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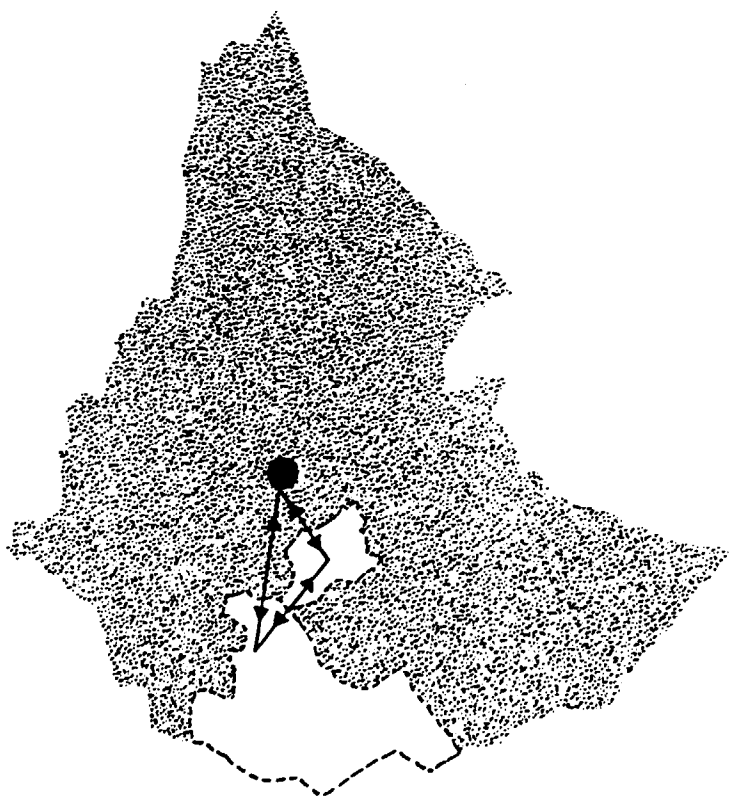
GOVERNMENT OF ETHIOPIA

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Strengthening the Intersectoral Linkage Between Agriculture and Industry

FINAL REPORT

January 1987



DANAGRO ADVISER a/s

AGRICULTURAL KNOW-HOW FROM DENMARK

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United Nations Industrial Development
Organization (UNIDO)
Head, Purchase and Contract Service
Division of Industrial Operations (PAC/DIO)
P. O. Box 300
A-1400 Vienna
Austria

Dato 19.1.1987
J.nr.: 334.01
NP/MB

Dear Sir,

Subject: Project no. XP/ETH/86/001 - Strengthening the Intersectoral Linkage between Agriculture and Industry - Contract NO. 86/27. Final Report.

We take pleasure in submitting the Final Report which has been elaborated on the basis of the constructive comments made by UNIDO (ref. your letter dated Nov. 11, 1986) and Vice Minister, Ministry of Industry, Ethiopia (dated Dec. 6, 1986).

Re: UNIDO comments on Draft Final Report

i) Chapter 1 "General Background" has been changed accordingly.

iv) Chapter 8 has been changed and extended to cover a general summary as well as recommendations.

ii), iii), v) Changed accordingly.

Re: Comments from Ministry of Industry, Ethiopia

1) This suggestion is fully incorporated in the Final Report, p. 5-5.

2) This point refers to a number of potential project areas for development within the agro-industrial complex. Our suggestion is that these project opportunities be evaluated under the sponsorship of the Agro-Industrial Coordinating Committee (Point 7 fully incorporated). The same applies to point 4 which covers the projects within basic necessities for the rural population.

3) Under the presentation of follow-up technical projects Ch. 5.6 and 7 a number of references are made to other relevant existing projects.

5) The suggestion to analyse hides and skins as a product chain is incorporated in p. 5-5.

6) The concept of agro-industrial complex is elaborated in Chapter 1 as well as in Chapter 8 which also introduce an alternative tool for evaluating the role of the agro-industrial complex in the national economy.

We believe that the above changes will prove satisfactory and would like to take this opportunity to thank UNIDO and Vice Minister Tadeos Haregewoch for the support given during the elaboration of the study.

Yours faithfully
DANAGRO ADVISER A/S

Erling Rasmussen
Director

PS: Please find attached a complete set of slides requested by UNIDO as well as a short summary of the most recent Danagro assignment in Denmark as previously requested.

TABLE OF CONTENTS

1. GENERAL BACKGROUND

1. GENERAL BACKGROUND

This study is concerned with the strengthening of linkages between agriculture and industry where linkages refer to the exchange of goods and services between agriculture and various agro-industrial subsectors, as well as to the exchange of goods between different agro-industries. Agro-industries using agricultural produce as raw material input for processing create by nature forward as well as backward linkages. Forward linkage effects are established as regards the generated demand for the processed product, causing additional investments in the distribution channels to reach the final consumer. Backward linkages are expressed through the provision of a market outlet, which generates increased agricultural production and further increases the demand for capital and seasonal inputs for agricultural production. The establishment of agro-industries generates an additional linkage through the whole demand for machinery, equipment and services required by the industry itself. As a whole the establishment of agro-industries generate linkages directly to agriculture as well as to other industrial subsectors.

The exact assessment of existing linkages between agriculture and industry requires a set of input - output tables for the various sectors of the Ethiopian economy. Input - output tables are not available and the provision of these is beyond the scope of this study. The study aims, however, through analysis of existing product chains to assess the present status of linkages.

Through the analysis of linkages, the structure of the agro-industrial complex, comprising agriculture and various industrial subsectors supporting agriculture is

partly presented, whereas a complete presentation of this complex again requires the above mentioned input - output tables.

As an introduction to the Ethiopian agro-industrial complex Figure 1.1. shows the major components of the cereal based agro-industrial complex with indicated level of activity. The figure indicates that industry supporting agriculture with capital goods and seasonal farm supply inputs is only in its infancy, and consequently most supply is imported. Most machinery and implements for agriculture are imported, while only low cost hand tools are locally manufactured. All fertilizer and other chemicals have to be imported, while Ethiopia is in the process of establishing its own seed supply sector.

Ethiopian agriculture is basically subsistence-oriented and dominated by the peasants sector, which accounts for about 95% of the total cultivated area. State Farms and smallholders organized in cooperatives are strongly supported by the Government, and represent presently 5% of the total area cultivated.

In spite of this production structure, state farms provide most of the locally produced grain for industrial processing. As a consequence a considerable share of raw material requirement for the cereal based food industries has to be imported to meet the total demand generated mainly by urban consumers and consumers in food deficit areas.

Figure 1.1. Major Components of Cereal-Based Agro-Industrial Complex.

Components of Agro-Industrial Complex	Activity Level
Provision of Capital Goods for Agriculture	Import of Machinery and Equipment
Provision of Seasonal Farm Supply Inputs	Import of Fertilizers & Chemicals, Local Production and Import of Improved Seeds
Agricultural Production	Production at Smallholder Level and at State Farms
Agricultural Marketing	Marketing through Agricultural Marketing Corporation, Private Traders and directly to Processing Industries
Industrial Processing	Industrial Flour Milling, and Malt Production
End-Users	Urban Consumers

It is apparent from above that existing intersectoral linkages between agriculture and industry in Ethiopia are poorly developed. A programme aiming to strengthen the agro-industrial coordination at all levels is required, and the study emphasizes the concept of integrated agro-industrial development as a means to achieve a higher final food production.

2. METHODOLOGY

2. METHODOLOGY

Due to the general nature of the study it has been important to clearly define the objectives and to adopt a realistic approach. The following main points have been considered prior to the implementation of the study:

a) Selection of appropriate bases for investigations
b) Major crops included in the study
c) Product chains

2.1 SELECTION OF APPROPRIATE BASES FOR INVESTIGATION

The industrial base supporting agriculture in Ethiopia, including industries providing farm input supply and industries using agricultural produce as raw material, is limited. In order to fully assess the present situation it was necessary to select for investigation purpose geographical areas which represent agricultural production sustained by an industrial base. In this way study recommendations apply to areas which are relatively well developed and do not touch the food deficit areas.

The deficit areas should, however, benefit from an improved coordination between agriculture and industry in the present food surplus producing areas. The immediate impact of a higher food production in selected areas would indirectly benefit present deficit areas through an increased local supply and transfer of food. Long-term effects of an improved coordination between agriculture and industry in the selected areas would be to utilize the experience gained in the development of present deficit areas.

The areas selected, where food production exceeds local demand and the surplus is locally used as raw material input for processing industries, are Chilalo Awraja in Arsi Region and Sidama Awraja in Sidamo Region.

2.2 MAJOR CROPS INCLUDED IN THE STUDY

Chilalo Awraja is primarily a grain surplus producing area (wheat, barley) with the surplus of wheat being processed in nearby Nazareth and malt barley utilized in the locally erected maltery.

Sidamo Awraja is a maize surplus area and also an area, to where cattle bought from many places in the Southern part of Ethiopia are trekked, slaughtered and industrially processed.

Based on selected crops in selected areas the supporting industries are analysed whether they are located in or outside the selected area.

The framework of the study is consequently the establishment of an improved coordination between agriculture and industry based on wheat, barley, maize and beef. This does not mean, however, that other crops grown in the selected areas or in neighbouring regions are left out. They are dealt with to the extent that they could be utilized for the strengthening of linkages within product chains for the major crops.

2.3 PRODUCT CHAINS

In order to establish present linkages the 4 major products will be analysed through a product chain. A product chain encompasses the following components as a vertical operation.

1. Procurement and distribution of capital goods for agriculture
2. Procurement and distribution of seasonal farm supply inputs.
3. Service and support institutions and industries for agriculture and the rural community
4. Agricultural production
5. Agricultural marketing
6. Industrial processing
7. Industrial marketing

The analysis of the product chain should primarily be integrated in the sense that linkages between 2 different activities in the chain are assessed as a means to evaluate the performance of the whole product chain. Linkages within a product chain should in this context be interpreted as the actual coordination between demand and supply of goods and services at all levels of the product chain.

Two sets of linkages are analysed. For each major product the performance of the vertical chain, described according to the components 1-7, is evaluated. In addition, the horizontal linkage between the cereal and meat product chains is assessed.

Based on the analysis the study should make recommendations for the improvement of vertical and horizontal intersectoral linkages. The study recommendations should be included in a plan of action grouped according to the nature of measures recommended (organizational, technical) and listed in priority order.

3. VERTICAL LINKAGES WITHIN THE CEREAL PRODUCT CHAIN

3. VERTICAL LINKAGES WITHIN THE CEREAL PRODUCT CHAIN

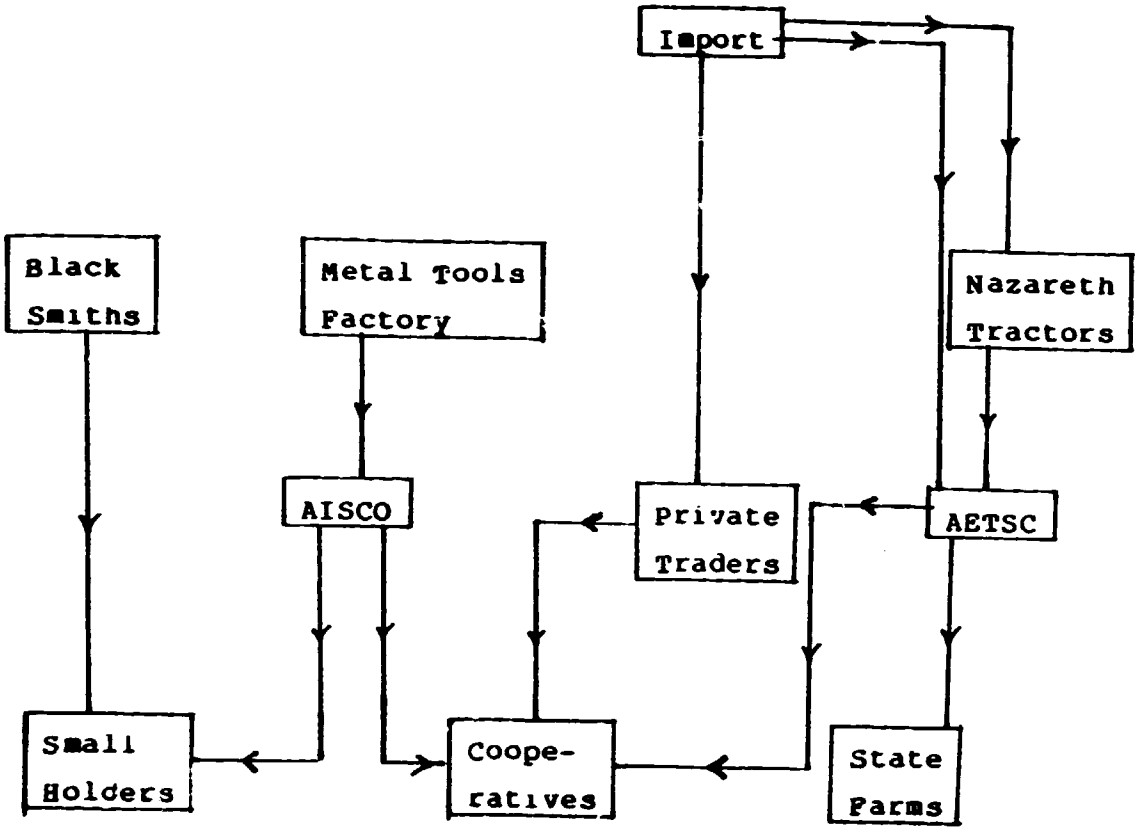
Within cereals the study has concentrated on wheat, maize and barley, and the product chains will be systematically analysed in the following.

3.1 PROCUREMENT AND DISTRIBUTION OF CAPITAL GOODS FOR THE PRODUCTION OF CEREALS

The structure of industry procuring and distributing capital goods for the production of cereals reflects basically the mechanization level at the various agricultural subsectors producing grains. The major share of total production originates from the smallholder sector which is unmechanized, while Producers Coop. and Service Coop. are in the process of mechanizing but still represent a minor share of production. The state farm sector, on the other hand, is characterized by a high mechanization level but provides as earlier stated only a small share of total grain output.

The procurement and distribution of capital goods for the different agricultural subsectors work according to Figure 3.1.

Figure 3.1 Procurement and Distribution of Capital Goods for Cereal Production.



3.1.1 Supply of Capital Goods for Smallholders

The main suppliers of implements for smallholders are traditional blacksmiths providing basic implements such as plough-shares and hand-tools including axes and hoes. Blacksmiths are part of the local traditional rural community and work on a service basis for local farmers. It is estimated that around 80% of the total smallholder demand for implements and tools are satisfied by local blacksmiths.

The remaining estimated 20% is covered by industrially manufactured implements and tools provided by Kotebe Metal Tools Factory under Ministry of Industry and distributed through AISCO which falls under Ministry of Agriculture (see 3.2). Major tools produced by Kotebe Metal Tools Factory are hoes, axes, hammers and sickles. The industrially manufactured tools represent an improved quality in relation to those produced by traditional blacksmiths but the design is unchanged. There is no real product design development taking place at industrial level, and the end-products are delivered without handles due to shortage of wood, which necessitates that farmers provide their own handles. As a result most tools supplied from the industry are, once applied at field level, unsuitable for the specific tasks to be performed. The demand for industrially manufactured tools, with due respect to appropriate design and suitability is insufficiently researched and as a result the present production and distribution of tools do not fulfil its mandate.

There is a lack of coordination between smallholder demand, manufacturing industry and distribution organization. In other words, the linkages between smallholder and industry manufacturing tools are poorly developed.

3.1.2 Supply of Capital Goods for Mechanized Agriculture

The mechanization of agriculture is based on imports of implements and machinery which is undertaken by AETSC (Agricultural Equipment and Technical Services Corporation) under Ministry of State Farms Development.

This corporation is also charged with the responsibility of distributing machinery and carrying out after-sales service of all imported machinery and equipment, as well as providing training for operators of machinery and equipment. AETSC has got only a headquarter facility in Addis to serve the whole country, which is heavily constraining its ability to undertake prompt services that cannot be done at State Farm level. There is lack of coordination regarding the level of spare parts at different State Farms which makes it more difficult for AETSC to operate smoothly. At the overall level, the operation of AETSC is constrained by lack of skilled service and maintenance personnel, and as an organization dependant on imported equipment AETSC is often limited in operations through the lack of foreign currency.

Distribution of tractors from AETSC has recently been extended due to establishment of an assembly operation in Nazareth based on imported parts from the USSR. Presently, the annual production capacity is 1,000 assembled units of tractors, out of which 40% are 80 HP, 2 wheel-drive, and 60% are 80 HP, 4-wheel drive. The present demand for tractors in the State Farm sector is concentrated on high powered units, such as 120 HP or more, of which all are imported. Consequently, the assembly of Nazareth tractor is primarily intended to be used in the mechanization of cooperatives and for resettlement projects. The mechanization of cooperatives is a process just recently started. The role of AETSC, which is established primarily to

assist large-scale state agriculture and which presently is operating without any regional network, is still to be defined in relation to mechanization of cooperatives.

A number of private industries, importing and distributing agricultural machinery and equipment for the mechanization of agriculture, are operating in Addis Ababa.

They are constrained by the lack of foreign exchange and have mainly supplied cooperatives and to some extent resettlement projects. Their role as suppliers and as providers of service and maintenance has been declining for several years, during which period machinery and equipment from alternative suppliers have been predominant. The role of private traders has been further curtailed through the establishment a local assembly of tractors destinated for cooperatives and resettlement schemes.

Observations indicate as a whole that linkages between procuring and distributing industries and the various agricultural sub-sectors are poorly developed.

