, the slaughter of animals for meat consumption is often carried out under far from ideal conditions. Meat produced under such conditions is contaminated and uninspected, and must be considered a hazard to human health.

This proposal for the construction of a pilot plant is not only to help improve the slaughtering of animals but to make fresh meat available to a rural community at affordable prices.

A. Location of Pilot Plant

The location of the pilot plant as proposed will be at Lunzu, 20 kms north of Blantyre.

B. Design of Slaughter-House and
Meat Processing Facility

Since this facility is to be a Pilot Plant, which could serve as a model for the future development of such facilities at service centres in Malawi, effort has been made to allow for flexibility and expansion of the facility if the demand for meat increases. The location of the plant at Lunzu, will help the rural community and because of its close proximity for Blantyre and city dwellers do visit the market regularly to purchase their food and household requirements.

The facility is designed for :

- (a) The holding and watering of livestock in lairages.
- (b) The slaughter of about 10-15 head of cattle and 20 head of goats per day - capacity to slaughter cattle can be increased by providing another slaughter bed.
- (c) The chilling of carcasses and freezing of any product if desired (particularly measles carcasses and offal).
- d) A retail butchery and meat processing facility.
- e) A hide and skin shed to process hides and skins and to serve as a depot for the purchase and collection of hides and skins from the surrounding areas for ultimate sale to Liwonde Tannery Limited.

- f) The processing of paunch and intestinal contents on especially constructed slabs to produce compost for use in the vegetable garden.
- g) The treatment of effluent and waste water from the slaughter house. All waste water will lead to a central drain and finally into a grease and solid trap. From this trap the effluent will lead into an evaporation pan.

By Products Processing:

No consideration has been given to the disposal of blood and waste because of small slaughter capacity. However, details will be considered in the final decision.

There may be merit to install a hammer-mill to produce bone-meal for the local feed manufacturers. Raw bones are found scattered all over and it could help not only to clear the environment, but could assist improve rural income.

C. Design Preparation of the Pilot Plant and the Equipment Required

A situation plan (Annex 12) and a floor plan for a cattle, sheep/goats slaughter house with chilling/freezing facilities and a retail butchery outlet (Annex 13) is shown.

The services of a Process Engineer is required to produce detail designs of the pilot plant and to provide costs for construction.

Approximate costs of the construction of the Pilot Plant, provision of refrigeration facilities, machinery, equipment and tools is given (Annex 14).

In summary these are :-

Building	K 460 000
Refrigeration	K 200 000
Machinery, equipment and tools	K 190 000
Administration, furniture and fittings	<u>K 175 000</u>
Total	<u>K1 025 000</u>

These estimates of costs are approximate and will have to be verified at the time of design preparation and construction and actual procurement of machinery and equipment. It must be stated that some of the quotations received for imported equipment may be slightly overstated because these items may be procured directly from the manufacturers.

D. Staffing

The recommended staffing for the pilot plant facility is set out below:

1)	<u>Administration</u>	
	Manager	1
	Clerk/Book-keeper	1
	Purchasing Officer	1
	Purchasing Assistant	1
	Driver/Sales	1
	Sales Assistant	2
	Watchman	2
2)	<u>Maintenance</u>	
	Fitter/Journeyman	1
	Handyman	1
3)	<u>Lairage and Slaughter House</u>	
	Supervisor	1
	Workers	12
4)	<u>Butcher and Processing</u>	
	Butcher	1
	Assistants	2

5. FINANCIAL EVALUATION

The proposed pilot plant involves the construction of a slaughter house, cold storage facilities, a retail butcher and meat processing facility. Provision for the acquisition of plant and meat processing equipment, a motor vehicle, furniture and fittings and the financing of initial working capital will also be required.

The total cost of the project as proposed is MK1 412 000 comprising of the following :

	MK
Fixed Assets	1 050 000
Working Capital	233 270
Contingency (10%)	<u>128 327</u>
TOTAL	<u>1 412 000</u>

Details are presented in Annex 15.

Financing Arrangements

The financing of the project has been discussed and local funding is available for such a project. Since the proposal being made is for the provision of a Pilot Plant which if successful can be used as a model for future development of the industry, the financing arrangements proposed is as follows :-

	<u>MK</u>	<u>Percent</u>
Loans (local borrowings)	662 000	46.9
Equity	100 000	7.1
Grant (external)	650 000	46.0
Total	<u>1 412 000</u>	<u>100.0</u>

The local borrowings will be from recognised financial institutions who have programmes for assisting Malawian entrepreneurs who wish to establish small to medium size business ventures. The loan repayment period will be over a period of 10 years, and interest calculated at the rate of 18.5 percent per annum. The grant funds will be used mostly for the acquisition of machinery, equipment, vehicle, refrigeration and meet part of the cost of construction particularly for steelworks and accessory equipment which forms part of the main building structure.

Financial Analysis

The project as proposed is intended to supply fresh meat, meat products, fish and ice to retailers operating at market centres (rural and urban) who will sell direct to the final consumers. The retail butchery and meat processing facility will retail direct to the local public and to institutions who would prefer bulk supplies. In addition to this, the facility will be used as a hide and skin collection centre. Furthermore, the facility will be developed as a Training Centre for local persons associated with the meat trade.

From the financial statements presented in Annexures 17 to 20, the project as proposed is financially and commercially viable. It should be noted that in preparing the analysis the cost and selling prices of various commodities (Annex 16) are based on the actual average prices prevailing at the time of the mission. However, in presenting the analysis some adjustments have been made and these include :

- a) An increase of 14% in price of raw material procurement in year 3 and a 5% increase thereafter. It is assumed that there is no increase in the quantity of raw material, though the potential for expansion exists.
- b) Besides the replacement of a delivery van in Year 5, no re-investment has been allowed for.
- c) Debtors assumed to represent 25 percent of total sales.
- d) Dividends (50%) has been allowed for and this could be considered as a reserve for replacement of equipment and machinery and expansion of business.
- e) Depreciation has been allowed for at the following rates :

<u>Asset</u>	<u>Rate %</u>
Building	5.0
Machinery & Equipment	12.5
Delivery Van	20.0
Furniture & Fittings	12.5
Installation & Commissioning	12.5
Tools and Equipment	12.5

The potential for the expansion of this enterprise exists and is very promising. The pilot plant as proposed should cope with any increased activity during the initial years of operation.

During the period under consideration (10 years), the average return on investment is about 24 per cent and the Return on Sales averages about 20 per cent.

6. CONCLUSIONS AND FINDINGS

1. The livestock industry in Malawi is not commercialised and is dominated by the small scale producer who owns ninety percent of the cattle in the country, producing livestock under very traditional and difficult conditions, mainly because land is used for crop production.
2. There is a determined effort by the Department of Veterinary Services to control animal and enzootic diseases, as evidenced by the controls exercised in the movement of livestock, vaccination and dipping of livestock.
3. The marketing of livestock is co-ordinated and conducted by the LPMU. In the Southern Region there is a reasonable distribution of sale pens.