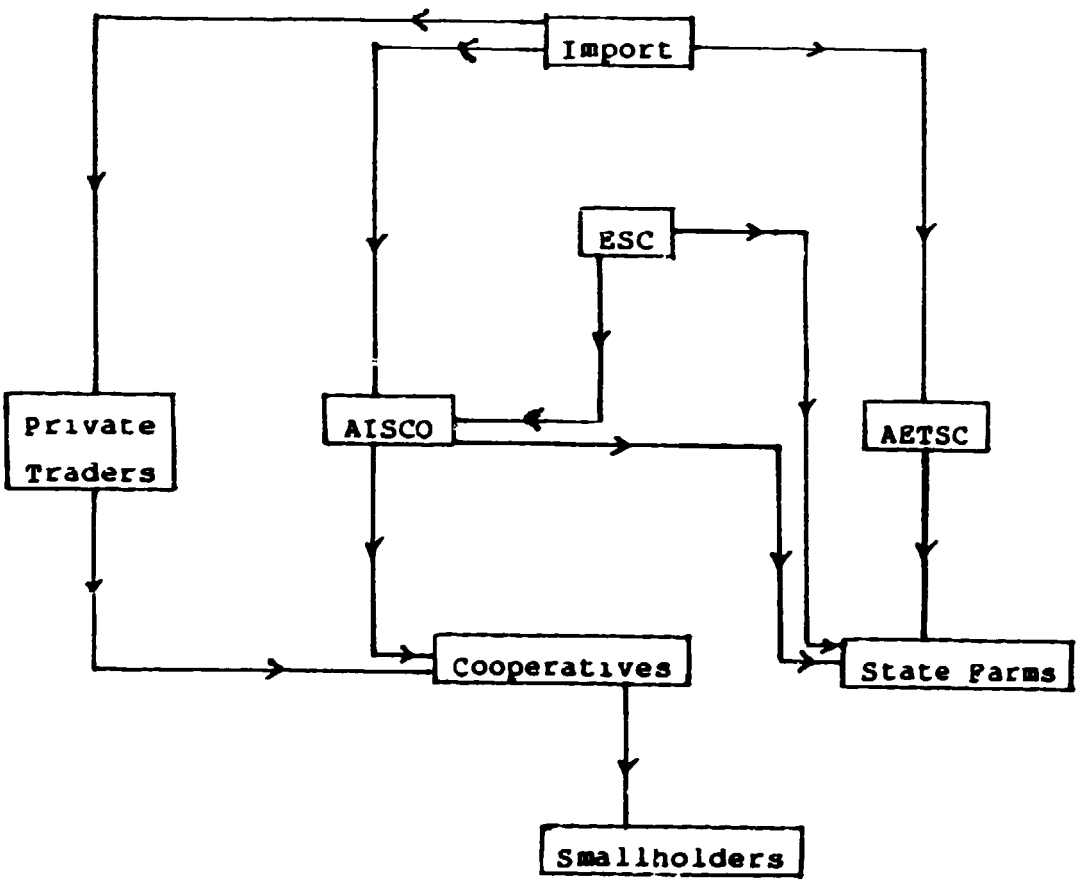
The industry serving smallholders is operating without taking the customer demand into consideration, the industry catering for the highly mechanized agriculture does not have any established network to reach the State Farms, and finally it is still to be decided which organization or industries should be charged with the responsibility of mechanizing cooperatives. The activities undertaken by the different industries, such as Kotebe Tools Factory, AISCO and AETSC falling under the umbrella of Ministry of Industry, Ministry of Agriculture and Ministry of State Farms Development respectively, are uncoordinated.

3.2 PROCUREMENT AND DISTRIBUTION OF SEASONAL FARM SUPPLY INPUTS

Seasonal farm supply inputs to be utilized for the production of grains include the technical inputs such as seeds, fertilizers and other chemicals as well as general consumer goods for the rural population.

Figure 3.2 shows the present structure of procurement and distribution of technical farm supply inputs.

Figure 3.2 Procurement and Distribution of Seasonal Technical Farm Supply Inputs



3.2.1 Procurement and Distribution of Fertilizers, Seeds and Chemicals

The procurement and distribution of technical, seasonal farm supply inputs for the production of grain among peasants are undertaken by AISCO. Procurement and distribution are based on the elaboration of demand estimation at Service Cooperative level carried out, through Rural Development Centres (1 centre consists of 1-2 Service Cooperatives) by Ministry of Agriculture staff. Demand estimates for fertilizer have to be devised at Service Cooperative level 12 months prior to expected delivery of inputs. This is partly due to a slow procedure for getting results at field level through various levels of Ministry of Agriculture before reaching AISCO, partly to a 6 months time requirement in procuring fertilizer through international tender.

Credit is provided for seasonal farm supply inputs through AIDB (Agricultural and Industrial Development Bank). Presently, AIDB provides such credit for service cooperatives in areas which can be served by its branches and sub-branches - 28 in total. In other areas AISCO has been assigned the responsibility on behalf of AIDB to administer credit and to handle its repayment through the network of Commercial Bank branches.

The responsibility includes carrying the full risk of defaults.

AISCO has got 2 main receiving centres at Nazareth and Kaliti and distributes inputs to a total of 598 Marketing Centres established by Ministry of Agriculture. AISCO is operating as a wholesaler, leaving retailing to registered Service Cooperatives.

It is, however, only a limited number of Service Cooperatives which are registered, and due to credit default the number of outlets has been further reduced. When a Service Cooperative's outstanding debt results in the percentage of repayment dropping below 95% - reduced in 1983 to 70% due to drought - the Service Cooperative is no longer eligible for credit.

Taking into account that the majority of AISCO distributed fertilizer is channelled through some 300 Service Cooperatives, the role of these institutions becomes clear. In this respect it should be noted that retailing at Service Cooperative level is constrained by weak management.

In the distribution of farm input AISCO is dependant on services provided by NATRACOR (National Transport Corporation) since it is without its own fleet of transport.

Table 3.1 shows the amount of inputs distributed through AISCO.

Table 3.1 Major Farm Inputs Distributed through AISCO ('000 tonnes)

DAP	47.6
UREA	7.0
Total Fertilizer 1)	54.6
Wheat Seeds	8.2
Maize Seeds	3.1
Barley Seeds	0.2
Teff Seeds	0.4
Total Major Seeds 2)	11.9

Source: AISCO

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1) Refers to the period September 85 - July 86 (includes State Farms)

2) Refers to the period September 85 - July 86 (excludes State Farms)

Private traders operate mainly in the supply of chemicals which is not provided by AISCO. All chemicals are imported.

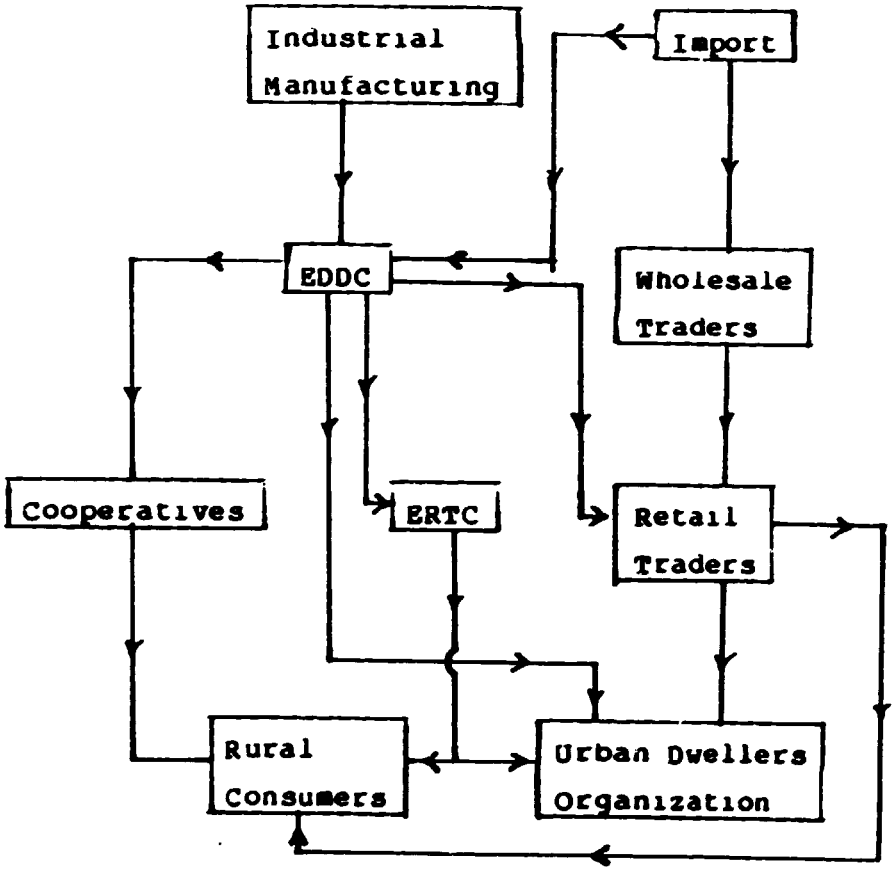
Seeds distributed by AISCO is procured from E.S.C., Ethiopian Seed Corporation, which falls under Ministry of State Farms Development. ESC is charged with the responsibility of seed multiplication and cleaning based on seed grain purchases from State Farms and to a less extent from cooperatives. However, the quality of seed grain received at ESC for processing is low, and as a result the amount of by-products generated is substantial. Presently, by-products are piling up at the various seed processing facilities due to lack of established market outlets. ESC is faced with other operational constraints, such as the lack of 2 basic seed farms which have been planned for several years. Another aspect is the need to update and readjust the mechanical condition of existing seed processing plants, including the improvement of service and maintenance facilities and training of operators.

ESC serves State Farms directly and smallholders through AISCO. Taking into consideration the amount of internal operational constraints that ESC is facing, it is apparent that ESC faces difficulties in satisfying the demand for the delivery of improved seeds for State Farms and for smallholders.

3.2.2 Procurement and Distribution of Consumer Goods, General Goods and Building Material.

A pre-requisite for agricultural production is the availability of consumer goods, general household goods and building materials for the rural community. The proceurement and distribution of these essential goods is shown in Figure 3.3

Figure 3.3 Procurement and Distribution of Consumer Goods, General Goods and Building Material for the Rural Community.



The distribution system is dual, comprising the state controlled EDDC (Ethiopian Domestic Distribution Corporation) and private wholesale traders.

EDDC is a wholesale organization for products industrially manufactured by factories under Ministry of Industry supplemented by some imported items. The products fall in 5 major groups:

1) General Goods
2) Building Material
3) Food Stuffs
4) Tyres, Canvases
5) Textiles

EDDC is operating 59 branches, and since most products have to be transported from the manufacturing plants in Addis, the organization is dependant on transport services provided by NATRACOR. The market outlets for EDDC are in order of importance cooperatives, private retail traders, Urban Dwellers Associations, and ERTC (Ethiopian Retail Trade Corporation) which is under Ministry of Domestic Trade. One of the main constraints in the operation of EDDC is, however, the shortage of goods supplied, and as a result the main retail market outlets, such as cooperatives and private retail traders, are getting additional supplies from private wholesale traders procuring imported as well as locally manufactured goods.

The supply of general and consumer goods to the rural community is a very costly operation. It is worth noticing that the supply system, using cooperatives as important retail outlets, is uncoordinated with the supply of seasonal farm inputs which is also being delivered through the cooperative outlets.

3.3 PROVISION OF SERVICE AND SUPPORT FOR AGRICULTURE AND SMALL-SCALE INDUSTRIES SUPPORTING ACRICULTURE

A number of institutions are established under various ministeries with the aim of supporting agricultural development at peasant level.

The services provided include research, extension, development of appropriate technology supporting agriculture, and the promotion of small-scale industries serving agriculture. These services are crucial to proper working linkages between agriculture and industry, and consequently they are assessed in the following.

3.3.1 Research and Extension

The main body charged with agricultural research is IAR, Institute of Agricultural Research which is an independent institution, and which board of directors is chaired by the Minister of Agriculture. IAR has developed a system of 7 research stations to cover all climatical and ecological zones. Results of research undertaken by IAR is, however, not applied by peasants due to a number of reasons.

IAR has been constrained regarding the purchase of new equipment and vehicles which has reduced the tempo of research work and has been detrimental to staff motivation. The major reason, however, for a weak impact on agriculture is the lack of coordination of research activities by IAR and a number of other institutions operating in similar fields of acitivities, sometimes even duplicating IAR.

The Rural Technology Promotion Department under Ministry of Agriculture is a recently established body with the aim of developing agricultural implements, promoting rural

industry and introducing alternative energy sources. A rural technology centre is established in Aselia to be concerned with development and adaption of new technology, whereas the testing under field condition takes place as agreed with selected Producers Cooperatives and Service Cooperatives.

HASIDA (Handicraft and Small Industries Development Agency) is the promotion and service organization under Ministry of Industry for all non-state operated industry. HASIDA has up to now been involved in activities, such as grain milling, oil milling, weaving and tailoring. HASIDA is constrained by a weak network of branches to reach the rural community and consequently to efficiently serve the target groups.

The extension service, which should be instrumental in establishing the appropriate linkages between research and rural community, has faced operational problems. With a total number of approximately 2000 extension agents in the country the overall extension staff to farm family ratio is around 1:2500. In order to strengthen the organization of extension staff a training and visit system (T&V) has been introduced recently on a trial basis.

The basic reason for a poor impact on the rural community of activities undertaken by service institutions is a lack of overall coordination within and between the institutions concerned. Working relations between research institutions and agroindustries are not established at this stage.

3.4 CEREAL PRODUCTION

The production of cereals in Ethiopia is, as previously mentioned, mainly subsistence oriented and takes place at

smallholder level. On the contrary, the production of cereals for marketing and processing is concentrated at State Farm level with a smaller share produced and procured at smallholder level.

Total production of cereals, including pulses and oilseeds, is shown in Table 3.2

Table 3.2 Total Estimated Production of Cereals, Pulses and Oilseeds 1981/82 - 1983/84 ('000 tonnes)

	1981/82	1982/83	1983/84
Peasants Sector	6,011	7,551	6,135
State Farm	285	254	203
Total	6,296	7,895	6,338

Source: MOA

3.4.1 Peasants' Production

It is estimated that cereals production accounts for around 87% of the total peasants' production in 1983/84 and amounts to some 5.2 mill. tonnes. Table 3.3 shows the estimated peasants' production and average yields of major cereals, which are teff, barley, wheat, maize and sorghum.

Table 3.3 Estimated Peasants' Production and Average Yield of Major Crops 1983/84

	Production '000 tonnes	Yield tonne/ha
Teff	1060	0.8
Barley	800	1.1
Wheat	560	1.0
Maize	1400	1.8
Sorghum	1180	1.3
Total Major Cereals	5000	

Source: MOA

3.4.2 State Farms Production

In the State Farm sector the major cereals produced are maize and wheat. Table 3.4 shows the estimated production of major cereals 1981/82 - 1983/84.

Table 3.4 Estimated State Farms Production of Major Cereals ('000 tonnes)

	1981/82	1982/83	1983/84
Maize	125	100	120
Wheat	130	150	150
Total Major Cereals	225	250	270

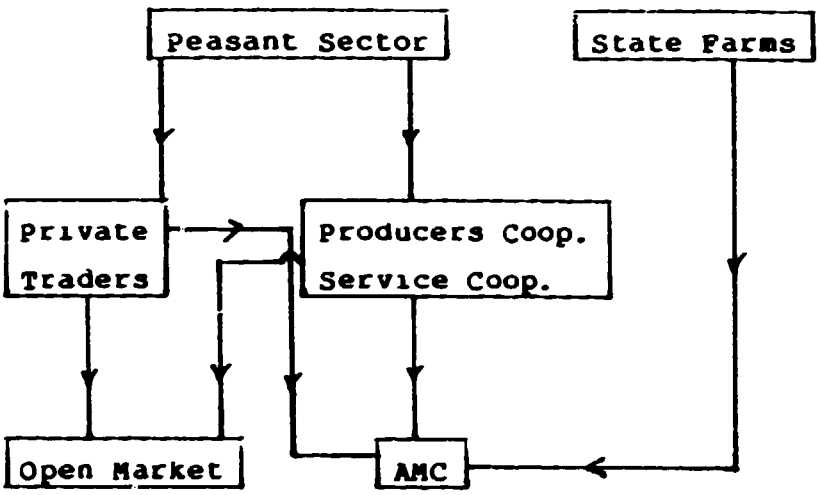
Source: Operation Reports SADC, CPSC

The yields obtained at State Farms level vary considerably from different state farms and from year to year. The recent figures on average yields for maize and wheat at State Farms are 2.6 tonnes/ha and 1.6 tonnes/ha respectively.

3.5 GRAIN MARKETING

Grain procurement and marketing is left to AMC (Agricultural Marketing Corporation) under Ministry of Domestic Trade and private traders. The grain marketing system is shown in Figure 3.4

Figure 3.4 The Grain Marketing System



3.5.1 AMC

AMC is the sole grain wholesale marketing organization operating and procures grain directly from State Farms, Producers or Services Cooperatives or Private traders. The amount of grain purchased by AMC so far is shown in Table 3.5

Table 3.5 Grain Procurement by AMC 1981/82 - 1983/84 ('000 tonnes)

	1981/82	1982/83	1983/84
From Peasants	305	385	265
From State Farm	150	190	145
Total	455	575	410

Source: AMC

The share of AMC grain procured in relation to total actual production by the various agricultural subsectors (see Tables 3.2 and 3.4) is shown in Table 3.6

Table 3.6 Share of AMC Procurement of Total Estimated Production (%)

	1981/82	1982/83	1983/84
Peasants Sector	5.1%	5.1%	4.3%
State Farms	52.6%	74.8%	71.4%
Total	7.2%	7.3%	6.5%

The average share of AMC grain procured in relation to totally estimated grain production 1981/82 - 1983/84 amounts to 7.0%. Table 3.6 shows that AMC does not procure all grains produced at State Farm level. The difference consists of grains delivered directly to the industry.

AMC sets prices in the present marketing system. It has fixed farm gate, wholesale, state farm and selling prices with state farms obtaining the highest prices due to higher mechanization costs. Each year AMC assesses quotas of grain to be delivered by Service Cooperatives, which in turn establishes quotas to be delivered by smallholders.

The price paid by SC's to smallholders set by AMC is uniform throughout Ethiopia. The quota system has been introduced to procure a bigger share of grain through AMC, and licensed private traders usually operate on a 50% quota basis which means they are obliged to deliver 50% of all grains handled. Additionally, the operations of private traders are limited in the sense that they cannot move the remaining 50% beyond the regional border, and consequently the open market consists of mainly deficit subregions or rural households in the same region.

Prices set by private traders are higher than AMC fixed prices.

AMC is operational in 7 regions with 17 branches, under which 120 purchasing centres are established. The organization is highly centralized leaving the responsibility of purchasing grains at fixed prices and warehouse-storing to branches. Deliveries are made at the request of AMC headquarter, Addis Ababa.

The total warehouse capacity of AMC is around 560,000 tonnes, and for the transportation of grains the organization is highly dependant on transport services provided by NATRACOR.

Presently, AMC has got no grain cleaning or drying facilities and receives grain with impurity not exceeding 12% and moisture not exceeding 15%. AMC has introduced no quality price incentive.

It should be noted that AMC is serving basically the same agricultural subsectors as AISCO and has built up parallel facilities such as warehouses. No coordination in terms of utilizing joint facilities has been established so far between AMC and AISCO. In fact, AMC used to undertake both

functions, but due to problems in the procurement and distribution of farm inputs AISCO was established to specifically undertake these duties.

The procedure of linking the provision of credit for seasonal farm supply input with loan recovery through crop produce is not in operation. As previously mentioned credit is provided by AID bank supported by AISCO and since AMC procures grain on cash basis and there are no established working relations between AID Bank and AMC, credit provision and crop procurement are seen as two distinct functions undertaken by different organizations.

3.6 PRIMARY INDUSTRIAL PROCESSING

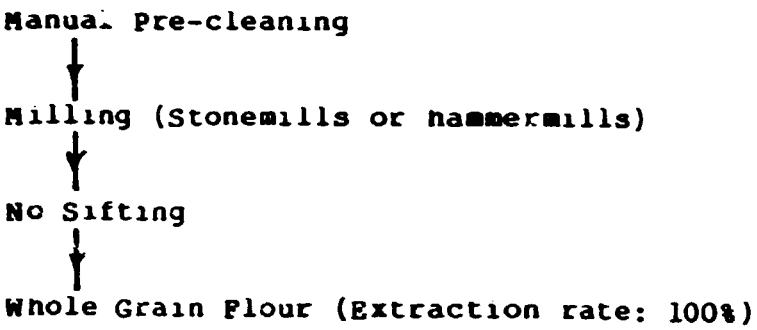
Processing of wheat, maize and malt barley takes place at small-scale as well as at industrial level. Small-scale processing or grain milling is a service operation where the client brings grain to the mill to be processed for a certain fee. Small-scale mills are operated by private individuals, service cooperatives or Urban Dwellers Associations and recently established mills have been promoted and supervised by HASIDA. Large-scale industrial processing of wheat and maize at flour mills is undertaken by EFC (Ethiopian Food Corporation) and production of malt based on localy produced barley is under the umbrella of EBC (Ethiopian Beverages Corporation). Both corporations fall under the Ministry of Industry.

3.6.1 Small-Scale Grain Mills

The importance of small-scale mills as a service to the rural community should not be underestimated when the only alternative is manual grinding.

Technology and production flow of small-scale grain mills is shown in Figure 3.5

Figure 3.5 Production Flow Diagram



The small mills have a capacity of 3-4 quintals/hour, they are electrified or diesel-driven. The end-product contains all ingredients including bran, and households use frequently a mixture of different whole grain flour.

Mills are imported and the total capital investment for the establishment of a small-scale grain mill can amount to Birr 25,000. Credit for the establishment of a grain mill can be obtained at AIDB through HASIDA. The main constraint in connection with the establishment is the often very time consuming procedure when a loan application has to be appraised by AID bank, Addis. The problems in running a small-scale grain mill are the procurement of spare parts and the lack of technical advice concerning maintenance.

3.6.2 Industrial Wheat Flour Mills

The production flow of industrial wheat flour mills is shown in Figure 3.6

Figure 3.6 Production Flow Diagram

Receipt of raw wheat in bags
↓
Pre-cleaning, 2% of raw wheat rejected
↓
Storing (silos)
↓
Main - Cleaning, 10% of raw wheat rejected
↓
Clean wheat
↓
Milling, 22% of clean wheat rejected
(fine and coarse bran)
↓
Mixing, 80% wheat flour and 20% maize flour
↓
Bagging

The capacity of wheat flour mills varies from 45 to 120 tonnes per day. Pre-cleaning by sifting removes impurities, such as straw and stones, whereas smaller impurities such as weeds, dust, broken and small kernels, are separated by the main cleaning where wheat is channelled through a system of sieves, trieurs and graders. The milling operation is carried out by a system of roller mills and vibrating sieves. The milling by-product, fine coarse bran, has got a high feed value and is ideal for cattle.

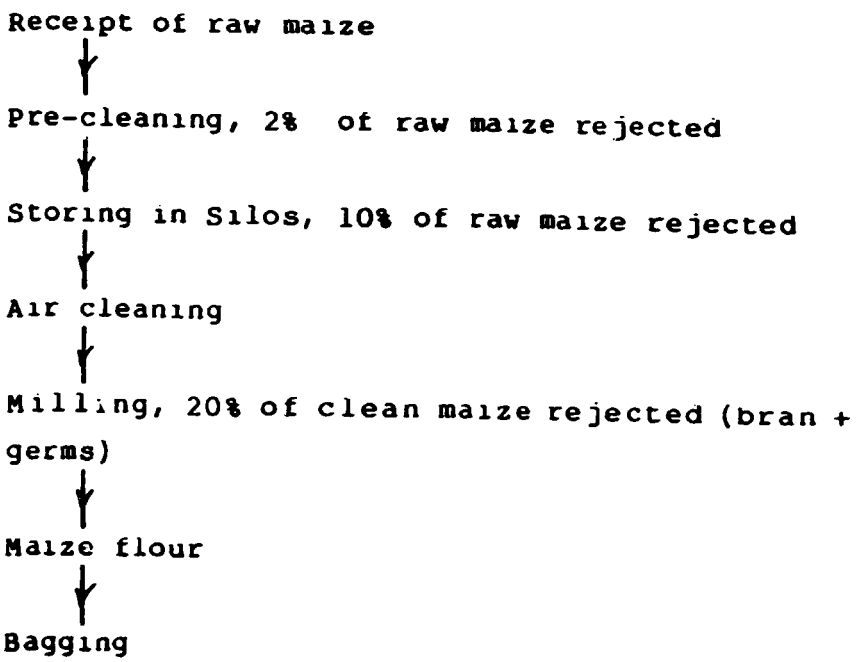
The annual volume of wheat processed at industrial flour mills is estimated at 225,000 tonnes.

The main constraints facing wheat flour mills are low raw material quality, lack of spare parts and lack of skilled personnel for maintenance and service.

3.6.3 Industrial Maize Flour Mills

Industrial processing of maize takes place at Debre Zeit Maize Flour Mills which has a capacity of 110 tonnes of cleaned maize per day. The production flow is shown in Figure 3.7

Figure 3.7 Production Flow Diagram



All raw maize is delivered by state farms.

Production technology is similar to industrial wheat processing with machines modified to the shape and hardness of maize kernels. The bran and germs are not separated but used directly as a mixture for fodder.

Main operational problem is low quality raw material input.

3.6.4 Malt Production

Industrial processing of barley to malt takes place at Asella Maltery. Raw materials are received from State Farms which deliver around 75%. The remaining share is supplied by Producers Cooperatives. Malt production flow is shown in Figure 3.8.

Figure 3.8 Malt Production Flow

Receipt of raw barley
↓
Pre-cleaning, 2% of raw barley rejected
↓
Drying
↓
Storing
↓
Main cleaning, 10% of raw barley rejected
↓
Grading, 23% of raw barley rejected
↓
Clean barley
↓
Steeping
↓
Germinating, 6% of raw barley loss
↓
Kiln Drying
↓
Polisher, 4% of raw barley rejected (germ)
↓
Finished Malt
↓
Storing
↓
Bagging

The plant delivered by Buhler-Miac, Braunschweig represents a high technological standard.

It should be emphasized that by-products are generated at different levels of the production process. At the main cleaning impurities such as smaller straw, dust and weed seeds are removed and mixed with germs from the kiln drying for processing into pellets for which no direct market outlets are found. The reject from grading consists of kernels less than 2.1 mm in diameter with a limited or no germination capacity and consequently unsuitable for

malting. Large quantities of this reject are stockpiled at the maltery.

The 1986 production of malt is estimated to 8,200 tonnes based on a raw material input of 15,500 tonnes of barley.

The main constraints faced by the maltery are low quality raw material input especially from State Farms and as already indicated the stockpilig of by-products and reject barley due to lack of established market outlet. The quality of raw material received from Producers' Cooperatives is higher than that supplied by State Farms. The stockpiling of reject barley occupies silo capacity which is intended for finished malt.

3.7 SECONDARY INDUSTRIAL PROCESSING

The processed maize and wheat flour is utilized for further industrial processing or sold directly to consumers via Kebeles.

The various secondary industrial processing plants include as the major units bakeries, private and public, The Pasta and Macaroni Factory run by EFC, FAFA Supplementary Food Plant and hotels and restaurants.

Generally speaking, the low supply of flour does not satisfy the demand created by the secondary processing industries and by Kebeles.

For malt the plan is that Asella Maltery should supply all 4 breweries, including Addis Ababa, Asmara, Meta Aba and Harrar. This supply should replace previous imports of malt with the possibility of using existing malteries in Addis Ababa and Asmara provided with clean barley from Asella.

4. VERTICAL LINKAGES WITHIN THE MEAT PRODUCT CHAIN

4. VERTICAL LINKAGES WITHIN THE MEAT PRODUCT CHAIN

Ethiopia is endowed with a very high and potential livestock population, but only a minor part is used as raw material input for industrial processing. The following is a description of the product chain based on the production, procurement, industrial processing and marketing of beef and sheep meat.

4.1 PROCUREMENT OF SEASONAL FARM INPUTS

The production of feed for ruminant livestock in Ethiopia is minor. The main forage sources in the highlands are unimproved and over-grazed common grazing areas with crop residues playing a secondary role. Forage conservation is practiced only in few places.

The supply to the modern dairy sector is an exception. Some few industrial feed mills operate in Addis Ababa primarily to assist larger State Dairy Farms and Cooperative Dairy Farms.

The situation in the lowland rangeland area is characterized by the availability of a variety of annual and perennial grasses and browse species. Range improvement have been undertaken only in the sense that grazing reserves have been attempted to be set aside. Fodder conservation and supplementary feeding are not practiced.

Two government feed-lots have been established near Nazareth but cater only for cattle which are destinated for live export.

Cattle and sheep intended to be slaughtered for processing are in general left to find whatever they can in a feed-scarce environment.

As a consequence major factors constraining production are under-nutrition and malnutrition. About 85% of feed intake is used to meet animal maintenance requirements and only 15% is utilized for production.

Presently agro-industrial by-products are insufficently utilized. Transport problems often prevent by-products to be moved to areas were they can be effectively used.

4.2 PROVISION OF SERVICES FOR THE PRODUCTION OF CATTLE AND SHEEP

The main services available for smallholders are provided by Ministry of Agriculture and include extension such a veterinary service team, a nutrition and range improvement team, a tsetse and Trypanosomias survey and control team, and a laboratory service team. Of particula. interest for the production of animals in the southern part of Ethiopia was the implementation of Third Livestock Development Project which included components, such as range improvement, water development, animal health improvement, road network establishment and training of pastoralists in animal health and range management.

4.3 LIVESTOCK PRODUCTION

The total number of major livestock species is shown in table 4.1

Table 4.1 Number of Major Livestock Species in Ethiopia

	1983/84 (mill.)
Cattle	27
Sheep	24
Goats	18

Source: AACM Livestock Sub-sector Review February 1984

Cattle and sheep are kept primarily in 2 different production systems, the Highland and Lowland Livestock System. Highland Livestock includes cattle and sheep as a part of mixed subsistence farming. Animals provide inputs (draft, transport and manure) to other parts of the farm system and generate consumable or saleable outputs (milk, manure, meat, hides, skins and wool).

Animals kept by pastoralists in the Lowland Livestock system do not provide inputs into crop production but are the very backbone of life for their owners.

Production estimates of cattle are shown in Table 4.2

Table 4.2 Estimates of Production from cattle

Draft Power	-	5.3 mill. hectares cultivated
Meat	-	214,000 tonnes carcase weight
Milk	-	620,000 tonnes
Manure	-	24 mill. tonnes
Hides	-	2.4 mill. hides

Source AACM: Livestock sub-sector Review February 1984

The majority of Ethiopia's cattle are indigenous breeds. Most of the highland cattle are Zebu type resulting from extensive cross-breeding. They are used mainly for draft and have poor meat and milk production potential. There are, however several higher potential indigenous breeds which are not generally used for draft. These include the Borana which is a superior beef breed from southern Sidamo.

Sheep and goats produce meat, skins and milk. Meat is the main product and estimated production is shown in Table 4.3

Table 4.3 Estimate of Production from Sheep and Goats

Sheep Meat	-	77,000 tonnes carcase weight
Goat Meat	-	55,000 tonnes carcase weight
Sheep Skins	-	7.7 million
Goat Skins	-	5.8 million
Milk	-	Negligible in most areas

Source: AACM Livestock Sub Sector Review February 1984.

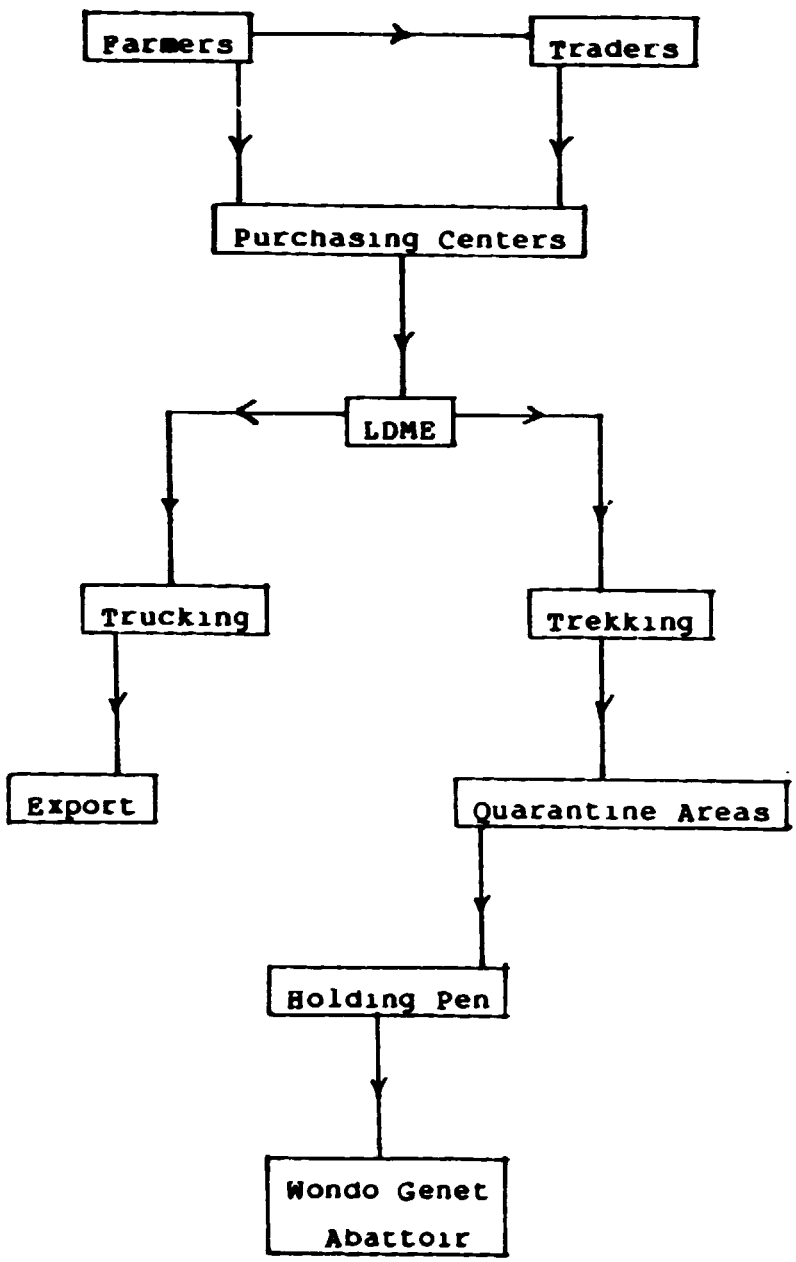
Production of meat from cattle, sheep and goats take place at smallholder level only.

4.4 PROCUREMENT OF CATTLE AND SHEEP FOR PROCESSING

The system of purchasing and procuring animals for processing is very important to comprehend as a pre-requisite for the establishment of the meat product chain.