Cattle are generally bought by the CSC, feedlot operators and butchers.

4. The CSC under ADMARC is the marketing authority that acts as a residual buyer of livestock and the only wholesaler for meat and meat products in the urban centres. The CSC operates abattoirs and cold storage facilities in Blantyre and Lilongwe and is operating under very difficult conditions because :
 - the Blantyre facility is in very poor condition and is in desperate need of repair to keep operating.
 - the Lilongwe facility needs equipment to be replaced to improve its refrigeration capability.
 - there is a lack of trained staff at all levels in the organisation particularly in the technical field.

The CSC also offers a service slaughter facility for butchers.

5. The CSC's efforts are concentrated on the economically viable areas of the operation and is currently involved in the purchasing and processing of hides and skins for the export market.

6. The slaughter and processing of livestock in the rural areas (and uncontrolled slaughtering in the urban centres) is done under very crude, unhygienic and poor conditions. If slaughter slabs/poles are available at rural produce markets, they are in poor condition and lack proper facilities and supervision. There is a lack of control of illegal slaughterings of livestock and selling of uninspected meat. Local councils lack funds to improve existing slaughter facilities let alone provide new ones.
7. The retail distribution and marketing of meat takes several forms and includes:
 - Rural butcher shops situated at the produce markets
 - Urban butcher shops situated at the urban produce markets
 - Urban butcher shops in the city/town (very few)
 - Supermarkets
 - Illegal traders on the roadside

Besides the supermarkets, the conditions of the retail outlets are extremely poor. Overall, the distribution and availability of meat in the country is poor.

8. Local retail meat prices have been liberalised but local councils exercise some control. Retail meat prices vary quite substantially depending on the market or area from where meat is bought. Consumers are extremely sensitive to meat prices.
9. There is a lack of trained staff in the meat processing field at all levels, and there are no training facilities available locally.

RECOMMENDATIONS

The Malawi Government, together with the support from various agencies is committed to the development of the agri-rural sector, so as to ensure food security and self sufficiency, both at the household and national level. The Government has already embarked on several programmes to achieve this objective and these include :

- the development of livestock production in the country
- the improvement of the rural marketing infrastructure and improve agricultural marketing
- increase rural incomes by encouraging private sector participation in agricultural trade

The following recommendations are made :

1. To develop livestock production, Government through its various agencies needs to provide :
 - Education and training through an efficient extension service to the small scale producers to improve animal husbandry practices.
 - For the establishment of commercial grazing and feeding facilities.
 - Incentives for the sale of livestock by setting realistic support prices for livestock, taking into account the cost of production.
 - Easy access to marketing facilities so that the producer sells his own animal directly at the market, thus avoiding any middle-men.
2. In order to improve the slaughtering and processing of livestock, and provide wholesome meat for sale at meat market centres consideration be given to support a proposal made to the Government of Malawi by a local entrepreneur, Agrofresh Limited, to establish a Pilot Plant Slaughter and Cold Storage facilities, at Lunzu, 20 Kms north of Blantyre. This type of facility will complement the activities of the CSC and help improve the slaughter of livestock and distribution of meat. The project as proposed is financially and commercially viable.

- a) The pilot plant to comprise of a slaughter hall, cold store facilities and a retail butchery outlet.
- b) Funding and support is required for the entire project which includes the :
 - design and construction of the plant
 - provision of machinery and equipment
 - services of a Process Engineer
 - services of a Meat Technologist
 - training of staff

Funding will be sourced locally by securing loans (MK662,000) for part of the total cost and it is suggested that a grant (MK650,000) be considered for the purchase of plant, machinery and equipment.

- c) Services of a Process Engineer is required to prepare detail design work and provide costs for the project.
 - d) Services of a Meat Technologist and Process Engineer will be required at the time of building, commissioning the pilot plant and for training of staff on-the-job.
 - e) The Pilot Plant be developed as a training centre of on-job training of slaughtermen and butchers who operate slaughterpoles/slabs and retail butcher shops. The facility can also be used by Meat Inspectors to gain practical experience.
 - f) Some training needs to be provided before the commissioning of the plant, particularly in the area of management, Engineering and Meat Technology.
3. The role and functions of the CSC needs to be reviewed by ADMARC (and Government) and stated.
4. For the CSC to play a meaningful role in the promotion and development of the livestock industry by acting as a residual buyer of livestock and a wholesaler of meat and meat products, it is necessary for the management and Board -
- to undertake a technical assessment of the facilities in Blantyre as a matter of urgency and plan for its development
 - to undertake a technical assessment of the facility in Lilongue and provide for its improvement

- to expedite the construction of a slaughter house and cold store facility at Mzuzu in the Northern province.
5. The CSC be provided with technical and financial support for the training of staff at all levels in the organisation. There is an immediate need for assistance in this area.
6. The Ministry of Agriculture in consultation with ADMARC, CSC, producer associations and other related organisations need to urgently prepare plans at a National level for the development of the livestock industry so as to achieve Government's objectives. Matters that need to be addressed include :
- method and means of increasing livestock (meat) output, including effective land utilisation and conservation measures
 - Provision and strengthening of extension and veterinary services
 - Provision of improved breeding stock
 - Improving the marketing infrastructure and services
 - Grading and assessment of live cattle and meat carcasses
 - Producer prices for livestock, prices for carcass meat and the wholesale price for meat, meat products and by products
 - Distribution of meat and meat products nationally

Annex 1

JOB DESCRIPTION

DP/MLW/88/018/11-52/J.12206

POST TITLE: Meat Processing and Cold Storage Facility Consultant

DURATION: One month

DUTY STATION: Blantyre, Malawi with travel within the country

PURPOSE OF PROJECT: The purpose of the project is to improve industrial productive capability and capacity through the development and application of appropriate industrial management systems and consultancy services, with a view to increasing national income and employment.

DUTIES: The expert will be expected to carry out the following duties :

1. Undertake a comprehensive and detailed study of the meat processing and cold storage facilities in Malawi, identifying the supply and demand aspects, regional references, problems of supply and distribution, processing facilities available.
2. Formulate a project proposal for a small scale meat processing and cold storage facility which could be promoted by a local entrepreneur, using local and foreign equity loans/grant/financing facilities. The project proposal should also include laying down the modality of establishing a pilot food facility and identifying the type of technical and financial assistance required.
3. Advise on the type of machinery required for the establishment of a small-scale meat processing and cold storage facility.
4. Make general short-term recommendations for the future development of the food/meat industry in the country, which could be taken up by the Government/Development Institutions/ International agencies for future development programme at the country and corporate levels.

BACKGROUND
INFORMATION:

Malawi is a landlocked developing country which places high emphasis on the development of agriculture and on the agro-based industry. Messrs. Agrofresh Limited - Project (Project Manager, Mr. J. A. Katangwe) had put up a project proposal which was shown to be financially and commercially viable.

The main purpose of the above mentioned short-term consultancy is to make an in-depth study of the meat processing industry in Malawi, formulate a small scale meat processing and cold storage unit and recommend appropriate schemes for technical and financial assistance and installation of Pilot Food (Meat Processing and Cold Storage) Facilities.