An illustration of the above system is the procurement of high quality animals from Borana and Arero in the southern part of Ethiopia for live export and local processing. The procurement system is shown in Figure 4.1

Figure 4.1 Procurement of Cattle and Sheep from Borana and Arero for Wondo Genet Abattoir



Cattle and sheep are bought at purchasing centres by LDME (Livestock Development and Marketing Enterprise) which is under Ministry of State Farms Development. LDME is charged with the responsibility of procuring cattle for live ex-

port as well as for slaughtering and processing. Purchasing prices are negotiated and reflect the demand/supply situation. All animals are vaccinated and those destinated for live export are trucked through Ethiopia. Animals for slaughtering and processing are trekked 300-400 km to a quarantine area where they are kept for at least 30 days while under veterinary control. Feeding along trek routes is a problem and the main forage supplies come from unimproved pasture, rangeland and to a smaller extent from crop residues. As a result it is imperative that animals gain weight during the quarantine period where local pasture is supplemented by hay and other supplements feed when available. After the quarantine period animals are trekked for another 40 km before they reach Wondo Genet Abattoir.

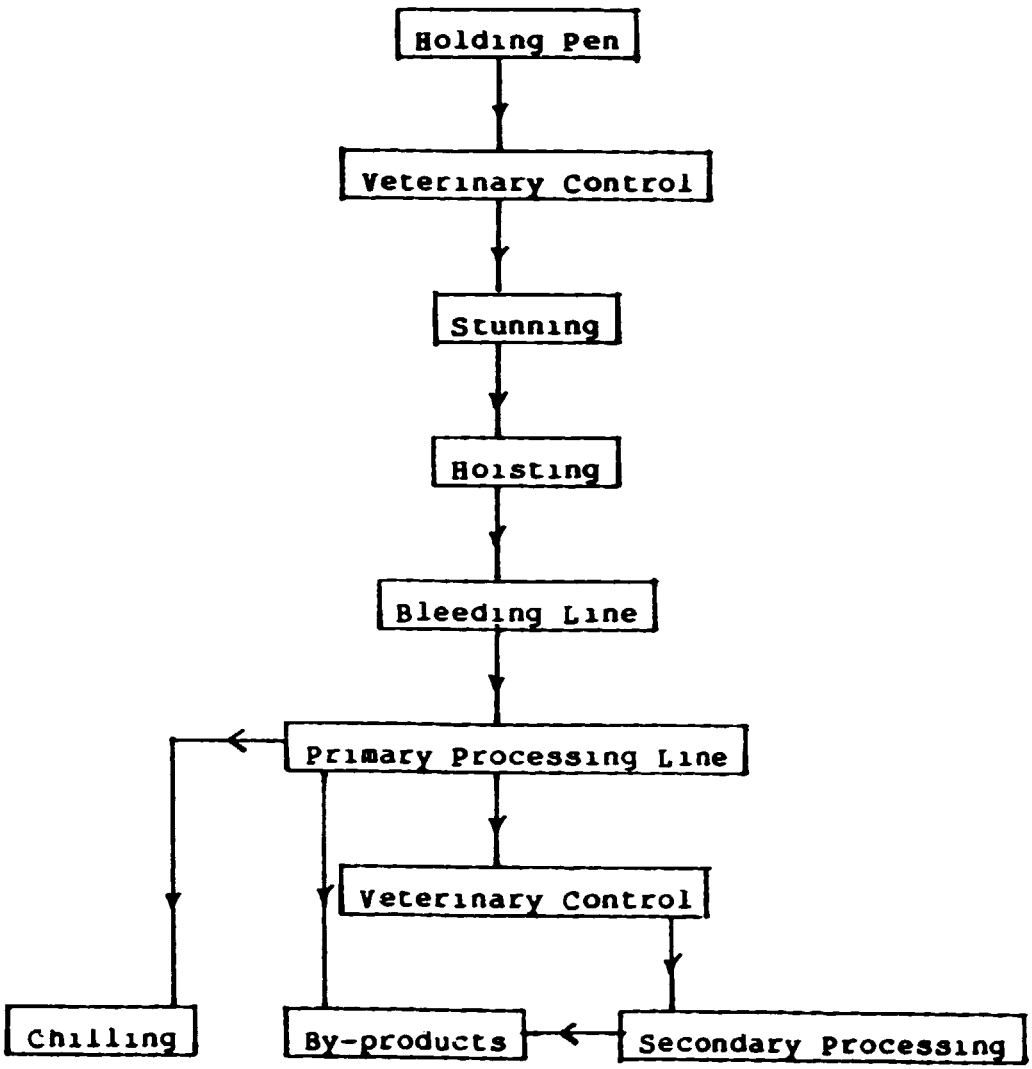
4.5 INDUSTRIAL PROCESSING

Domestic consumption of meat is traditionally based on backyard-slaughtering which in urban areas has been replaced by slaughtering of cattle and sheep on a service basis at abattoirs for retailing at butchers' shops. The estimated local consumption of meat is according to FAO 1984 estimate 13.9 kg/capita of which beef and veal account for 6.4 kg and mutton and lamb for 2.3 kg respectively.

In addition to the slaughtering of animals for local consumption the industrial processing of meat based on abattoir operation caters mainly for the export market.

The operation undertaken at Wondo Genet Abattoir is assessed in the following with the production flow shown in Figure 4.2

Figure 4.2 Production flow at Wondo Genet Abattoir



From the holding pen animals are sent for veterinary control before entering the slaughterhouse. After stunning the animal is hoisted to the bleeding rail where it is cut and after bleeding transferred to the processing line. The carcass is skinned and split by electrical saw. Post-mortem inspection is carried out of carcass and organs, and some carcasses are transferred to chilling rooms to be sold frozen or chilled. Other carcasses are further de-

boned and made into primal cuts to be packed and exported. Edible by-products, including tongue, heart, lungs, kidney and liver, are sent for further processing while the inedible by-products go to the dry-rendering plant to be converted to meat/bone meal and tallow.

The final products include beef and mutton carcasses frozen or chilled, frozen primal cuts, frozen edible by-products (tongue, liver, kidney, tribe etc.) and sterilized boneless and chopped beef in alu-pouches. The capacity of the slaughtering line is 300 cattle or 600 sheep at a maximum per day. For finished products the capacity of freezing rooms is small, only eqivalent to some few days production.

The overall constraints of processing is highly linked to constraints at preceeding and subsequent stages of the product chain. As an example it is noted that only 40% of the beef meat is usable for frozen primal cuts and boiled beef. The remaining 60% should be utilized for chopped products for which insufficient demand has been created. This implies the piling up of inferior cuttings which disturbs production of primary products.

The aspects of marketing will be further elaborated in the following.

As a final observation it should be noted that the factory is presently operating at 1/3 of its maximum slaughtering capacity.

In order to give an idea of the amount of processed meat Table 4.4 shows the national export value of meat and meat products 1981/82 - 1983/84

Table 4.4 Export Value of Meat and Meat Products 1981/82 - 1983/84 ('000 Birr.)

	1981/82	1982/83	1983/84
Boiled Meat	358	606	338
Minced Meat	2,215	3,597	3,441
Frozen Beef	1,451	1,468	1,485
Frozen Mutton	2,393	1,739	1,522
Meat Extract	304	151	216
Canned Meat	4,215	4,465	2,933
Total	10,936	12,026	9,935

Source: Statistical Bulletin, Ministry of Industry 1985

4.5.1 Utilization of By-products

About 45% of the live weight of an animal being slaughtered and processed is inedible offal and used for meat and bone meal, blood meal, bone meal and technical fat.

Meat and bone meal is made from a mixture of inedible offals from the slaughter of animals. It has go_ a high content of easily digestible protein and minerals and is a highly valued product for feed compounding. Due to the very low capacity of feed mills in Ethiopia the bulk of meat and bone meal produced at abattoirs is exported. In 1983/84 the export of meat and bone meal accounted for around 750 tonnes.

Blood meal has a very high protein content and is used as a component in concentrate feeds. Presently only very small quantities are produced due to the limited capacity of dry-rendering plants and to a non established market outlet.

Bone meal has got a high mineral content but is presently not realized as a feed component in Ethiopia. Considerable quantities has been utilized as fertilizers.

Technical fat is not presently produced as a separate product in the dry-rendering process.

4.6 INDUSTRIAL MARKETING

As previously mentioned, constraints identified at an initial stage of the product chain are accumulated to the disadvantage of industrial meat marketing. First of all the local eating habits which favour consumption of back-yard-slaughtered animals, and as a result the domestic market for industrially produced meat is not yet developed. The bulk of processed meat, which does not go for export, is sold to the armed forces, and consequently only a minor quantity reaches the urban consumers who supplement their own consumption through the purchase of meat from local butchers.

Export marketing is assessed in the following.

4.6.1 Export Marketing

The major constraint to expanding exports of meat is the disease status of Ethiopia. Since Ethiopia is not declared a livestock disease free area it is very difficult to export fresh, frozen carcasses and cuts to most countries except some few markets in the Middle East. For other markets the only remaining known possibility is the export of sterilized products.

General export promotion is carried out through 9 international offices at Djibouti, South Yemen, Saudi Arabia, Italy, Great Britain, GDR, Japan, USSR and USA. This export promotion is supposed to cover not only the meat export potential, but all products considered for export. The local activities of export promotion should be linked with initatives undertaken at international offices. The Market Research Service under Livestock Development and Meat Corporation is in charge of domestic and foreign market research concerning processed meat products. Presently this office is staffed with 1 person only and no market research has so far taken place.

The working relations between Market Research Service and meat processing factories, which fall under the same ministry (Ministry of State Farms Development), have not yet been established.

5. STRENGTHENING VERTICAL LINKAGES WITHIN THE CEREAL PRODUCT CHAIN

5. STRENGTHENING VERTICAL LINKAGES WITHIN THE CEREAL PRODUCT CHAIN

The strengthening of vertical linkages within the cereal product chain should be based on the existing structure and should focus on an improved coordination between agriculture and industry. The following is a summary of constraints to existing linkages between agricultural production and the various services provided to agriculture, be they situated at preceding or at subsequent stages at the product chain.

Link of the Chain	Constraints
Procurement of Capital goods	Product development does not reflect consumer demand Insufficient network
Procurement of Seasonal Farm Supply Inputs	Slow procedures of demand estimates Insufficient network Shortage of supplies
Procurement of Consumer Goods	Shortage of supplies
Provision of Service and Support for Agriculture and Small-Scale Industries	Insufficient network
Agricultural Marketing	Pricing and quota system Insufficient network

Link of the Chain	Constraints
Industrial Processing	Low raw material supply and quality
Industrial Marketing	Shortage of supplies

This summary gives a general idea of the present relationship between agriculture and agroindustry based on the cereal chain. It is a common feature that it seems very difficult to reach agriculture with the necessary inputs from various support industries. This in connection with a marketing system, which does not provide the sufficient price incentives, makes the processing industry the victim in the sense that it receives a low raw material supply and quality. Consequently, the consumer marketing organizations face difficulties in satisfying the demand by rural and urban consumers.

It is apparent that behind the difficulties to efficiently serve and reach agriculture is a number of different reasons. Some reasons are based on operational aspects of the specific industry charged with the responsibility of undertaking the specific service for agriculture. The direct solution to eliminate the identified constraint would be to improve the operational relation between the industry concerned and agriculture. This might involve a combination of different proposals, including the upgrading or extension of physical facilities, the training of managers, and possibly the coordination between the industry concerned and other agroindustries. The upgrading or extension of physical facilities and training of managers could in this context be called a technical industry related initiative, while the coordination with other agroindustrial institutions is an initiative falling under the strengthening of agroindustrial working relationships.

The observations indicate that activities of the product chain are highly fragmented and left to be carried out by an increasing number of corporations falling under different ministries.

Consequently, it becomes more and more important, also with the view to achieve a balanced development between agriculture and industry, to ensure a proper agroindustrial coordination, meaning not only coordination between agriculture and industries serving agriculture, but also coordination within the various industries. The need for agroindustrial coordination should not be seen as an isolated initiative, but as a means to fully benefit from proposed technical industry-related initiatives. Agroindustrial coordination is the necessary framework for the successful implementation of technical proposals.

In the following the elaboration of the agroindustrial coordination will be introduced prior to recommended technical projects to strengthen the intersectoral linkages between agriculture and industry.

5.1 AGROINDUSTRIAL COORDINATION

A summary of the various corporations, institutions and industries charged with the responsibility of undertaking activities of the cereal product chain is shown in figure 5.1. The figure includes only public sector involvement in the cereal chain, and is not exclusive in the sence that private intermediaries also operate at different levels as described in Chapter 3. At this stage coordination is, however, required primarily among public sector institutions.

It is proposed to establish an Agro-Industrial Coordinating Committee which should count the various corporations, institutions and backstopping ministries listed in Figure 5.1 as members. The committee should also as a member count Livestock and Meat Corporation (LMC) to emphasize the broad scope of the organization.

The specific tasks of the committee would be:

A. Product Flow Supervision

To supervise the current development of the various product chains and currently improve the efficiency of the product flow through a better coordination of activities undertaken by various intermediaries of the chains.

B. Project Evaluation

To evaluate planned technical development projects within the various product chains in order to assess the planned linkages and to adjust project proposals accordingly.

C. Information Collection

To collect and analyse information regarding the operation of all industries of the product chains and prepare working papers on issues relevant to the overall performance of the agro-industrial complex.

D. Formal Reporting

To refer directly to the ONCCP (Office of the National Committee for Central Planning).

In the following, the 4 specific tasks will be further elaborated.

Re A Product Flow Supervision

The product flow of the various product chains should be assessed continuously using an approach similar to that introduced in Chapter 3 and 4. There is a need to also analyse product chains for oil seeds, cotton, tobacco, sugar cane, grapes and also for products of other chains such as hides and skins. These studies should be undertaken under the sponsorship of the Agro-industrial Coordinating Committee.

It also falls under this Committee to supervise and adjust the seasonal activities carried out by the various intermediaries of the agro-industrial complex. During the planting season the issues will be concentrated on the farm supply input aspects, of which the task to reach the farmers with the timely supply of all requirements is the major one. This might call for a coordination of logistical initiatives since transportation usually is a joint effort by the industries, providing goods and service, and Natracor which assists all industries. During the peak input season the need to coordinate the warehouse capacity and demand calls for the involvement of not only farm input supply industries, but also the crop marketing industry which might have spare capacity at that time of the year.

Figure 5.1 Corporations and Institutions involved in the Cereal Product Chain

Component of Cereal Chain	Corporation, Institution	Ministry
1. Procurement of Capital Goods	AETSC	State Farms Dev.
	Nazareth Tractors	Min. of Industry
	Metal Tool Factory	Min. of Industry
	AISCO	Min. of Agric.
2. Procurement of Seasonal farm Supply Inputs	ESC	State Farms Dev.
	AISCO	Min. of Agric.
	EDDC	Min. of Dom. Trade
	ERTC	Min. of Dom. Trade
	NATRACOR	Min. of Transp. and Communication
3. Provision of Service and Support for Agriculture and Small-scale Industry	IAR	Min. of Agric.
	Rural Technology Dev.	Min. of Agric.
	Agricultural Extension	Min. of Agric.
	NASIDA	Min. of Industry
	AID Bank	
4. Production	State Farms	State Farms Dev.
	P.C., S.C.	Min. of Agric.
5. Agricultural Marketing	AMC	Min. of Dom. Trade
	NATRACOR	Min. of Transport & Communication
6. Industrial Processing	NASIDA	Min. of Industry
	EPC	Min. of Industry
	EBC	Min. of Industry

The need to be involved in the exchange of information on seasonal progress applies equally to the processing industries, which should plan the intake of grains for the coming season, and should - provided they do not have an evenly production flow - use a period of low capacity utilization to undertake major service and maintenance on machinery.

Re B Project Evaluation

When new projects are initiated within the various product chains the receiving industry will get due attention from the planning to the implementation stage. It is, however, crucial to the successful implementation of the project that other agroindustries, which will be affected by the specific project, are equally involved at the planning stage. So far, this has been the case with only few projects.

The Agro-Industrial Coordinating Committee should play an active role in this respect and as necessary documentation the Committee should have elaborated and currently up-date the status of all projects under the agro-industrial complex. Such documentation is presently found at ministry level but apparently no coordinated overall presentation of project status under the agro-industrial complex is available

Re C Information Collection

In order to create a strong action-oriented coordination committee it is important to have established a systematic information collection of data regarding the operations of member industries and institutions. As a major task the coordinating committee should be able to calculate produc-

tion costs for all agricultural produce on which pricing should be based.

The collected data should be analysed and working papers be prepared at the request of the committee.

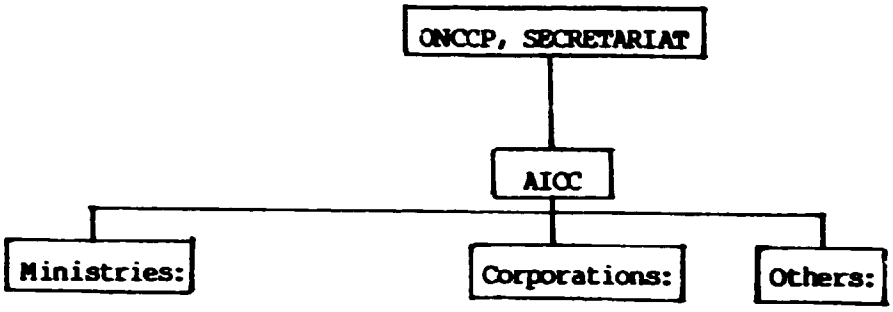
This would be important, especially in connection with project evaluation where the impact on bigger parts of the specific product chain should be assessed. Gradually the information collected and working papers prepared would further substantiate the establishment of the Agro-Industrial Coordinating Committee.

Re D Formal Reporting

To give the Agro-Industrial Coordinating Committee a central stand it is necessary that the Committee refers directly to ONCCP. The committee should be seen as the umbrella organization representing all industries and institutions of all agro-industrial product chains. All communication between ONCCP and various industries should automatically go via the Committee and it is recommended to establish a full time secreteriat within ONCCP to ensure the effectiveness of the Committee.

Figure 5.2 shows the proposed Agro-Industrial Coordinating Committee membership. The membership would be increased according to the development of new projects, if so required.

Figure 5.2 Proposed Agro-Industrial Coordinating Committee. (AICC)



Ministries:	Corporations:	Others:
Min. of Agric.	AETSC	IAR
Min. of State Farms Dev.	NMWC (2)	Rural Technology Dep.
Min. of Industry	AISCO	Agric. Extension Dep.
Min. of Domestic Trade	ESC	HASIDA
Min. of Transp. & Com.	EDDC	AID Bank
Min. of Resettlement & Rehab.(1)	ERTC	Producers' Coop
	NATRACO	Service Coop
	AMC	
	EFC	
	EBC	
	AMSC (3)	
	LMC	

1) This newly established ministry receives a considerable amount of farm supply inputs

2) NMWC, National Metal Works Corporation, is the umbrella corporation for Nazareth Tractors and Kotebe Tools Factory

3) AMSC - Agricultural Mechanization Services Corporation. Presently under formation. The objective of this corporation is on a rental service to provide machinery for larger cooperatives.

Upon the establishment of a proper organizational framework for the various product chains, a number of technical projects will be proposed which should further improve the overall performance of the agroindustrial sector, and especially improve intersectoral linkages.

5.2 FOLLOW-UP TECHNICAL PROJECTS

The elaboration of technical proposals has been made with due attention to the aspect of strengthening linkages between agroindustries and the peasants' sector. This is done since the peasants' sector presently is characterized by low mechanization and minimum farm input application, and therefore is expected to respond to improved services and incentives. The proposed follow-up projects also consider the expected impact of villagization and resettlement schemes which should facilitate the access to farmers through Producers Cooperatives and Service Cooperatives. The following technical projects within the cereal chain will be introduced:

1. Mechanization of the peasants' sector
2. Improved hand tools for agriculture
3. Establishment of service centres for small-scale grain mills
4. Establishment of extension service attached to maltery

In the selection of proposed technical projects the idea has been to identify programmes, which first of all are suitable in the context, and secondly programmes which are not presently under planning.

5.3 MECHANIZATION OF THE PEASANTS' SECTOR

Mechanization of the peasants' sector is a long-term issue and should be accomplished through an intermediate stage

with the introduction of appropriate equipment suitable for local conditions. Presently, simple hand tools are available only, while product development of local implements has started just recently. It is important to speed up product development, industrial manufacturing and distribution of such equipment to fully substantiate the intermediate stage of mechanization.

Prior to the description of the proposed project the ongoing activities within the field will be assessed.

5.3.1 Present Status

One priority area already identified is the development of suitable equipment for land preparation. A number of animal drawn implements are planned to be included in the tentative production programme for an Improved Agricultural Machinery & Implements Factory, which is presently under feasibility study. The tentative list of implements includes a light weight plough, a disc harrow for initial seed bed preparation, a spring tooth cultivation harrow for intermediate seed bed preparation, a spike tooth harrow for final seed bed preparation, and drill type and broadcast type grain seeders. It should be emphasized that these implements are all animal-drawn. The development, production and distribution of these implements are very important but should be supplemented by a variety of other implements which are introduced in the following project description.

5.3.2 Project Description

The project description goes according to the following components:

1. Product development
2. Product testing
3. Industrial manufacturing
4. Distribution
5. Service and maintenance

Product development, product testing and distribution are project activities, which should be undertaken by institutions and industries which are presently charged with these responsibilities and which are expected to be able to cope with increased acitivities.

Components, such as industrial manufacturing and service and maintenance, involve, on the other hand, establishment of new organziational and psysical facilities.

Re 1. Product Development

Product development is presently carried out by Rural Technology Promotion Department which should still be charged with this responsibility. Priority areas of peasants' mechanization have been identified under the following points.

A. Weed control
B. Threshing and grain cleaning
C. Rural transportation

Implements for weed control, which could be locally developed, include animal drawn row-crop cultivators for weed removal and back-mounted, hand-operated sprayers for chemical weed and pest control.

Threshing and grain cleaning implements to be developed include stationary threshers for teff and small grain maize shellers and grain cleaners.

Stationary threshers should include chaff/grain separators and bagging-off spout and be powered by electric motor and v-belts, combustion engine and v-belts, tractor mounted flat belt pulley or tractor power-take-off shaft.

Maize shellers could be powered by electric motor or combustion engine or through power-take-off shaft to machine mounted in triplepoint hitch.

Finally, grain cleaners, which should be with bagging-off spout and exchangeable sieves for all types of grain, could be powered manually, by electric motor or by internal combustion engine.

Rural transportation is another priority area with room for improvement, which could facilitate the daily life of the majority of people. The implements, which could be developed, include improved wheel barrows, sack carts, bag conveyors and animal-drawn carts.

The wheel barrows presently used are quite unsuitable for most tasks to be carried out. Most wheel barrows are home made by local materials or discarded parts from various machinery. Some wheel barrows are, however, equipped with proper steel wheels which were manufactured by Kotebe Tools Factory some years ago. It is suggested to introduce an improved type of wheel barrows equipped with large size inflated rubber wheels. The expected demand for such wheel barrows would come from villages, construction sites and processing industries.

The majority of operations, from production at farm level to delivery of final grain products, is presently carried out manually. Grain is transported in 100 kg bags which neccessitates the local development of sack carts and bag

conveyors. The sack carts should be with steel or rubber wheels and could be applied in warehouses as well as in a number of processing industries. Bag conveyors should be powered by electric motors or combustion engines and be utilized for truck loading and bag stacking in warehouses.

Transportation of goods between farm gate and village/market is presently performed mainly on donkey back. The introduction of locally developed animal-drawn carts, equipped with inflated rubber wheels and simple brakes, would generally benefit the rural population.

Re 2. Product Testing

The introduced, locally developed implements should be tested as presently at a number of selected Service and Producer's Cooperatives in order to ensure that the implements are suitable for local conditions and acceptable by farmers. This testing is done prior to any industrial manufacturing.

Re 3. Industrial Manufacturing

The basic idea behind local manufacturing is to establish a high local product content. In this connection it is of utmost importance to assess whether existing or planned production facilities could supply required inputs or

offer additional facilities for the production of the specific implements.

The first option to further investigate is the possibility of integrating production of some of the proposed products with production at the planned Improved Agricultural Machinery & Implements Factory. Proposed products, such as animal-drawn row crop planters and row crop cultivators

for weed removal, represent a technology level similar to products already represented in the planned production schedule. If the planned production capacity is insufficient to accomodate production of planters and cultivators, the possibility of extending the plant should be investigated.

As regards the more sophisticated proposed products, such as threshers and grain cleaners, it should be investigated whether the expected demand would justify the establishment of a new plant.

For the proposed products it would be necessary with initial import of some key parts, while the locally produced parts possibly could be supplied from the Spare Parts and Hand Tools Factory presently being constructed.

For the more simple implements suggested, such as rural transportation items, it should be investigated to set up small-scale industries under HASIDA which could produce some parts and assemble the final product with the supply of key parts from Spare Parts and Hand Tools Factory.

Figure 5.3 shows the various suggested implements with tentative production systems.

Figure 5.3 Suggested Implements to be Produced under Different Manufacturing Systems

Suggested Implements	Manufacturing System
Weed Control	
Row crop planters Row crop cultivators Hand-operated sprayers	Manufactured at the planned or extended Improved Agricultural Machinery & Implements Factory
Threshing and Grain Cleaning	
Stationary threshers Maize shellers Grain cleaners	New plant dependent on total demand. Import of key parts, other parts supplied from Spare Parts and Hand Tools Factory.
Rural Transportation	
Wheel barrows Sack carts Bag conveyors Animal drawn carts	Key parts manufactured at Spare Parts and Hand Tools Factory. Assembly at small-scale industries under HASIDA

Re 4. Distribution

Since all implements proposed are demanded by the peasants' sector, it is important to utilize a distribution channel which reaches the Service and Producers Cooperative level. AISCO has the responsibility of procuring and distributing all required farm supply inputs including implements to the peasants' sector. Consequently, AISCO,

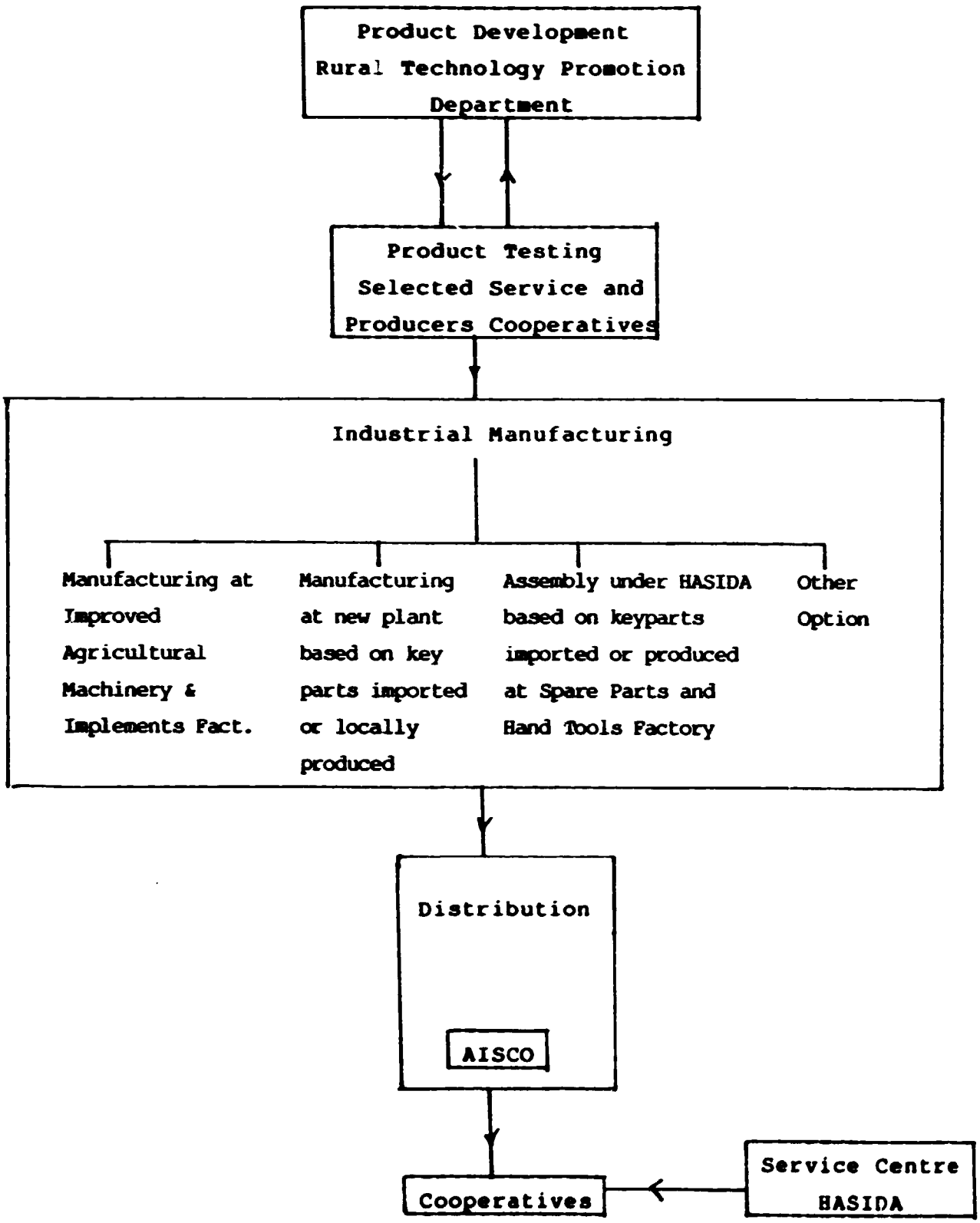
which is presently being considered for extension of its network (IFAD project), should be capable of undertaking all additional distribution which is derived from this production project.

5.3.3 Summary of Product Flow

The proposed product flow, including components from product development to distribution, is shown in Figure 5.4. Apart from the objective of supplying peasants with a variety of intermediate implements, the project would have the desired impact on existing agroindustries involved.

The closer relationships between peasants, Rural Technology Promotion Department, Improved Agricultural Machinery & Implements Factory, Spare Parts & Hand Tools Factory, HASIDA, and AISCO would benefit the further development in the field of mechanization of the peasants' sector.

Figure 5.4 Proposed Product Flow



5.3.4 Establishment of Service Centres

The need to establish service and maintenance centres to cater for the produced output of new implements is particulary strong in a situation where existing facilities cannot be utilized. In all, service and maintenance facilities are poorly developed in Ethiopia.

The whole concept of establishing service centres as a small-scale industry under HASIDA is described as a specific technical project in chapter 5.5. Primarily, these centres should provide services to the small grain mills, but since they work with some of the same target groups, it should be considered to which extent they could also provide services for implements proposed under this particular project. Possibly, the proposed service centres for small-scale grain mills could at a later stage be extended for this purpose.

For a full description of service centres under HASIDA, see chapter 5.5.

5.4 IMPROVED HAND TOOLS FOR AGRICULTURE AND CONSTRUCTION

Most daily work in agriculture and construction is performed in the traditional, non-mechanized way, and the hand tools and implements used are often not suitable for the specific jobs. The ongoing industrial production of hand tools at Kotebe Tools Factory has, as already indicated under 3.1.1., been unable to satisfy the demand for improved hand tools for agriculture and construction. Some of the major reasons for this situation are the lack

of sound product development and testing, the insufficient customer response, and the lack of coordination between production and distribution. This necessitates a rehabilitation of the industry.

5.4.1 Project Description

Project components for the implementation of a scheme for the procurement of improved hand tools include:

1. Product Development
2. Product Testing
3. Industrial Manufacturing
4. Distribution

Re 1. Product Development

The existing product range is limited, and the factory continues to produce unimproved tools.

It might be illustrative to refer to the present multi-purpose shovel produced by the factory. Tools are produced without handles and this should be the first proposal for the production of improved tools. The shovel is multi-purpose, which means it is used for a number of tasks including hole digging, concrete mixing, grain shovelling etc., for many of which it is quite unsuitable. This shows that there is room to propose the development of improved tools within the present product range.

The establishment of a product development department would require the employment of at least 1 mechanical engineer or tools specialist. The product development section should work directly with the users via the establishment of an extension service staffed with at least 1 extension agent.

The extension service should be able to assess the qualitative demand at cooperative level and transfer the message to the product development section for further action. The developed products should be channelled back to end-users to be inially tested at testing centres.

Re 2. Product Testing

The present testing centres, established by Rural Technology Promotion Department for testing of light equipment among cooperatives, should be utilized also for the testing of hand tools. It is crucial for the extension agent to closely follow the testing phase to be able to fully comprehend the customer response and finally to transfer the response back to product development, if further product adjustment has to be carried out. The process of product development directed by customer response from testing centres might have to be repeated several times before a final product has been developed. At this stage only the manufacturing department will be involved.

Re 3. Industrial Manufacturing

The present manufacturing capacity will have to be assessed to establish whether it can accomodate an additional production of improved tools developed by the product development section and tested by Rural Technology Promotion. Presently, the factory has a die manufacturing unit which could be utilized to add new tools design to its programme. Other facilities required for the upgrading and improvement of hand tools would be the introduction of proper tempering technology, and this leads to the aspect of upgrading the skills of existing labourers at the factory. All aspects, including the procurement of raw material, the choice of production technology and labour

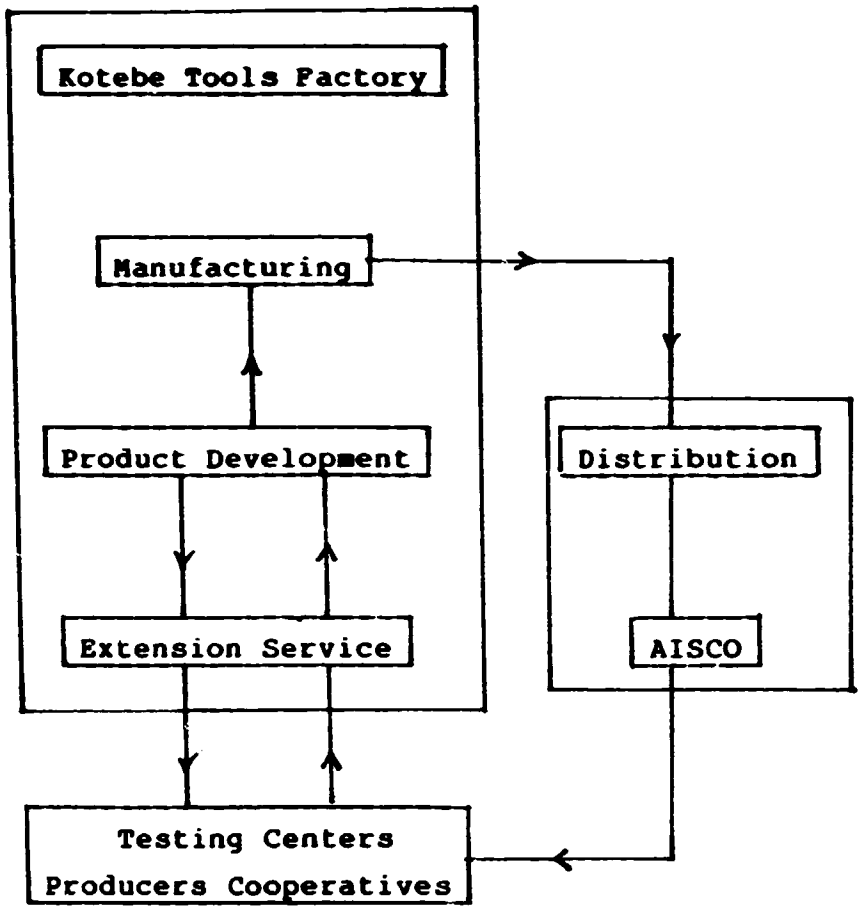
requirement will have to be assessed prior to the initiation of production.