Annex 2

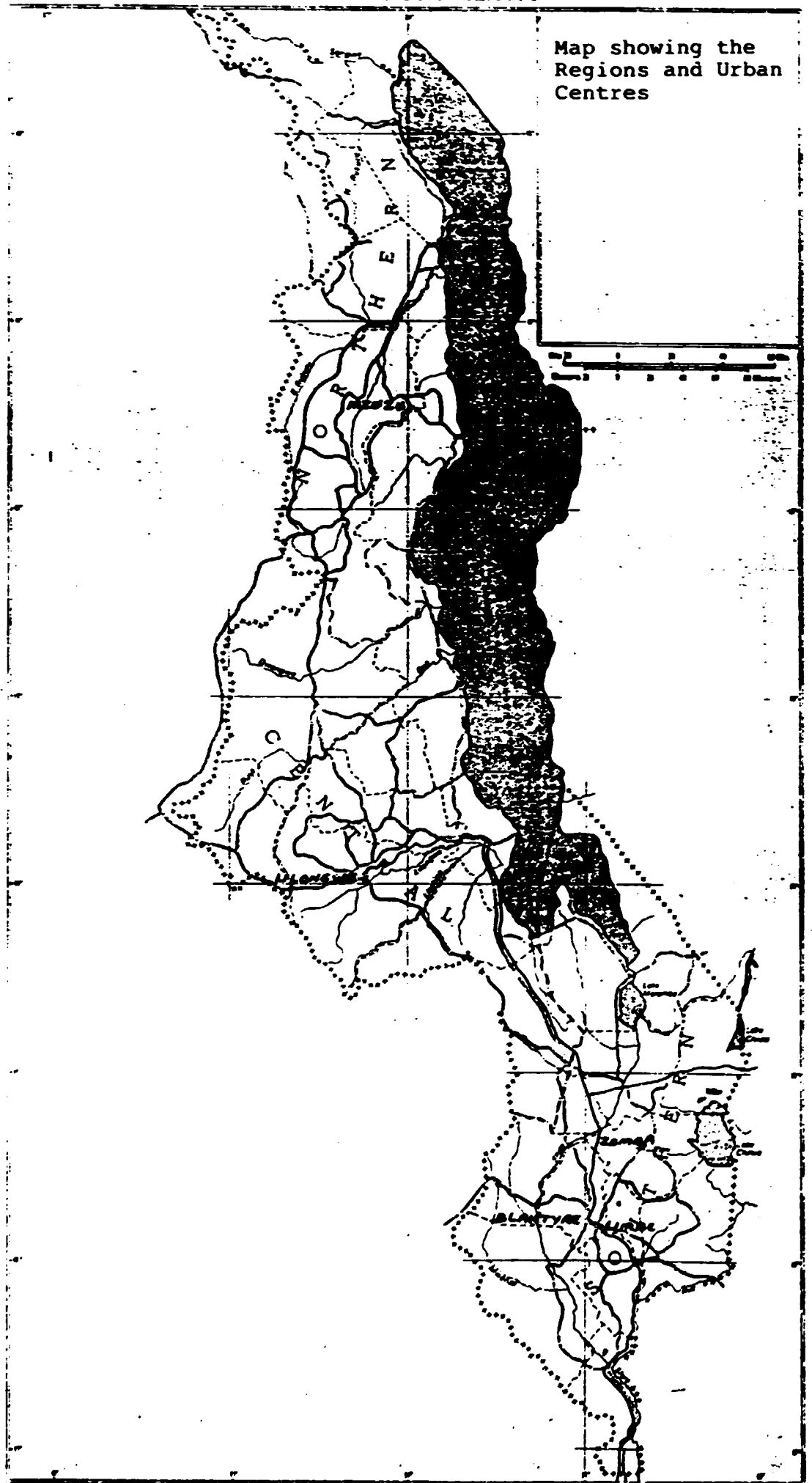
PERSONS CONTACTED DURING MISSION

- Mr M I Ahmed - Temp-Cool Refrigeration, P O Box 51345, Limbe
- Mr W P Mmani - Chief Engineer, ESCOM, P O Box 2047, Blantyre
- Mr C Amasi - Tannery Manager, Liwonde Tannery Limited, P O Box 138, Liwonde
- Mr J-Bapu - Divisional Operations Manager (Fresh Foods), PTC, P O Box 30402, Chichiri, Blantyre 3
- Mr A Brown - Everglo Electric Company, P O Box 1582, Blantyre
- Mr P Curtis - Operations Manager, Kandodo, P O Box 1106, Blantyre
- Mr T P Damba - New Blantyre City Butchery, St Davids Street, Blantyre
- Mr A Jacob - Chief Technical Adviser, Industrial Consultancy Services, UNIDO, P O Box 566, Blantyre
- Mr R Issa - Guirawekha Ranching, P O Box 3, Ngabu
- Mr A R Issa - Guirawekha Ranching, P O Box 3, Ngabu
- Mr C Kachiza - Industrial Development Officer, MITI, P O Box 30366, Capital City, Lilongwe 3
- Mr E J Kapenga - Kapenga's COD Butchery, Limbe
- Mr J A Katangwe - Project Manager, Agrofresh Limited, P O Box 80095, Maselema, Blantyre 8
- Mr K Kohtamaki - UNDP, P O Box 30135, Capital City, Lilongwe 3

PERSONS CONTACTED DURING MISSION

- Mr Munga - Senior Technical Officer (Disease Control), Blantyre ADD, P O Box 30277, Chichiri, Blantyre 3
- Mr Mpina - Market Superintendent, City of Blantyre, P/B 67, Blantyre
- Mr A Jumbe - National Expert, UNDP, P O Box 30135, Capital City, Lilongwe 3
- Mr Y P B Msosa - Managing Director, Liwonde Tannery Limited, P O Box 138, Liwonde
- Mr Muakalagho - Divisional Agricultural Officer, Blantyre ADD, P O Box 30227, Chichiri, Blantyre 3
- Dr A Ndovi - Chief Veterinary Officer, Dept of Veterinary Services, P O Box 30372, Capital City, Lilongwe 3
- Mr S B Naphiyo - Livestock Marketing Officer, LPMU, Box 96, Blantyre
- Dr R K D Phoya - General Manager, Cold Storage Company Limited, P O Box 575, Blantyre
- Ms C Retstocke - UNDP, P O Box 30135, Capital City, Lilongwe 3
- Mr F C Tukulala - Regional Planning Officer (s), Southern Division, P O Box 349, Blantyre
- Also Visited - Rural slaughter slabs/poles
- Hides and skins collection depots
- Rural produce market (meat traders)
- Urban produce markets (meat traders)
- Roadside meat markets
- Blantyre Islamic Mission Farm