Re 4. Distribution

Distribution of improved hand tools should be undertaken by AISCO and the introduction of new tools should be sustained by the experience gained during the testing phase. This experience should be fully utilized when introducing the hand tools at cooperative level. The extension agent employed by the factory should be instrumental in the introduction phase not only to AISCO, but also when AISCO introduces the tools to the cooperatives.

The proposed product flow for manufacturing of improved hand tools is shown on Figure 5.5

Figure 5.5 Proposed Product Flow for Hand Tools Manufacturing



5.5 ESTABLISHMENT OF SERVICE CENTRES FOR SMALL-SCALE GRAIN MILLS

Whether the daily diet of Ethiopian households is based on the consumption of teff for injera or wheat for bread baking or a combination of different grains, considerable quantities of grains have to be ground into flour. It is evident that custom grinding from small-scale flour mills at village or farmers cooperative level is gaining popularity at the expense of traditional manual grinding. As regards to the existing small-scale grain mills presently operating, the main constraint, as described in 3.6.1, is the lack of proper service, repair and spare parts facilities.

5.5.1 Project Description

The project will be described according to the following components:

1. Service centre facilities
2. Staffing
3. Organization

Re 1. Service Center Facilities

The required need for service and spare parts, as identified, is grouped according to the 2 different types of mills utilized, i.e. hammer mills and stone mills, and shown in Table 5.1

Table 5.1 Required Services and Spare Parts for Hammer and Stone Mills.

	Hammer Mills	Stone Mills
Spare Parts and Supplies	hammers	stones
	hammer pins	drive belts
	screens	belt connectors
	v-belts	bearings
	bearings	misc. bolts & nuts
	misc bolts & nuts	lubricants
	lubricants	belt vax
Services	balancing of rotor	mill stone reconditioning
	electrical check-up	motor-mill alignment
	general repairs &	electrical check-up
	parts replacement	general repairs &
	routine inspection	parts replacement
	safety check	routine inspection
		safety check

A service centre should include a workshop and a spare parts store with a sufficiently large capacity to store the expected demand for a 2-3 month period.

It should be investigated to which extent the spare parts and supplies listed above could be supplied from Spare Parts and Tools Factory presently under construction. As an example, hammers and screen plates could be produced and supplied locally. Spare parts and supplies, which cannot be manufactured locally, should be imported through the existing private channels and supplied to the centres.

A service centre should provide service for up to 200 small-scale grain mills and be located in provincial urban centres. This will enable the centre to reach grain mills situated in towns as well as in nearby villages.

Re 2. Staffing

The staffing of a service centre should include the following:

1	Administrative manager
2-3	Technicians
1	Spare parts clerk

The training of technicians to provide them with the sufficient know-how to operate efficiently could be provided in 2 components. The aspects of general operation of small-scale grain mills are important in order to provide on-site instruction to mill operators, whereas more specialized skills are required to solve more than routine check-ups.

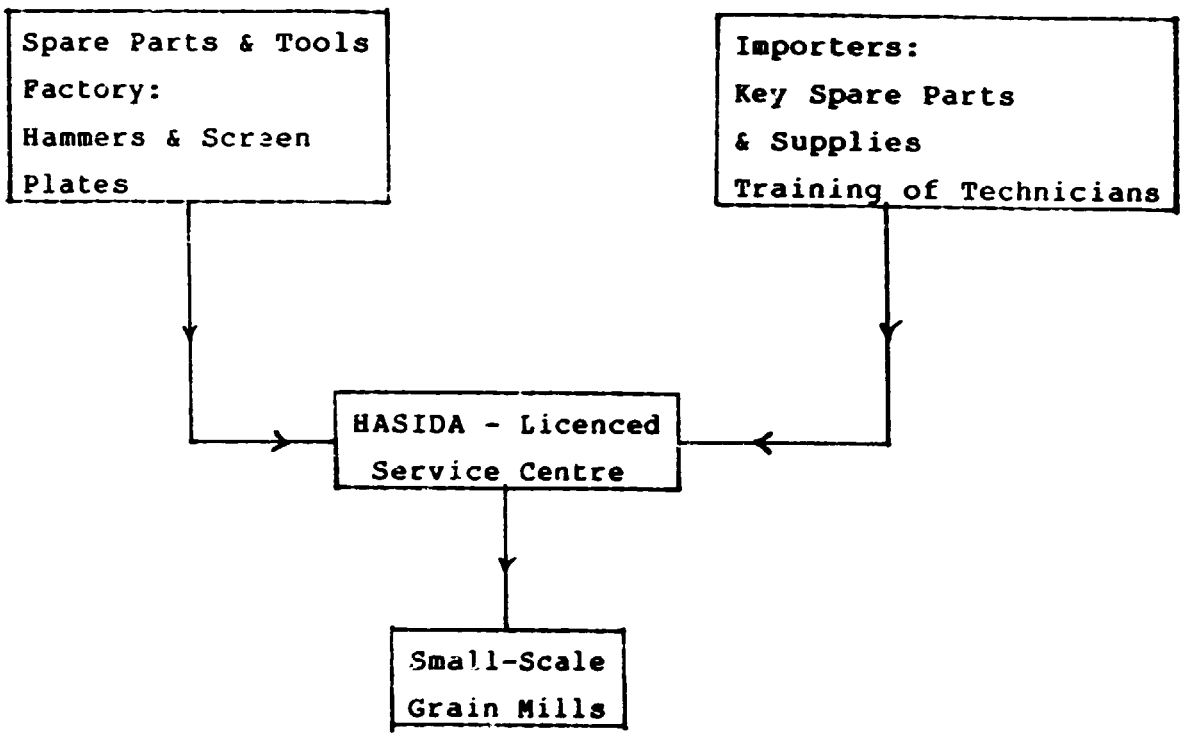
It should be considered how to utilize the technical expertise already existing at the importers' level in connection with the establishment of training programmes for service centre technicians.

The importance of securing the service team to be mobile should be emphasized. For duties, such as service and maintenance as well as for the correct replacement of spare parts, it is necessary that the service centre is equipped with a van which should be utilized by a technician on a full-time basis. The remaining 2 technicians should be involved in service at the workshop or directly at the location of small-scale mills close to the centre.

Re 3. Organization

It is proposed that the service centre is established as a small-scale industry under HASIDA, since the capital investment and staff requirement is limited and the major target group is mills already established as HASIDA units. The proposed service concept is shown in Figure 5.6

Figure 5.6 Proposed Service Center Concept for Small-Scale Grain Mills



5.6 VERTICAL INTEGRATION FOR THE PRODUCTION OF MALT

The issue of establishment of some degree of vertical integration within the cereal product chain is of particular interest to the production of malting barley.

5.6.1 Objective

The overall objective of a closer linkage between production of barley and malt factory is the improvement of raw material input. Presently, State Farms supply around 75% of all raw material inputs, amounting to some 10,000 tonnes, while Producers Cooperatives supply around 2,000 tonnes on an annual basis. The quality of malting barley supplied by Producers Cooperatives is, however, much higher than the produce delivered by the State Farms.

The idea is to increase the intake of malting barley from Producers Cooperatives at the expense of State Farms, which could concentrate on other crops.

The anticipated higher raw material quality as a result of a larger share of total intake received from smallholders would lead to the production of an improved malt quality which ultimately would reduce the need to import high quality malt.

The means to reach these objectives are the introduction of a price/quality incentive together with the establishment of a special extension service, which should cater specifically for the smallholers.

5.6.2 Introduction of Price/Quality Incentive

The present payment system applied by the maltery to customers, State Farms as well as Producers Cooperatives is not based on quality and imposes only minimal requirements to the product supplied.

Moisture content should be below 12%, and impurities also below 12%. These criteria do prevent the receipt of huge amounts of barley which is later rejected, mainly due to small kernels less than 2.1 mm in diameter. According to 2.6.4, an average of 23% of raw barley received is rejected due to small kernels with low germinating ability. It is apparent that the introduction of a price/quality incentive system should primarily be based on grading of kernels according to size of diameter.

Presently, the maltery procures barley from State Farms at Birr 50/quintal, and from Producers Cooperatives at Birr 55/quintal.

This uniform pricing policy is easy to adminster but does not reflect the wide quality difference between the 2 sub-sectors, nor does it reflect the fact that there is wide difference in the quality from different suppliers within the same sub-sector.

The introduction of a price/quality incentive should be sustained by the establishment of a special extension service directly at the maltery. This extension service should as its main target group have smallholders organized in Producers Cooperatives.

5.6.3 Establishment of a Malting Barley Extension Service

Extension service as attached to Ministry of Agriculture is general of nature, and agents are not specialized in specific fields of activity. The establishment of the malting plant in 1984 and the acute problem of low quality raw material input necessitates, however, improved extension service to raise the share of malting barley received from smallholders, who already have demonstrated their ability to deliver a good quality, compared to what is received from State Farms.

Presently, the coordination between malt factory and Producers Cooperatives is inadequate, and it is found that the direct assignment of 2-3 extension agents to the maltery would bridge the gap between production and processing. The extension agents would, based on requirements to raw barley from a processing point of view, channel advice to smallholders through the Producers Cooperatives. Advice should be concentrated on improved practices from soil preparation to harvest, and it is important that extension agents in addition to a background as an agricultural graduate fully comprehends the requirements to the raw barley through the processing of barley into malt.

The assignment of extension agents to the maltery would facilitate overall production planning and would be a prerequisite to contract arrangement with outgrowers, whose production are constantly supervised by extension agents.

5.6.4 Provision of Transport Services

The production of grains by smallholders for industry is usually procured by AMC which provides or arranges for transport. In the case of malting barley, the factory is

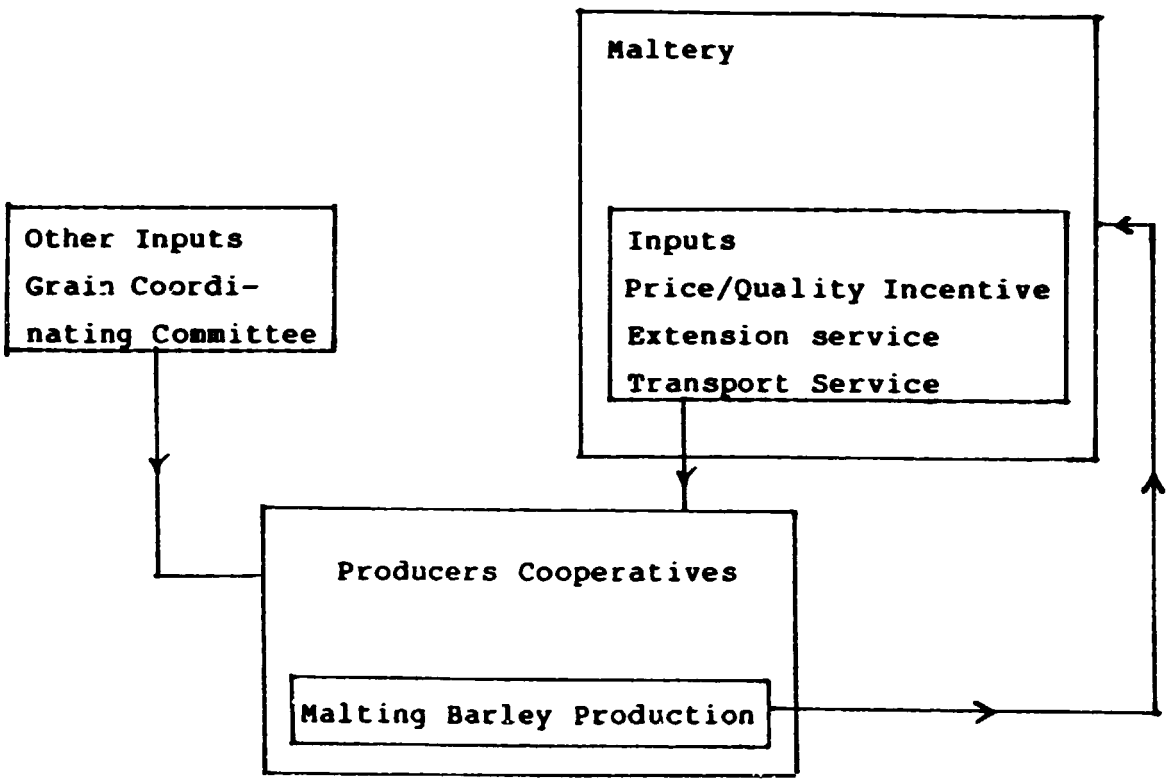
located in the main production centre, and direct delivery from producer to factory is cost-saving compared to the introduction of an intermediate such as AMC. State Farms deliver by their own fleet of transport, and the expected production and delivery of increased amounts of barley from smallholders would necessitate provision of a special transport service. The establishment of a transport fleet at the maltery for services to suppliers and for transportation of by-products and reject barley should by assessed.

5.6.5 Provision of Other Inputs and Services

The provision of other essential inputs for the production of malting barley, including capital goods, seeds, fertilizer and chemicals, and a number of other important services are not controlled by the malt factory. Consequently, the idea of establishing vertical integration for the production of malt is based on the assumption of established coordination between ministries, corporations, and other institutions. The proposed Agro-Industrial Coordinating Committee would be instrumental for the success of vertical integration for the production of malt as described above.

Figure 5.7 shows the project organization

Figure 5.7 Organization of Vertical Integration for the Production of Malt.



The vertical integration for the production of malting barley stands basically as a demonstration of improved working relationship between industry and smallholer agriculture.

6. STRENGTHENING VERTICAL LINKAGES WITHIN THE MEAT CHAIN

6. STRENGTHENING VERTICAL LINKAGES WITHIN THE MEAT CHAIN

The strengthening of vertical linkages within the meat product chain should be based on the existing structure as described in chapter 4. The following is a summary of constraints to existing linkages between production of animals and various services provided at preceding or subsequent stages.

Link of the Chain	Constraints
Procurement of Seasonal Farm Supply Inputs	Feed Industry not developed
Provision of Services for the Production of Animals	Insufficient extension and vet. services
Procurement of Animals for Processing	Lack of trekking facilities
Industrial Processing	Lack of raw material supply
Industrial Marketing	Lack of developed markets

Due to the fact that it is difficult to efficiently reach pastoralists and farmers with sufficient services for the production of animals, the industry becomes the victim in the sense that it receives a low raw material supply and quality. To furtner aggravate the situation, the meat processing industry is only capable of exporting a small quantity of processed meat due to lack of developed markets. Marketing of processed meat is thus significantly different from grain marketing, where local demand far exceeds supply. On the other hand, the coordination re-

quired between production of animals and institutions and industries of the meat product chain should be relatively easy to implement compared to the grain product chain, which involves a higher number of independent bodies.

Figure 6.1 shows the various corporations, institutions and industries charged with the responsibility of undertaking activities within the meat product chain. The figure only includes public institutions, and at the overall level 3 ministries are involved, i.e. the Ministry of Agriculture, the Ministry of State Farms Development, and the Ministry of Foreign Trade.

The Ministry of Agriculture provides extension and veterinary services, while procurement of animals, industrial processing and marketing are undertaken by corporations and enterprises under Ministry of State Farms Development. The Ministry of Foreign Trade is involved in industrial marketing through its foreign offices.

Figure 6.1 Corporations and Institutions involved in the Meat Product Chain.

Component of Meat Product Chain	Corporation/ Institution	Ministry
Procurement of Seasonal Farm Supply Inputs	Poultry and Feed Enterprise	Min. of State Farms Development
Provision of Services for the Production of Animals	Extension, Vet. Serv. IAR AID Bank	Min. of Agric.
Procurement of Animals for Processing	Livestock Development & Marketing Enterprise	Min. of State Farms Development
Industrial Processing	Livestock & Meat Corporation	Min. of State Farms Development
Industrial Marketing	Livestock & Meat Corporation	Min. of State Farms Farms Development Min. of Foreign Trade

A prerequisite for successful implementation of projects within the meat product chain is the close coordination of activities of the product chain, and hence cooperation between corporations and institutions named in Figure 6.1. Livestock and Meat Corporation under Ministry of State Farms Development should play a leading role as coordinator of the various activities listed in Figure 6.1, since this corporation is already involved in procurement, industrial processing and marketing. Coordination is re-

quired as regards to ongoing acitivities as well as to planned projects, which fall under the meat product chain or have got components which interfere with parts of the chain.

The marketing aspect of the product chain is considered vital and should serve as an overall guideline for the adjustment of other components.

Project proposals would include export marketing as well as domestic marketing infrastructure. Export marketing infrastructure should primarily deal with processed meat, since live animals export marketing is planned to be covered by a component of Fourth Livestock Development Project. Domestic marketing infrastructure covers the supply of fresh as well as processed meat for the domestic market. The marketing infrastructure for export and domestic marketing is interrelated, and consequently the following project proposal incorporates both aspects.

6.1 MARKETING BASED DEVELOPMENT OF MEAT CHAIN

The major present constraint to development of industrially processed meat is the lack of final export and domestic market outlets. Since the present status of Ethiopia is "Non-Disease Free Area", only sterilized products have been exported to markets outside The Middle East. Some few countries in The Middle East have imported, however, fresh or frozen carcasses and cuts.

The marketing based development is to cover an intermediate phase, in which Ethiopia or at least major livestock intensive parts of Ethiopia are expected to change status from "Non-Disease Free Zone" to "Disease Free Zone". The present status of "Non-Disease Free Zone", characterized by the export of only few commodity items

based on prime meat and the insufficent domestic market demand for lower grade cuts, is the reason for meat processing factories to operate far below capacity. In such a situation it is recommended to strengthen market research, product development and promotion abroad, as well as at the domestic scene.

6.1.1 Strengthening The Market Research Service

Market Research Service under Livestock and Meat Corporation which has just recently been established and which is presently manned with only 1 person, should be strengthened in order to be able to undertake the following tasks:

1. International market research for meat products
2. Initiation of product development
3. Liaison with other chain components
4. Initiaton of promotion campaigns
5. Marketing Information Service

Re 1. International Market Research for Meat Products

International market research should start in the countries, which already import processed meat from Ethiopia, in order to establish whether these markets could be further penetrated by existing or new products. This should be followed by systematic market research in neighbouring countries, Middle East and Mediterranean countries to establish markets for products already produced in Ethiopia and to identify product groups which might be developed in Ethiopia.

It is expected that there is a need for 3 marketing researchers to be fully engaged in international market research.

Re 2. Initiation of Product Development

In order to ensure that recommendations from market research is channelled back to the processing industries, one food technologist should be in charge of establishing the linkage to meat factories. In particular, the food technologist should be instrumental in assessing, together with the meat industry, whether it would be feasible to develop new products, from which a market demand has been identified under the market research. This implies a very close liaison with meat factories in the country.

Product development should also take place as far as the domestic market is concerned. This is an opportunity to initiate the process of introducing industrially manufactured meat for the Ethiopian consumer, initially the urban consumer. The underutilization of processing facilities and lower graded cuts supports and necessitates the development of a local market for industrially produced meat. It would, as an example, be of interest to develop traditional local disnes as canned food, and to test the acceptability in the urban centres. To cater for product development for the domestic market it is proposed to assign another food technologist, who again would liaise closely with meat factories for the development phase and who would also liaise with local marketing organizations for initial product testing.

Re 3. Liaison with other Chain Components

Provided successful product test results at the international market or at the domestic market, it is necessary to adjust and prepare backward linkages for the industrial production of identified products.

The components concerning procurement of seasonal farm supply inputs and other services include basically improved animal nutrition and health, which of course are long-term aspects to be dealt with under Fourth Livestock Development Project. The remaining chain components, such as procurement of animals and industrial processing, should be adjusted if required on a short-term basis to comply with recommendations regarding increased production in order to exploit an identified market for newly developed products.

The present condition of meat factories only allows the production of canned and vacuum-packed sterile packs. At this stage it cannot be justified to bring factories up to standard for the export of raw meat due to the disease status of Ethiopian livestock. Other adjustments as required could, however, be justified in order to fully clear backward linkages to new production still under the limitations imposed by the present disease status. Provided clear backward linkages, promotion campaigns can be initiated.

Re 4. Initiation of Promotion Campaigns

It is important to attach a promotion section to the product development section of Market Research Service. This section should be capable of organizing international as well as national promotion campaigns for newly identified product groups. Initially, the section should be manned by two officers, but the organization of international campaigns will also call for a strengthening of the foreign trade offices in the 9 countries, where Ethiopia already is represented. The possibility of opening new offices in countries, where export potentials have been identified, should be considered.

The profile of promotion officers should be highly marketing oriented with a basic product knowledge. They should be capable of approaching international marketing organizations and should at the same time continuously liaise with national marketing organizations for the introduction of industrial products at the domestic market.

Re 5. Marketing Information Service

The establishment of the Market Research Service should be sustained by a systematic marketing information service, which should develop information to be rade available for all relevant institutions in Ethiopia and abroad. Information should be developed along the following lines:

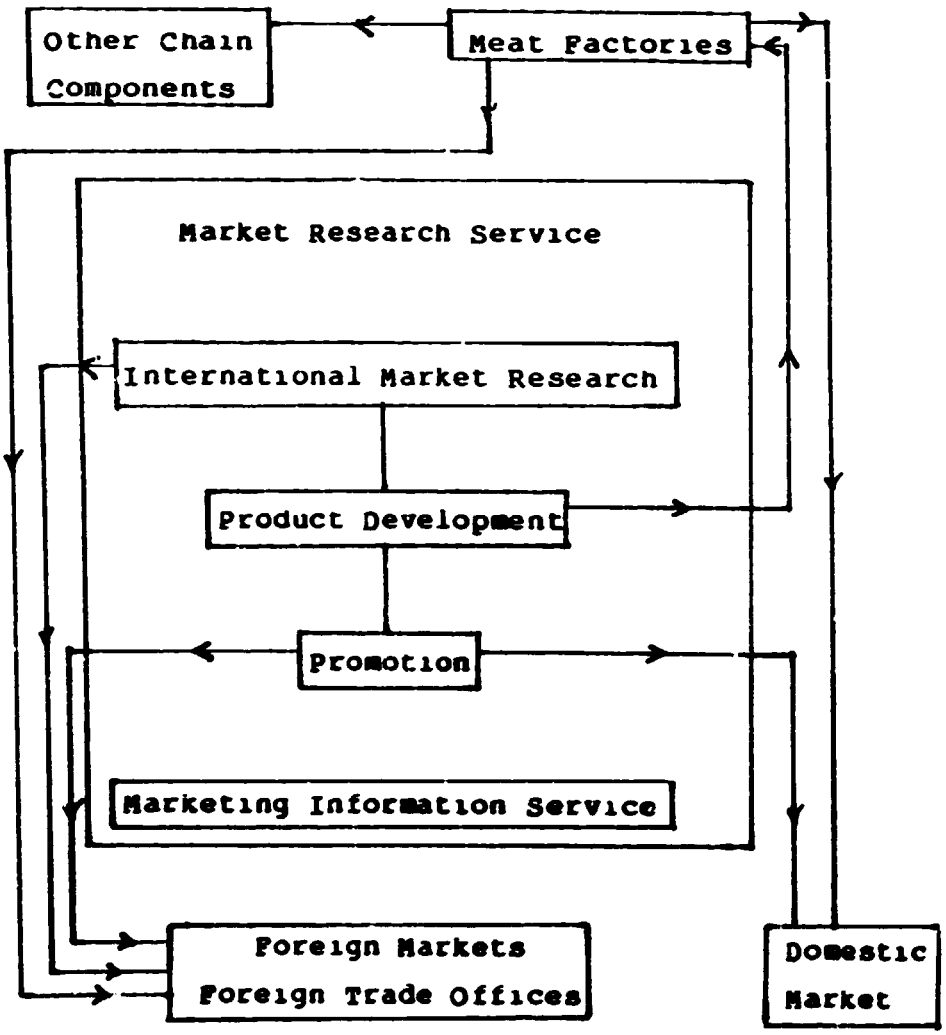
- Current price review, Ethiopia and world-wide
- Market research reports
- Import requirements including health regulations, customs and other terms
- Current file on ongoing and planned projects in Ethiopia

It is proposed that Marketing Information Service is staffed with initially two marketing economists. The establishment of the Marketing Information Service according to the above guidelines would sustain the operational activities of Market Research Service to such an extent that it would become the platform for what is called marketing based development of the meat chain.

The proposed structure of Market Research Service would enable it to be prepared to cope with expected increased acitivities as a result a new status for Ethiopia as a "Livestock Disease Free Zone". This situation would justify the rehabilitation of several meat factories to cope with raw meat export, and it would require several changes as far as all other chain components are concerned. It is

very important to have an already established structure via Market Research Service which can be utilized in a completely different market situation. The proposed project organization chart is shown in Figure 6.2

Figure 6.2 Project Organization Chart



A summary of manpower requirements for the proposed marketing based development project is shown in Table 6.1.

Table 6.1 Proposed Manpower Requirements for the Marketing Based Meat Development Project.

Section	Manpower Requirements
International Market Research	2 Marketing Researchers
Product Development	2 Food Technologists
Promotion	2 Marketing Economists
Marketing Information Service	2 Marketing Economists

It should be considered to which extent technical assistance should be provided for this project.

7. STRENGTHENING HORIZONTAL LINKAGES BETWEEN GRAIN AND MEAT PRODUCT CHAIN

7. STRENGTHENING HORIZONTAL LINKAGES BETWEEN GRAIN AND MEAT PRODUCT CHAIN

In addition to suggestions made under Chapter 5 and 6 to establish an improved interrelationship between agriculture and industry within the grain and meat product chain, the linkages between different product chains would further substantiate agroindustrial working relations. As already indicated under Chapter 6, Livestock and Meat Corporation should coordinate the various activities within the meat chain and as such be represented at the Agro-Industrial Coordinating Committee.

The following is an attempt to outline major fields of activities creating horizontal linkages for the benefit of agricultural production.

7.1 UTILIZATION OF AGRO-INDUSTRIAL BY-PRODUCTS

As indicated in Chapter 3 and 4, the agricultural processing industry, using agricultural raw material for the production of food products, generates considerable amounts of by-products. For most industries concerned more attention should be paid to the establishment of optimal use of organic by-products. The by-products originate from the following processing industries:

1. Flour Mills
2. Oil Mills
3. Sugar Factories
4. Maltery
5. Seed Processing Units
6. Abattoir and Meat Factories

1. Flour Milling

a) Reject grains

Consists mainly of light weight, undersize kernels which - if used for flour milling - would reduce flour extraction rate and production capacity of the flour mill.

This product is mainly being sold as a raw material for poultry and pig feed, and in case of good quality also for human consumption.

b) Wheat bran

Contains the majority of the wheat hulls ground off the grain in the roller mills.

The product is sold direct to the small-scale cattle and horse owners for feeding purposes, and it is normally used direct without any mixing with other feed components.

The demand exceeds the supply, and only minimal stocks are kept at the flour mills.

c) Maize germs

In advanced maize flour production the oil containing germs are separated as a special high-energy by-product used as a raw material for the animal feed industry.

d) Maize bran

Contains the majority of the hulls ground off the kernels in the roller mills.

The product is sold direct to small-scale cattle and horse owners for feeding purposes, sometimes mixed with other feed components.

2. Vegetable Oil Milling

The press residue remaining after oil extraction is a relatively high-protein component, mainly suitable for cattle feed compounding.

At present, four types of oil seed comprise over 95% of the total amount of raw material processed in Ethiopian oil mills, listed below in order of importance:

a) cotton seed
b) linseed
c) rape seed
d) niger seed (nug)

Other oil seeds, such as safflower and sunflower, will be available in larger quantities for processing in the future.

The press residue known as oil seed cake is traded in huge quantities on the world market as a raw material for the feed industry.

Since this industry in Ethiopia is only in an infant stage, the surplus production of oil seed cakes is exported, mainly via Djibouti or Asab ports, but due to the high transport costs within Ethiopia, the ex-factory sales prices are very low.

Apparently the total quantity of the most popular oil seed cake, nug cake, is used by the Ethiopian feed industry or sold to individual livestock owners, but the majority of other oil seed cakes is either being stockpiled or exported at a rather slow rate and at low prices.

3. Sugar Manufacturing

The raw material for sugar manufacturing in Ethiopia is exclusively sugar cane. This produces three types of by-products in large quantities:

a) molasses
b) sugar cane tops
c) bagasse

These have very different characteristics as seen from a feed point of view:

a) Molasses

Consists of the non-crystallizable part of the sugar. It appears in a liquid to semi-liquid and sticky form. It has a high energy content and is highly palatable for cattle, but its crude protein content is negliable.

The molasses consumption for cattle feeding in Ethiopia is very low, and due to the high transport costs to seaport, ex factory prices are also low. Large

quantities of molasses have in the past been used for application on internal roads within the sugar plantations to reduce dust formation.

Export targets for molasses in the years 1986-89 are Birr 3.6 mio., corresponding to app. 22,000 tons at present world price fob Asab.

Depending on the efficiency of sugar extraction, each ton of processed sugar cane produces 30-40 kg molasses.

b) Sugar cane tops

Comprise the top half of sugar cane plant at time of harvesting. It is common practice to burn the cane field prior to harvest to eliminate the inconvenience of handling the tops. This field burning causes no damage to the sugar containing lower half of the cane plant.

Sugar cane tops can be classified as an attractive roughage component in ruminant feeds. It has a reasonable content of digestible energy and crude protein as well as a high roughage value.

The recovery of sugar cane tops from the fields is labour intensive with the present level of technology, but the two cattle feedlots near Nazareth are already using sugar cane tops in their feeding programmes.

Green sugar cane tops have a low storage ability and are at present only used during the periods of availability direct from the fields.

c) Bagasse

The term is used to describe the by-product deriving from pressing the juice out of the lower half of the sugar cane plant.

It has no value as a source of crude protein, and its energy content is very low, if no additional treatment is carried out.

Each ton of sugar cane produces 250-300 kg bagasse with a moisture content of 50-55%. This is low enough to enable bagasse to be used as a fuel for the steam boiler at the sugar factory, which becomes nearly self-sufficient in energy. Over 85% of the bagasse is used this way, and the balance normally does not justify the high cost of converting it into what at best would be a low grade feed component.

4. Malt Production

Two by-products are produced in sufficiently large quantities to justify their consideration as a source of commercial ruminant feed components:

a) Reject grain
b) Malting waste

These by-products appear in different forms and can briefly be described as follows:

a) Reject grain

This fraction contains small kernels (less than 2.1 mm in diameter), broken kernels and light weight kernels with a limited or no germination capacity, which consequently are unsuitable for malting.

At present up to 35% of the raw barley received at the plant falls into this category, totalling 5-6000 tons/year. Large quantities are already stockpiled at the maltery due to lack of demand. Most of the stock is stored in bags in two separate storage buildings at the maltery site, but some is stored in bulk in silos intended for raw barley or finished malt.

The contents and digestibility of crude protein, energy and fiber makes this by-product an attractive ruminant feed component.

b) Malting waste

This by-product is generated at several stages in the malting process and consists of a uniform mixture of process dust, hulls and malt sprouts. The maltery is equipped with a separate processing line for malting waste including a pellet press and a pellet cooler. The product therefore appears at high density, ø 8 mm pellets, which are well suited for future handling and transport.

The quantity generated corresponds to app. 15% of the total amount of cleaned and graded barley entering the malting plant, or app. 1700 tons per year.

A demand for this product has not yet developed, and most of the production up to now has been stockpiled at the maltery site.

Its suitability as a feed component is due to its content of crude protein and energy as well as its attractive uniform composition and physical properties.

5. Seed Processing

The Ethiopian Seed Corporation under the Ministry of State Farm Development operates 7 seed processing plants in different locations. The majority of seeds processed are wheat, barley, maize and sorghum.

In all cases a number of different by-products are produced. As regards the above mentioned food grains, the by-products can be divided into three main categories:

a) small, unbroken kernels
b) broken kernels, heavy weed seeds
c) chaff and light particles

Intensive attempts have been made to sell these by-products to a variety of buyers, but with limited success, and especially the centres at Kofele, Asela and Nekempte have severe problems. Stocks varying from 1800 to 3000 tons remain unsold at each of these three centres as of June 1986.

The details are:

a) Small kernels

The intention has been to sell this category for local processing into flour (wheat, maize) or for brewing local beer (barley) at prices up to Birr 47,-/100 kg, but the demand is much less than the supply. Consequently, stocks are accumulating rapidly.

The feed value in terms of protein and energy is 10-20% below that of regular grain due to a higher proportion of hulls on the total weight. For the same reason, the product is most suitable for cattle feed mixture.

b) Broken kernels

This category is sold to the Kaliti Feed mill for use as a component in poultry and pig feeds at ex plant prices of app. Birr 11,-/100 kg. Due to the low capacity of the Kaliti Feed mill the demand is less than supply, and stocks are accumulating.

The feed value corresponds to that mentioned under a) above.

c) Chaff etc.

This is a high fibre, low value product which is mainly disposed at auction sales for use in direct feeding of local cattle. Prices obtained are up to Birr 7.-/100 kg.

Since the quantities available are low, stocks are not accumulating, and this material will not be considered as a constant source of raw materials for cattle feed compounding.

The products described under a) and b) are available at present in quantities up to 20,000 tons annually, depending on the quality of raw grain received by the seed processing plants. This quality is highly influenced by climatic conditions (drought, frost etc.) resulting in a high proportion of light kernels).

6. Abattoir Operation

In the operation of abattoirs about 45% of the total live weight entering the slaughterhouse will be inedible offal etc., which is normally converted into dehydrated, sterilized by-products such as:

a) meat and bone meal
b) blood meal
c) bone meal
d) technical fat

The different products have individual characteristics as follows:

a) Meat and bone meal

This product is made from a mixture of all the inedible offals deriving from the slaughter of a wide variety of animals. It is a highly valued product by feed compounders due to its high content of easily digestible protein and minerals.

At present, the low capacity feed mills in Ethiopia use limited quantities for the manufacture of poultry and pig feed, and the balance is exported at low prices resulting in an ex factory price of only Birr 15.-/100 kg and a cif price Asab port of Birr 30.-/100 kg.

b) Blood meal

In a large-scale slaughterhouse, producing large amounts of blood, it can be viable to produce blood meal as a separate product.

Its protein content is extremely high, and the product is especially valuable as a component in concentrate feeds for young monogastric animals. The production of blood meal in Ethiopia is very small at present, but it could be increased with improved management of dry rendering plants and replacement of old equipment.

c) Bone meal

In the case of big de-boning operations, the production of bone meal as a separate product can be justified. This has taken place to a certain extent in Ethiopia, but the feed value of the high mineral content of this product has not been fully realized, and considerable quantities have been used as fertilizers.

d) Technical fat

In most abattoir and dry rendering operations considerable quantities of fat are produced as a separate product. It has found a number of uses as a raw material in various chemical industries.

It can, however, also be used as a component for the manufacture of high energy feed concentrates, mainly for dairy cattle, to improve the fat content of the milk without reducing the cow's bodyweight.

Only small quantities of technical fat, if any, are used in the feed industry in Ethiopia at present.

7.2 SAMPLE ANALYSIS

In order to assess the quality of by-products generated, samples of 10 common by-products have been taken for analysis and the results are shown in Table 7.2.

The samples were analysed according to moisture content, crude protein, crude fat, fibre, ash and N-free extracts. Internationally recognized digestibility factors are used in calculating the net nutritive value of each component with energy values expressed in Scandinavian Feed Units (1 F.U. equals energy value of 1 kg good quality feed barley of 15% moisture content).

Data stated for products of which no samples have been analysed indicate standard feed values used by the Scandinavian Feed Industry.