Map showing the Regions and Urban Centres



LIVESTOCK : NUMBER BY TYPE, 1978 - 1987

Year	CATTLE				Goats	Pigs	Sheep
	Total	Northern Region	Central Region	Southern Region			
1978	789,533	217,586	370,657	201,290	655,084	174,316	78,747
1979	789,529	212,603	368,933	207,993	650,203	197,312	88,929
1980	840,315	235,678	395,522	209,115	690,939	193,148	82,937
1981	870,576	229,821	409,800	230,955	718,154	205,677	85,043
1982	887,032	239,256	417,569	230,207	760,947	197,922	110,546
1983	907,959	255,141	416,530	236,288	631,071	211,704	155,607
1984	948,519	271,235	422,754	254,530	738,547	186,031	149,854
1985	1,019,959	290,941	455,158	273,860	799,094	322,413	184,711
1986	1,010,659	285,714	434,009	290,936	789,300	281,538	165,483
1987	839,471	210,719	386,750	241,002	586,562	238,302	88,476

SOURCE: Department of Animal Health and Industry
 Malawi Statistical Year book, 1987 - National Statistical Office,
 Zomba

LIVESTOCK MARKETS IN THE SOUTHERN REGION OF MALAWI

DISTRICT	MARKET	MAP REFERENCE
Nsanje (Lower Shire)	Chimombo	1
	Nsanje	2
	Tengani	3
	Bangula	4
	Chuluchankongo	5
Chikwawa I (Lower Shire)	Ndalapa	6
	Ngabu	7
	Chaonanjiva	8
	Jombo	9
	Tomali	10
Chikwawa II (Lower Shire)	Kubalaleka	11
	Chilikha	12
	Mthumba	13
	Kanjedza	14
	Makhwila	15
Machinga	Phalula	16
	Mikoko	17
Mangochi	Chikomwe Mponda	
Mulanje	Phutheya Sombani	

COLD STORAGE COMPANY LIMITED

Beef Producer Prices and Wholesale selling Prices for selected items -
(Effective from 1 November 1990)

- A. Beef Producer Prices (K per Kg Cold Dressed Mass (CDM))
 - Low Grades K3.15
 - Top Grades K5.50

- B. Wholesale Prices (K per Kg)

Item	Wholesale Price K per Kg
Low Grade Carcase Beef - Sides	4.25
Low Grade Cut Beef	4.75
Top Grade Carcase Beef - Sides	6.25
Top Grade - Hindquarters	7.00
Top Grade Cut Beef	7.00
Liver	4.50
Offals	1.75
Kidneys	4.50
Cattle Head	5.00 each
Hooves	.80 each
Ox Tail	3.75
Heart	4.50
Pet Food	1.00 Packet
Goat	4.50
Lamb A	6.70
Lamb B	5.66
Sheep/Goat Head	.50 each
Ice Block	4.00/block
 <u>By Products</u>	
Blood Meal	1.50
Meat and Bone Meal	1.90
Tallow	1.75

TOTAL LIVESTOCK SLAUGHTERED (HEAD) BY CSC
DURING 1989 AND 1990

YEAR	CATTLE			SHEEP	GOATS	PIGS
	CSC	BUTCHERS	TOTAL			
1989	8 381	9 613	17 994	1 593	612	1 633
1990	-	-	11 877	725	691	4 716

SOURCE Cold Storage Company Limited

SLAUGHTER FACILITIES IN THE SOUTHERN REGION OF MALAWI

<u>Location</u>	<u>Category</u>
Blantyre (CSC-Registered Abattoir)	A
Lunzu	B
Liwonde Boma	B
Thyolo	B
Ckikuaua	B
Balaka	B
Govala	C
Jali	C
Thandue	?
Mangochi Boma	C
Namwera Turnoff	C
Ngabu	Open
Bvumbve	C
Namiuaua	C
Bangula	C
Mwanza	C
Phalula	C
Nchalo	Open

Note:

- Category A Registered abattoir
- B Slaughter slab with roof and walls
- C Slaughter Pole/Slab with roof only
- Open Slaughter Pole/no roof

RETAIL MEAT PRICES AT VARIOUS OUTLETS

A. Retail meat Prices (K per Kg) at Lunzu Produce Market and at the Ngumbe Trading Centre

Lunzu Produce Market		Ngumbe Trading Centre (Roadside)	
Items	Price	Item	Price
Meat with bone	4.50	Beef	3.00
Offal	2.50	Goat meat	3.50
Liver	4.00	Offal	2.50
Bones	3.50	Liver	5.00
		Cow Head	10.00
Chikwawa & Ngabu Markets		Feet (cow heels)	1.00 each
Meat with Bone	1.80		

B. Retail Meat Prices Low Grade (K per Kg) at Urban Produce

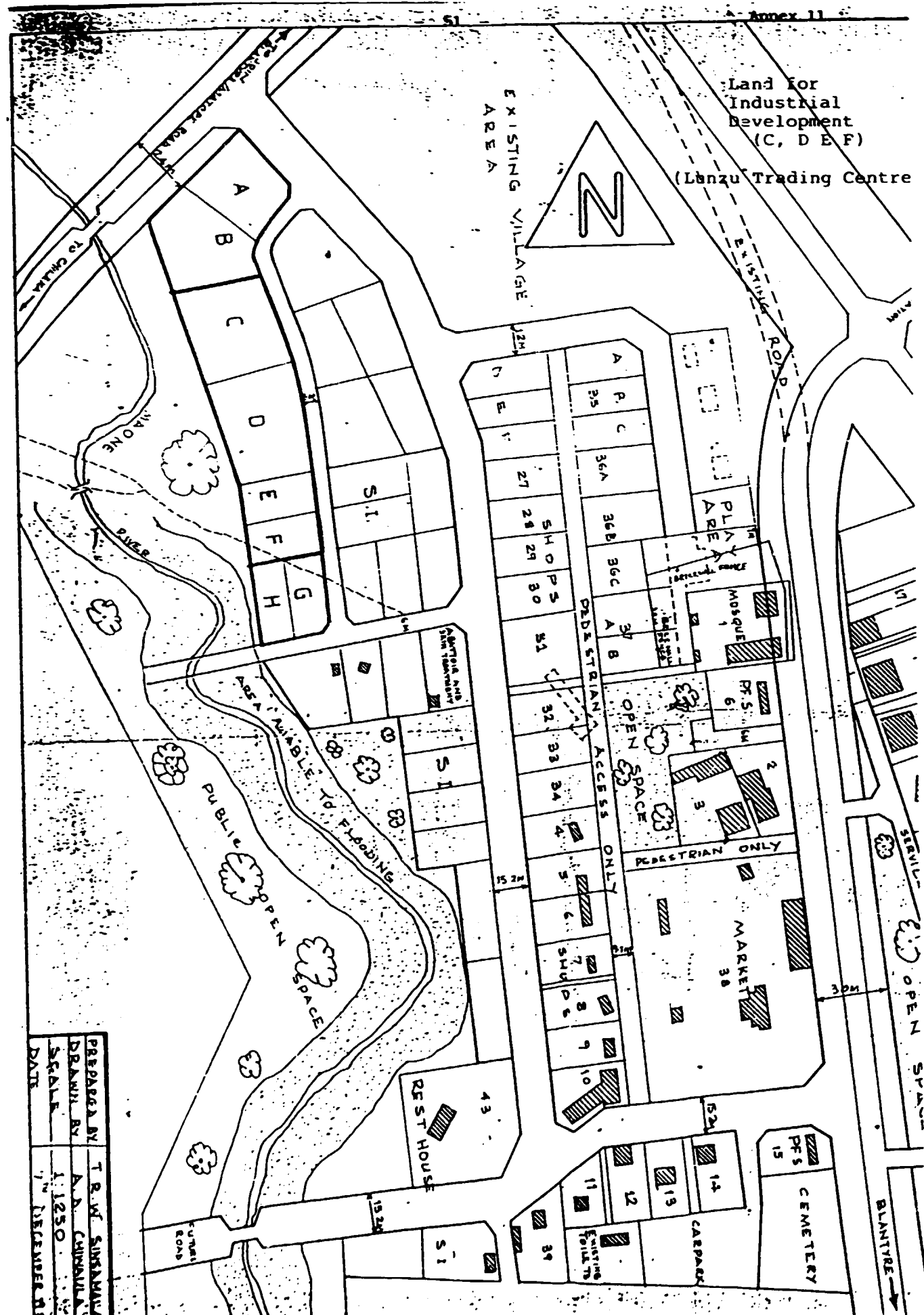
Market (Blantyre and Limbe)