The feed values found are compared to nutritive requirements of standard production feed and highly concentrated feed compounds which are characterized as shown in Table 7.1.

Table 7.1 Characteristics of Standard Production Feed and Highly Concentrated Feed

	Digest. Crude Prot./F.U.	Gram Fat/F.U.	Kg Feed/F.U.
Standard Production Feed	165 - 185 gr.	60 - 80 gr.	0.95 - 1.00
Highly Concentrated Feed (Dairy Cattle)	250 - 275 gr.	85 - 100 gr.	0.83 - 0.95

TABLE 7.2

DATA AND FEED VALUES OF AGRO-INDUSTRIAL BY-PRODUCTS FOR CATTLE IN ETHIOPIA

TYPE OF INDUSTRY / TYPE OF BY-PRODUCT	ETH. SAMPLE ANALYZED	NUTRIENT CONTENT STATED ON CHEMICAL ANALYSIS BASIS						KG FEED/ FEED UNIT	DIGESTIBLE NUTRIENTS IN GR/F.U		
		CRUDE PROTEIN	CRUDE FAT	FIBRE	N-FREE EXTRACT	ASH	H_2O		CRUDE PROT.	CRUDE FAT	FIBRE
FLOUR MILLS:											
Reject grain, wheat	yes	16.3	2.6	5.1	72.7	3.3	11.2	0.96	99	14	44
Wheat bran	no	17.7	4.5	10.7	61.2	5.9	13.0	0.95	133	36	107
Maize germs	no	16.1	21.3	3.3	53.5	5.8	10.0	1.02	119	160	33
Maize bran	no	19.9	3.5	11.5	60.5	4.6	12.0	1.22	155	28	115
OIL MILLS:											
Cotton seed cake (extracted)	yes	47.9	0.9	11.8	31.0	8.4	9.4	1.00	379	7	107
Cotton seed cake (with lint)	yes	24.4	4.3	29.3	36.9	5.1	7.8	1.50	300	57	406
Nigerseed cake	yes	32.2	6.9	11.7	40.7	8.5	9.9	0.98	248	56	106
Rapeseed cake (extracted)	yes	43.5	3.2	9.9	32.2	11.2	9.0	1.01	340	28	91
Linseed cake	yes	32.1	9.6	10.9	40.7	6.7	8.1	0.92	227	77	92
Linseed residues	yes	13.4	10.2	12.7	43.7	20.0	9.9	1.15	101	100	132
SUGAR FACTORY:											
Molasses	no	4.8	-	-	83.0	12.2	27.0	1.67	79	-	-
Sugar cane tops	no	3.2	0.8	16.9	25.2	3.9	50.0	2.40	(roughage component)		
MALTING PLANT:											
Reject grain, barley	yes	13.5	2.8	5.1	75.3	3.3	11.8	1.10	89	20	48
Malting waste	yes	17.5	2.5	15.7	47.8	16.5	9.8	1.30	169	27	185
SEED PROCESSING PLANT:											
Reject grain, barley	yes	11.6	2.1	5.6	64.8	2.4	13.5	1.12	91	18	55
ABATTOIR:											
Meat and bone meal	no	53.0	10.0	-	3.7	33.3	9.0	1.05	438	81	-
Blood meal	no	92.0	-	-	-	-	8.0	0.65	1415	-	-
Technical fat	no	-	99.0	-	-	-	1.0	0.35	-	298	-

According to Table 7.2, 4 out of 10 samples analysed have an energy content corresponding to less than 1.00 kg feed per F.U., 6 out of 10 samples analysed have a digestible crude protein content of more than 165 gr per F.U., and 2 out of 10 samples have a crude fat content of more than 60 gr per F.U.

Provided that by-products, of which no samples have been analysed, are considered according to the standard nutritive content indicated in Table 7.2, a total of 7 by-products have an energy content corresponding to less than 1.0 kg feed per F.U., 8 by-products have a digestible crude protein content of more than 165 gr per F.U. and 5 by-products have a crude fat content of more than 60 gr. per F.U.

In addition, a total of 7 by-products, including tested and non-tested by samples, have a fibre content above 100 gr per F.U., which justifies their use as digestible crude fibre in cattle feed compounds. This factor is, however, particularly significant in a situation where ruminants fed on concentrates derived from by-products do not have access to other fibrous feeds, such as straw, hay, sugar cane tops or green forage.

All in all, the analysis of samples of agroindustrial by-products indicate that several products are quite suitable for inclusion in feeding rations for cattle when considering important factors, such as total energy, digestible crude protein and crude fat.

The total quantities of the various by-products at the national level remain to be established.

These quantities are, however, far above what can be processed at the very limited feed processing facilities in the country and justify an improved utilization.

7.3 STUDY PROPOSAL

Based on the above findings it is proposed to prepare a study of the total availability and quality of agro-industrial by-products in the country as a basis for improved utilization. More specifically the study should cover:

1) A complete inventory and production potential for all agroindustrial by-products which are or will be generated in the country.

2) Planning of national feed requirements and preparation of a programme to establish feedmills. Determination of location, product lines and production volume.

The study should be coordinated with all initiatives within the livestock sector, including the Dairy Rehabilitation and Development Project which is to be initiated in November 1986. This project has a component of pasture production and feed rations for dairy cattle and should be planned accordingly.

7.4 UTILIZATION OF AGRO-INDUSTRIAL BY-PRODUCTS AS A SOURCE OF FUEL

Organic by-products and waste products are generated in all sectors of agriculture, horticulture and forestry. Some are easily utilized by the producers themselves, and others can be used for feeding in nearby locations without further processing. The least valuable waste products are, however, often poorly utilized or discarded altogether.

The decreasing availability of wood as a household fuel has intensified the search for alternative fuel sources. Many of the by-products referred to above are high in energy, but their low density and large particle size make them impractical for household use.

These raw materials include straw, chaff, grain hulls, cotton lint, sugar cane bagasse, coffee husks, wood waste etc.

Experience in a number of developing countries over the last 10-15 years have proved that many of these low value products can be processed into cylindrical high-density briquettes with a moisture content of app. 10% and an energy value of about 4000 kcal/kg. This compares to typical firewood with an energy value of about 3000 kcal/kg and fuel oil with 9600 kcal/kg.

Briquetting experience also exists in Ethiopia. A plant based on the Eco-Briquette system has been in operation in the Kolfe district in Addis Ababa since 1985. It works only on external raw materials, such as saw dust, wood shavings, cotton lint, coffee husks and an imported binding agent. Sun drying is employed to reduce moisture content to the level required for good binding ability and high energy value.

This privately owned plant is 80% funded by AID Bank and licensed by HASIDA. It is located close to its customers, hotels and large households, but up to 350 km from its raw material sources which makes transportation a major operational expense.

The price of the briquettes produced competes well with the prices of fire wood and other fuel supplies, and in terms of energy cost it is claimed that one Birr worth of

briquettes can replace 3-4 Birr worth of fire wood based on Addis Ababa prices.

As could be expected, the users of fuel briquettes initially require some advice in the proper use of this new type of fuel, but after only a short introductory period they have no difficulties in controlling the combustion temperature of these high energy briquettes.

Based on experience gained, it is proposed to prepare a study for the establishment of briquetting plants in rural centres.

The study should specifically assess the availability of raw material for processing since wood is becoming scarce. For customers to fully benefit and appreciate this initiative it is important to evaluate, and possibly include in the project, improved stoves as developed by Rural Technology.

The complete project including briquetting plant and provision of improved stoves for customers is seen as a way to improve living conditions in rural areas and should be considered in relation to the villagization programme and resettlement schemes.

8. SUMMARY AND RECOMMENDATIONS

8. SUMMARY AND RECOMMENDATIONS

The agro-industrial complex comprising all upstream and downstream activities generated by farming is a very important economic sub-sector in the development of Ethiopia. The empirical study of relationships between agriculture and industry requires, however, the availability of input-output tables, which would also facilitate the incorporation of sub-sector analysis into a broader macroeconomic framework. In the absence of input-output table, the study approach has been to identify major crops for each of which an analysis of the whole underlying product chain has been elaborated. The analysis is summarized in this chapter.

8.1 GENERAL SUMMARY

Within all product chains analysed, including those of major cereals and beef, there is an identified lack of coordination between the relatively large number of public intermediaries operating.

The activities of the product chains are highly fragmented which leads to a situation where processing industries receive only a low raw material supply and quality. For processed grains local demand far exceeds supply and consequently additional quantities of grains have to be imported. In the case of beef meat the industry is only capable to export a small quantity of processed meat due to the disease status of Ethiopian cattle and in view of the lack of developed markets for specialized products. Since coordination within the specific product chains is poor (i.e. vertical linkages are poorly developed) the horizontal linkages between different product chains are not and cannot be expected to be well established.

As a result of the above, the major part of the Ethiopian agro-industrial complex comprises a large number of public intermediaries for which the concept of integrated development needs to be introduced. This aspect will be treated in details in the recommendations.

8.2 RECOMMENDATIONS

The overall poor coordination within the agro-industrial complex should be strengthened as a first priority.

Technical projects which aim to increase the productivity of a specific chain component are not expected to have a full impact, if the general coordination to preceding and subsequent chain components is not established. Consequently it is recommended to implement a programme which establishes an organizational framework to ensure agro-industrial coordination as a prerequisite for implementation of technical projects. More specifically the recommended programme comprises two elements:

1. Establishment of an Agro-Industrial Coordinating Committee (AICC).

2. Implementation of Technical Projects supervised by AICC.

AICC should as members count representatives from all public intermediaries within the agro-industrial complex and operationally be supported by a full time secretariat at ONCCP. AICC should establish a unit where all information regarding the agro-industrial complex is collected analysed and used as a necessary tool in the continuous process of strengthening the various relevant product chains.

Thus AICC should become a crucial platform for evaluation of planned projects within the agro-industrial complex where the committee should ensure evaluation and follow-up on linkage effects generated by the specific project.

As a pre-requisite to undertake this function it is, however, important that the committtee has access to analysis of all major product chains, including those dealt with in this study and others such as oil seeds, cotton, tobacco, sugar cane, grapes and hides and skins.

It is equally important that the committee continuously is informed about status and progress of existing projects falling under the agro-industrial complex.

A final task which naturally falls under the committee is the calculation of production costs for all agricultural produce on which pricing should be based.

With the introduced Agro-Industrial Coordinating Committee which is expected to ensure the strengthening of vertical as well as horizontal linkages within the agro-industrial complex, the technical proejcs as earlier recommended would, once implemented, have a final higher impact.

Table 8.1 shows the proposed projects grouped according to their expected linkage effects.

Table 8.1 Proposed Projects according to Expected Generated Linkage Effects

Proposed Project	Vertical Linkages		Horizontal Linkages
	Cereal Product Chain	Meat Product Chain	
Agro-Industrial Coordinating Committee	X	X	X
Mechanization of Peasants' Sector	X		
Improved Hand Tools for Agriculture	X		
Service Centres for Small-Scale Grain Mills	X		
Extension Service for Maltery	X		
Marketing based Meat Chain Development		X	
Utilization of By-products for Feeds			X
Utilization of By-products for Fuel Briquetting			X

For a more comprehensive summary of proposed projects, Figure 8.1 lists the major project components, the planned linkage effects generated and indicates other present or planned related projects.

The proposed projects cover chain components from provision of capital goods for agriculture to industrial marketing, and it is a common feature of all projects that the peasants' sector, as the backbone of agriculture which needs to be guided into a cooperation with the industry, should benefit directly or indirectly.

It is of vital importance to stress the fact that the establishment of the Agro-Industrial Coordinating Committee provides a platform for coordination of all ongoing and planned projects within the cereal and meat product chain and later also for other product chains.

It is a common feature among the proposed technical projects within the cereal product chain that they are based on a specific chain component, but high priority is paid to the necessary linkage effects. As an example the mechanization of the peasants' sector is based on the provision of capital goods for the smallholder sector, which means that the project is basically production oriented. High emphasis is, however, put on product development and testing, distribution and the establishment of required service facilities. A pre-requisite for such a project is that the Agro-Industrial Coordinating Committee through preparation of production costs for all grains provides the background for a sound pricing of major cereals.

Table 3.1 Crop Projects Profile

PROPOSED PROJECT	CHAIN COMPONENT	MAJOR PROJECT COMPONENT	LINKAGE EFFECTS	RELATED PROJECTS
Agroindustrial Coordination	All	Establishment of Grain Coordinating Committee and ONCCP Secretariat	Coordination with all Chain Components	
Mechanization of Peasants' Sector	Provision of Capital Goods for Agriculture	Product Development and Testing, Industrial Manufacturing, Distribution and Service	Peasants' Sector Rural Technology AISCO HASIDA	Improved Agricultural Machinery and Implements Factory (under Feasibility Study) Spare Parts and Hand Tools Factory (under const.)
Improved Hand Tools for Agriculture	Provision of Capital Goods for Agriculture	Product Development and Testing, Industrial Manufacturing and Distribution	Peasants' Sector Rural Technology AISCO	
Service Centre for Small-scale Grain Mills	Provision of Service and Support for Agriculture	Work Shop, Spare Parts Store, 3 Technicians	Peasants' Sector Kebele Importers HASIDA	Spare Parts and Hand Tools Factory (under Construction)
Extension Service for Maltery	Provision of Service and Support for Agriculture	Provision of Price/Quality Incentive (Marketing) Assignments of Extension Agents	Peasants' Sector	
Marketing Based Meat Chain Development	Industrial Marketing	Market Research, Product Development and Promotion, Marketing Information Service	Effects on all Meat Chain Components	Fourth Livestock Development Project (World Bank) Livestock Marketing Project (AACM)
Utilization of By-products for Feeds	Industrial Processing Provision of Seasonal Farm Input Supply	Assessment of By-products Availability, Establishment of Feed Processing Facilities	Agroindustries producing By-products Pastoralists, Peasants, Feedlots, Livestock Projects	Utilization of Slaughterhouse By-Products (UNIDO) Dairy Rehabilitation and Development Project (under Implementation)
Utilization of By-products for Fuel Briquetting	Provision of Consumer Goods	Procurement of By-products Establishment of Fuel Briquetting Plant Distribution of Improved Stoves and Briquettes	Rural Households Rural Technology HASIDA Consumer Shops	

The establishment of Service Centers for small-scale grain mills is a project which emphasizes the general need for service and maintenance in relation to all technical projects. This project is expected to generate forward as well as backward linkage effects.

The establishment of an extension service attached to the maltery sustained by a price/quality incentive and with the view to establishing contract arrangements with outgrowers is an attempt to establish vertical integration in the product chain. The experience gained from such a project, especially the provision of a price/quality incentive, could be of major importance to arrangements made for the production of other grains, including wheat and maize.

The Marketing Based Meat Chain Development Project highly emphasizes the importance of marketing aspects as leading guidelines for the development of a whole product chain. A proper marketing basis within the meat chain would further benefit the sector when Ethiopia assumes status as "Disease Free Zone" and a number of new markets will be opened.

The projects regarding utilization of agro-industrial by-products emphasize aspects which previously have been neglected. The idea is to better utilize existing resources as raw material inputs for the production of livestock feeds and fuel briquetting for the benefit of rural households. In addition to these direct objectives, the two proposals create horizontal linkages which will further sustain the required agro-industrial development.

The agro-industrial coordinating Committee should as previously indicated evaluate the presented technical projects for expected linkage effects. It would fall as a

more long-term issue under the committee to develop new tools for evaluation of intersectoral linkages between agriculture and industry.

The establishment of input-output tables would be an example of a specific technique which could create a basis for an evaluation of agricultural policies with respect to such macro-economic goals as GDP, employment and balance of trade and should therefore be considered.

APPENDIX

List of Ministries, Corporations, Organizations and other Institutions visited during the Mission April 23 - June 30, 1986

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List of Ministries, Corporations, Organisations and other Institutions visited during the Mission April 23 - June 30, 1986

Ministries:

Ministry of Industry
Ministry of Agriculture
Ministry of State Farms Development
Ministry of Domestic Trade
Ministry of Foreign Trade
Ministry of Coffee and Tea Development

Office of the National Committee for Central Planning (ONCCP)

Corporations:

National Metal Works Corporation
Ethiopian Food Corporation (EFC)
National Leather and Shoe Corporation
National Chemical Corporation
National Textile Corporation
Ethiopian Seed Corporation (ESC)
Agricultural Equipment and Technical Services Corp.
Livestock Development and Meat Corporation
Agricultural Marketing Corporation (AMC)
Ethiopian Bewerages Corporation
Ethiopian Domestic Trade Corporation (EDDC)
Ethiopian Retail Trade Corporation (ERTC)
National Tobacco and Matches Corporation
Basic Commodities Supply Corporation
Agricultural Input Supply Corporation (AISCO)

Other Institutions:

University of Addis Ababa
Handicraft and Small-Scale Industries Development Agency (HASIDA)
Agricultural and Industrial Development Bank (AID Bank)
Institute of Agricultural Research (IAR)

Agricultural Production:

Bera Chale Producers' Cooperative
Witcho Service Cooperative
Horuta Producers' Cooperative
Itaya Service Cooperative
Lole State Farm
Awassa State Farm
Kuriftu Feedlot
Awassa Quarantine Area

Agroindustries:

Ethiopian Meat Concentrates
St. George Brewery
Kotebe Metal Tools Factory
Malt Factory, Asella
Debre Zeit Flour Mills
Nazareth Flour Mill
Small-scale Flour Mills, Asella
Privately Owned Bakery, Asella
Arsina Mirta Edible Oils Mills
Kaliti Feed Mill
Nazareth Tractor and Agricultural Equipment Factory
Awassa Flour mill

Wondo Genet Meat and Canning Factory

Debre Zeit Abattoir

Addis Ababa City Council Abattoir

International Organizations:

UNIDO

FAO

SIDA

EEC