Item	Price
Meat with Bone	5.50
Steak	7.50
Liver	7.00
Offal	3.00
Tongue & Heart	5.50

C. Average Retail Meat Prices Top Grade (K per Kg) at

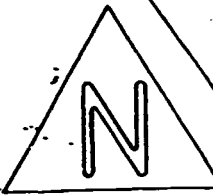
Supermarkets and Butcher Shops

Item	Price	Item	Price
Fillet	19.99	Silverside	14.07
Topside Steak	14.07	T Bone Steak	17.49
Thick Flank	14.07	Sirloin Steak	17.49
Rump Steak	17.49	Rolled Sirloin	17.99
Stewing Beef	8.89	Porterhouse Steak	15.30
Choice Mince	14.07	Stewing Meat	9.05
Economy Mince	9.05	Chuck	9.05
Shin	6.77	Ration Meat	6.77
Kidney	7.50	Oxtail	7.15
Tongue	7.15	Liver	7.15
Bones	1.00		



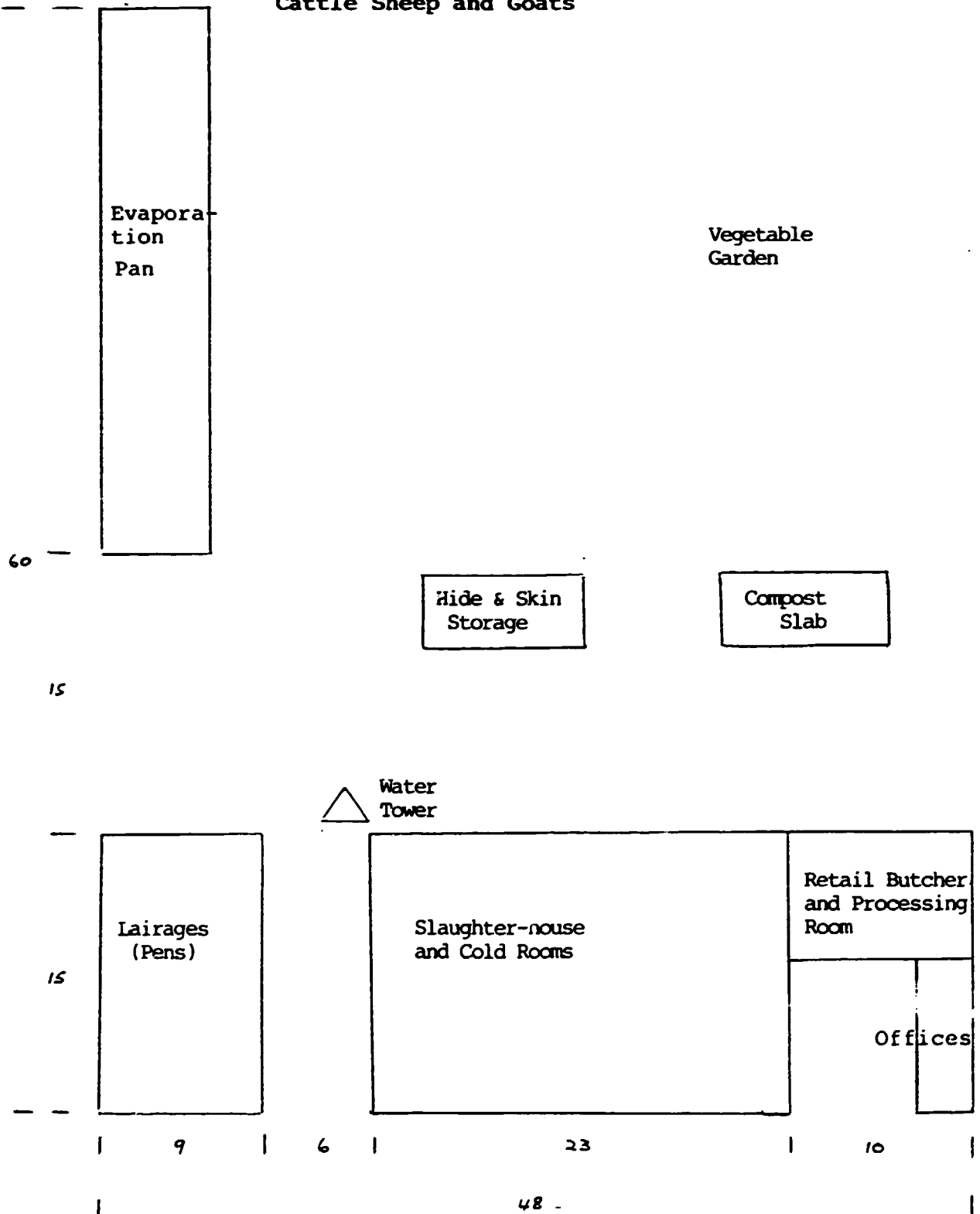
Land for Industrial Development (C, D E F)
 (Lanzu Trading Centre)

EXISTING VILLAGE AREA



PREPARED BY	T. R. W. SIKHAWA
DRAWN BY	A. D. CHINDALA
SCALE	1:1250
DATE	7 th DECEMBER 1977

Situation Plan of Slaughterhouse for Cattle Sheep and Goats

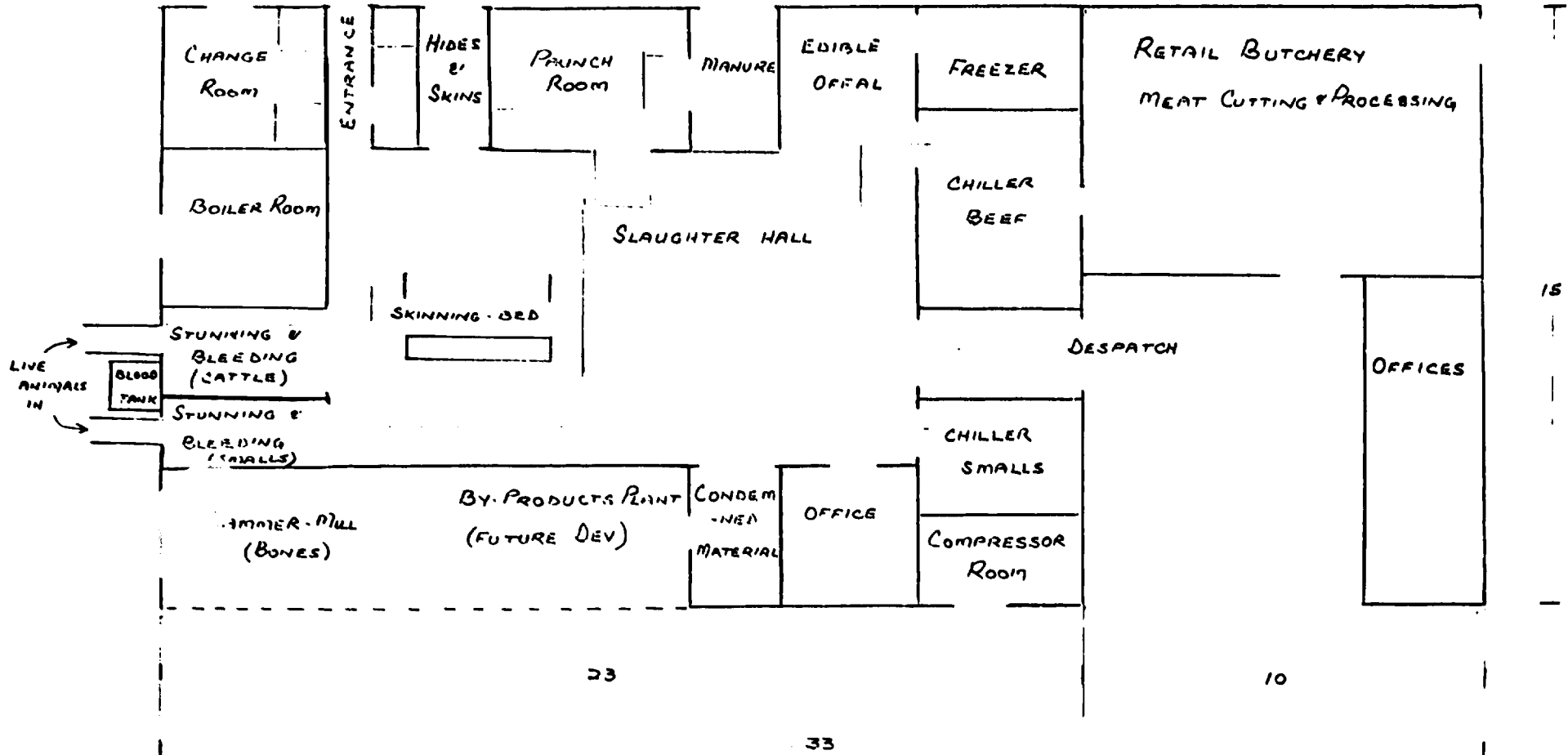


Measurements in Metres (Not to scale)

Cattle, Sheep and Goats

Slaughter-house and Retail Butchery

(Including Chiller and Freezer)



Measurement in Metres (Not to scale)

PROVISIONAL LIST OF MACHINERY, EQUIPMENT AND TOOLS

For the operation of the slaughter house, meat processing and retail butchery, certain items of equipment and machinery form part of the main building structure. Similarly, a certain amount of loose tools needed for the efficient operation of the facility is also included but not costed out since it will be covered under the total cost of the facility. This list is a guideline, and where special machinery, equipment and tools must be purchased, approximate procurement costs for budget purposes has been given.

A. Lairage and Slaughter House

- | | |
|---------------------------------------|----------------------------|
| Stunning box for cattle | Hot water geysers |
| Hoist | Water tank and pumps |
| Horn saw | Effluent pumps |
| Skinning bed/cradle | Lighting |
| Beef trolley | Boiler (optional) |
| Carcase spreader | Shower |
| Meat rollers | Toilet/urinals |
| Overhead rails | Sterilising washing units |
| Gambrels (sheep and goat) | Stand for pluck inspection |
| trolleys | Stand for head inspection |
| Portable platform (Carcase splitting) | |

B. Machinery, Equipment and Tools

Specific items required for :-

1. Slaughter House

<u>Item</u>	<u>Quantity</u>	<u>Approx Price MK</u>
Overhead track scales	2	26 000
Carcase splitting saw	1	15 000
Platform scale (general purpose)	2	5 000
Captive bolt stunning pistol & cartridges	2	15 000
Manure wagon	1	1 500
Hammer mill (Size 1.5)-Bone mill with	1	<u>11 000</u>
		MK 60 000
Refrigeration Equipment		MK200 000

2. Butcher and Meat Processing

Band saw	2	15 000
Metal tables (stainless steel tops)	3	3 000

Butcher scales (15kg)	2	11 000
Pench top scale (50 kg)	1	20 000
Meat rail	1	1 000
Meat cutting saw (hand)	3	150
Meat cleaver	2	100
Hamburger/Patty former	1	500
Brine pump (hand operated)	1	400
Mincer	1	5 250
Sausage filler (hand operated)	1	3 300
Meat tenderiser	1	5 000
Meat slicer	1	3 500
Cooking kettle/pot (150 litre)	1	2 600
Bins (plastic/metal)	20	600
Trays (plastic)	100	1 500
Knives (stainless steel)		
Flaying Knife	30)	
Boning "	10)	2 000
Steak "	10)	
Sharpening steels	20	1 200
Sharpening stones	10	200
Scabbards	20	400
Meat hooks (stainless steel)	50	500
		<u> 500</u>
		MK 77 200

Allowance for spares on machinery (10 per cent) MK 12 000

Optional Items

Bowl cutter (20 litre)	1	16 000
Hollymatic patty former	1	25 000
		<u> 25 000</u>
		MK 41 000

C. Administration

Motor vehicle (delivery 2 tonne diesel with canopy)	150 000
Furniture and Fittings	25 000
Office Equipment	
	<u> 175 000</u>
	MK175 000

Summary:

a) Slaughter house	MK 60 000
b) Refrigeration Equipment	MK200 000
c) Butcher & Meat Processing	MK 77 200
d) Allowance for spares	MK 12 000
d) Administration	MK175 000
	<u> 524 200</u>
e) Optional items	MK 41 000
	<u> 565 200</u>
	MK565 200

PROJECTED COSTING AND FINANCING**Fixed Assets****MK**

Building structures	460 000	
Cold room	200 000	
Meat processing equipment	190 000	
Delivery van	150 000	
Furniture and fittings	25 000	
Installation and commissioning	15 000	
Handling tools and equipment	10 000	
TOTAL COST OF FIXED ASSETS		1 050 000

Working capital requirement

Initial stock (2 months)	197 270	
Salries and wages (2 months)	10 000	
Operating expenses (2 months)	20 000	
Pre-operating expenses	6 000	
TOTAL WORKING CAPITAL		233 270
SUB TOTAL		1 283 270
Add 10 percent contingency		128 327
TOTAL PROJECTED COST		1 411 597
ROUNDED UP		1 412 000

PROPOSED FINANCING**%**

Loans	662 000	46.9
Equity	100 000	7.1
Grants	650 000	46.0
	1 412 000	100.0

ANNUAL INCOME AND EXPENDITURE

ITEM	QUANTITY	PRICE (MK)	EXPENDITURE	INCOME-SALES	
			VALUE (MK)	PRICE (MK)	VALUE (MK)
Cattle (head)	2 520	400	1 008 000		
Carcase Beef (Kg)	352 800			4.00	1 411 200
Fifth Quarter (head)	2 520			84.50	212 940
Hide (each)	2 520			10.00	25 200
Goat/sheep (head)	5 040	30	151 200		
Carcase Meat (Kg)	60 480			3.50	211 680
Fifth Quarter (head)	5 040			15.00	75 600
Skin (each)	5 040			1.50	7 560
Fish (Kg)	3 600	2.20	7 920	2.75	9 900
Meat Products (Kg)	3 600	4.00	14 400	6.00	21 600
Ice (Bags)	3 600	0.50	1 800	3.0	10 800
Bone Meal (Kg)	6 000	0.05	300	1.80	10 800
TOTAL			<u>1 183 620</u>		<u>1 997 280</u>

COSTING AND REALISATIONNotes and Assumptions4. CATTLE

Live cattle will be purchased at sales conducted by the LPNU

- Liveweight	= 300 kg
- Average purchase price	MK1.20 per kg
- Dressing Percentage	48 per cent
- Carcase Mass CDM	140 kg
	(CSC average carcase mass - 150kg)
- Selling price for carcase beef	MK4.00 per kg
- Offal per carcase	24.2kg per carcase
- Fat and waste trimming per carcase	10 kg per carcase
- Fifth Quarter Realisation	MK84 per carcase
- Transport charges - live cattle	MK20.00 per head
- Annual throughput	2 500 head

5. GOAT/SHEEP

Goats and sheep will be purchased from producers in the area.

- Liveweight	20-30 kg
- Average purchase price	MK20.00 per animal
- Dressing percentage	45 per cent
- Average carcase mass	12 kg
- Selling price	MK2 50 per kg
- Offal per carcase	5 0 kg per carcase
- Fifth Quarter realisation	MK15 0 per carcase
- Annual throughput	5 040 head

C. FISH

Source of supply will be from individuals and Maldeco fisheries. A minimal quantity of 300kg per month will be handled.

D. MEAT PRODUCTS

A minimal quantity (300kg per month) of fresh sausage, hamburgers, polony and salted beef will be produced.

E. ICE

There is a good demand for ice and for budget purposes 300 bags (x10kg) is considered adequate.

F. BONE MEAL

Raw bones will be bought from the rural folk and milled to produce bone-meal for sale to feed manufacturers.

G. HIDES AND SKINS

In addition to processing its own hides and skins, the facility will be used as a collection depot for raw stock produced by the rural folk. Hides and skins will be sold to Liucade Tannery.

H. FRUIT AND VEGETABLE

Additional income can be generated from the sale of fruit and vegetable but this is not considered part of the project.

PROJECTED MONTHLY CASH FLOW YEAR 1	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
CASH INFLOWS													
Loans	662 000												662 000
Equity	100 000												100 000
Grants	650 000												650 000
Cash sales	124 830	124 830	124 830	124 830	124 830	124 830	124 830	124 830	124 830	124 830	124 830	124 830	1 497 960
Debtors		41 610	41 610	41 610	41 610	41 610	41 610	41 610	41 610	41 610	41 610	41 610	457 710
TOTAL CASH INFLOW	1 536 830	166 440	166 440	166 440	166 440	166 440	166 440	166 440	166 440	166 440	166 440	166 440	3 367 670
CASH OUTFLOWS													
Fixed assets	1 155 200												1 155 200
Stocks	197 330	98 665	98 665	98 665	98 665	98 665	98 665	98 665	98 665	98 665	98 665	98 665	1 282 645
Salaries and wages	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	60 000
Electricity and water	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	1 000	12 000
Motor vehicle expenses	750	750	750	750	750	750	750	750	750	750	750	750	9 000
Travel expenses	500	500	500	500	500	500	500	500	500	500	500	500	6 000
Telephone and postage	150	150	150	150	150	150	150	150	150	150	150	150	1 800
Advertising	250	250	250	250	250	250	250	250	250	250	250	250	3 000
Sundry expenses	500	500	500	500	500	500	500	500	500	500	500	500	6 000
Repairs and maintenance			1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500	15 000
Interest on loan												122 470	122 470
Loan repayment												66 200	66 200
Business licence	10 000												10 000
Pre-operating expenses	6 000												6 000
TOTAL CASH OUTFLOW	1 376 680	106 815	108 315	108 315	108 315	108 315	108 315	108 315	108 315	108 315	108 315	296 985	2 755 315
NET CASH SURPLUS/(DEFICIT)	160 150	59 625	58 125	58 125	58 125	58 125	58 125	58 125	58 125	58 125	58 125	- 130 545	612 355
BALANCE BROUGHT FORWARD	160 150	160 150	219 775	277 900	336 025	394 150	452 275	510 400	568 525	626 650	684 775	742 900	612 355
BALANCE CARRIED FORWARD	160 150	219 775	277 900	336 025	394 150	452 275	510 400	568 525	626 650	684 775	742 900	612 355	612 355

PROJECTED ANNUAL CASH FLOW	1	2	3	4	5	6	7	8	9	10
CASH INFLOW										
Loans	662 000									
Equity	100 000									
Grants	650 000									
Cash sales	1 497 960	1 497 960	1 497 960	1 497 960	1 650 000	1 650 000	1 837 500	1 837 500	2 025 000	2 025 000
Debtors	457 710	499 320	499 320	499 320	545 777	550 000	607 292	612 500	669 792	675 000
TOTAL CASH INFLOW	3 367 670	1 997 280	1 997 280	1 997 280	2 195 777	2 200 000	2 444 792	2 450 000	2 694 792	2 700 000
CASH OUTFLOW										
Fixed assets	1 155 200				198 000					225 000
Stocks	1 282 645	1 183 980	1 349 737	1 417 224	1 488 085	1 562 490	1 640 614	1 722 645	1 808 777	1 899 216
Operating expenses	120 000	136 800	149 000	150 000	160 000	180 000	194 000	200 000	222 000	236 000
Interest	122 470	110 223	97 976	85 729	73 482	61 235	48 988	36 741	24 494	12 247
Loan repayment	66 200	66 200	66 200	66 200	66 200	66 200	66 200	66 200	66 200	66 200
Tax		199 442	204 758	133 167	106 866	151 674	135 149	213 451	177 276	251 564
Dividends		121 881	125 130	81 380	65 307	92 690	82 591	130 442	108 335	153 734
TOTAL CASH OUTFLOW	2 755 315	1 818 527	1 992 801	1 941 700	2 165 940	2 114 289	2 167 542	2 377 478	2 407 082	2 643 961
NET CASH SURPLUS/(DEFICIT)	612 355	178 753	4 479	55 580	29 836	85 711	277 249	72 522	287 710	- 143 961
BALANCE BROUGHT FORWARD		612 355	791 108	795 587	851 167	881 003	966 715	1 243 964	1 316 486	1 604 195
BALANCE CARRIED FORWARD	612 355	791 108	795 587	851 167	881 003	966 715	1 243 964	1 316 486	1 604 195	1 460 234

**PROJECTED YEARLY PROFIT
AND LOSS ACCOUNT**

	1	2	3	4	5	6	7	8	9	10
Turnover	1 997 280	1 997 280	1 997 280	1 997 280	2 200 000	2 200 000	2 450 000	2 450 000	2 700 000	2 700 000
Cost of sales	1 183 980	1 183 980	1 349 737	1 417 274	1 488 085	1 562 490	1 640 614	1 722 645	1 808 777	1 899 216
GROSS PROFIT	813 300	813 300	647 543	580 056	711 915	637 510	809 386	727 355	891 223	800 784
Operating expenses										
Salaries and wages	60 000	66 000	73 000	80 000	88 000	97 000	106 000	118 000	129 000	141 000
Electricity and water	12 000	14 000	14 000	14 000	16 000	16 000	16 000	16 000	16 000	16 000
Motor vehicle expenses	9 000	11 000	13 000	14 000	9 000	11 000	13 000	14 000	16 000	16 000
Insurance and licences	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
Travel	6 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000	10 000
Telephone and postage	1 800	1 800	3 000	3 000	4 000	4 000	5 000	5 000	5 000	5 000
Advertising	3 000	3 000	3 000	3 000	5 000	5 000	5 000	5 000	5 000	5 000
Sundry expenses	6 000	6 000	7 000	7 000	8 000	8 000	9 000	9 000	9 000	10 000
Repairs	15 000	15 000	16 000	17 000	18 000	19 000	20 000	21 000	22 000	23 000
Pre-operating expenses	6 000									
Total operating expenses	128 800	136 800	149 000	158 000	168 000	180 000	194 000	208 000	222 000	236 000
OPERATING PROFIT	684 500	676 500	498 543	422 056	543 915	457 510	615 386	519 355	669 223	564 784
Interest	122 470	110 223	97 976	85 729	73 482	61 235	48 988	36 741	24 494	12 247
Depreciation	118 825	111 259	104 639	98 847	133 379	95 944	92 063	88 668	85 697	88 497
PROFIT BEFORE TAX	443 205	455 018	295 927	237 480	337 054	300 332	474 335	393 946	559 032	464 040
TAXATION	199 442	204 758	133 167	106 866	151 674	135 149	213 451	177 276	251 564	208 818
NET PROFIT	243 763	250 260	162 760	130 614	185 380	165 182	260 884	216 671	307 468	255 222
Dividends	121 881	125 130	81 380	65 307	92 690	82 591	130 442	108 335	153 734	127 611
RETAINED EARNINGS FOR THE YEAR	121 881	125 130	81 380	65 307	92 690	82 591	130 442	108 335	153 734	127 611
RESERVES BROUGHT FORWARD		121 881	247 011	328 391	393 698	486 388	568 979	699 421	807 757	961 490
RESERVES CARRIED FORWARD	121 881	247 011	328 391	393 698	486 388	568 979	699 421	807 757	961 490	1 089 101

PROJECTED YEARLY BALANCE SHEET

	1	2	3	4	5	6	7	8	9	10
CAPITAL EMPLOYED										
Lease	595 800	529 600	463 400	397 200	331 000	264 800	198 600	132 400	66 200	
Equity	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000	100 000
Grants	650 000	650 000	650 000	650 000	650 000	650 000	650 000	650 000	650 000	650 000
Reserves	121 881	247 011	328 391	393 698	486 388	568 979	699 421	807 757	961 490	1 089 101
	1 467 681	1 526 611	1 541 791	1 540 898	1 567 388	1 583 779	1 648 021	1 690 157	1 777 690	1 839 101
FIXED ASSETS										
Cost	1 155 200	1 155 200	1 155 200	1 155 200	1 353 200	1 353 200	1 353 200	1 353 200	1 353 200	1 578 200
Accumulated depreciation	118 825	230 084	334 724	433 571	566 949	662 893	754 957	843 625	929 321	1 017 819
Net book value	1 036 375	925 116	820 476	721 629	786 251	690 307	598 243	509 575	423 879	560 381
CURRENT ASSETS										
Stock	98 665	98 665	98 665	98 665	98 665	98 665	98 665	98 665	98 665	98 665
Debtors	41 610	41 610	41 610	41 610	45 833	45 833	51 042	51 042	56 250	56 250
Cash	612 355	791 108	795 587	851 167	881 003	966 715	1 243 964	1 316 486	1 604 195	1 460 234
	752 630	931 383	935 862	991 442	1 025 502	1 111 213	1 393 671	1 466 192	1 759 110	1 615 149
CURRENT LIABILITIES										
Tax	199 442	204 758	133 167	106 866	151 674	135 149	213 451	177 276	251 564	208 818
Dividends	121 881	125 130	81 380	65 307	92 690	82 591	130 442	108 335	153 734	127 611
	321 324	329 888	214 547	172 173	244 364	217 740	343 893	285 611	405 298	336 429
NET CURRENT ASSETS	431 306	601 496	721 315	819 267	781 138	893 473	1 049 778	1 180 581	1 353 812	1 278 720
NET ASSETS	1 467 681	1 526 611	1 541 791	1 540 898	1 567 388	1 583 779	1 648 021	1 690 157	1 777 690	1 839 101
RATIOS										
Gross profit margin (%)	40.72	40.72	32.42	29.04	32.36	28.98	33.04	29.69	33.01	29.66
Operating profit margin (%)	34.27	33.87	24.96	21.13	24.72	20.80	25.12	21.20	24.79	20.92
Return on sales (%)	28.32	28.30	19.72	16.18	18.66	16.43	21.36	17.58	21.61	17.64
Return of investment (%)	30.20	29.81	19.19	15.41	21.50	18.96	28.78	23.31	31.45	25.23
Debt ratio (: 1)	0.88	0.81	0.76	0.71	0.68	0.63	0.60	0.54	0.51	0.45
Current ratio (: 1)	2.34	2.82	4.36	5.76	4.20	5.10	4.05	5.13	4.34	4.80