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E.I. Contract No. 626
May 1972

REPORT NO. I

THE FEASIBILITY OF PRODUCING PULSE CROPS FOR EXPORT MARKETS

PART A — Technical, Economic, and Financial Analysis of Pulse Production and Export Marketing With Emphasis on White Haricot Type Beans

PART B — Reconnaissance Survey of Pulse Crop Production in Ethiopia and Potential Export Markets

Prepared for:

Planning and Programming Department
The Ministry of Agriculture
Imperial Ethiopian Government

The United States Agency for International Development participated in the funding of this contract.

PREFACE

This report is one of several prepared under Contract No. 626 between Experience, Incorporated and the Ministry of Agriculture of the Imperial Ethiopian Government. The United States Agency for International Development was also involved in this program through participation in the funding of the contract. Field work on the project was initiated in October 1971 and continued through March 1972. In the course of work, eleven specialists were in Ethiopia for varying periods of time.

Initially, the purpose of the project was to conduct a reconnaissance survey to establish the export potential of feed grains (maize, sorghum, barley) and pulse crops. That particular activity made up Phase I of the contract program. Phase II involved the more detailed study of several aspects of the production and marketing of certain grains and pulses. It was determined that attention in Phase II should be focused particularly on the planning of a project through which production of pulses for export will be increased substantially. Other focal points in the second phase included multiplication and distribution of improved seeds (grains and pulses), outlook for the marketing of malting barley, and the prospects for export of durum wheat.

In conducting the field work in Ethiopia, the Experience, Incorporated specialists were assisted importantly by local counterpart personnel assigned temporarily to work on the contract program. Without the help of these persons it would not have been possible to complete the assignment effectively or on time. The contract program was attached to and received logistic support from the Planning and Programming Department of the Imperial Ethiopian Government Ministry of Agriculture where Ato Mulugetta Bezzabeh, Department Head, and Ato Ketema Desta, Project Coordinator, were especially helpful. Policy guidance and useful suggestions on procedure and findings were provided by the United States Agency for International Development staff, and by an Inter-Agency Steering Committee chaired by Ato Mulugetta Bezzabeh.

Experience, Incorporated staff members resident in Ethiopia at various times during the course of this contract program were:

Allan Q. Moore, Project Leader (Phase I) and Grain Marketing Specialist

E. R. Duncan, Project Leader (Phase II) and Extension Specialist

Herman T. Holmes, Seed Marketing Specialist

Norton C. Ives, Agricultural Engineer

Ray A. Pendleton, Cereal Grains Agronomist

Charles W. Peters, Agricultural Economist (General)

John B. Schneider, Agricultural Economist (Marketing)

James R. Snitzler, Transportation Economist

Gayatri P. Tewari, Seed Production Agronomist

Bruno Utelli, Pulse Marketing Specialist

Peter H. van Schaik, Pulse Agronomist

In addition, several members of the Experience, Incorporated home staff in Minneapolis, Minnesota were involved in the project.

Counterpart Imperial Ethiopian Government personnel assigned to the contract program included particularly:

Ato Getachew Haile, Ministry of Agriculture

Ato Ghiorghis H. Mariam, Ministry of Agriculture

Ato Mamo Desta, Ethiopian Grain Corporation

Ato Hiruy Belayneh, Institute of Agricultural Research

Ato Wolde Yohanis Woldayes, Ministry of Agriculture

Reports prepared under auspices of this contract are:

A. Field Reports (prepared and presented in Ethiopia by field staff)

1. Production and Marketing of Pulse Crops in Ethiopia, Final Report, Phase I, December 1971

2. Production and Marketing of Feed Grains in Ethiopia, Final Report, Phase I, December 1971

3. Ethiopian Malting Barley, Draft Report, February 1972

4. Pulse Production Project, Ethiopia, Draft Report, February 1972

5. A Seed Improvement Program Proposal for Ethiopia, Draft Report, March 1972

B. Final Reports (submitted upon completion of the project work program)

1. The Feasibility of Producing Pulse Crops for Export Markets, Report No. I, May 1972

2. The Feasibility of Producing Cereal Grain Crops for Export Markets, Report No. II, May 1972

3. An Implementation Plan for a Seed Improvement Program in Ethiopia Report No. III, May 1972

4. The Transportation, Processing, and Storage of Ethiopian Grains and Pulses for Domestic and Export Markets, Report No. IV, May 1972

NOTE: Throughout the final reports the exchange rate used is Eth. $2.50 = US$1.00. Except where specifically stated otherwise, all monetary expressions refer to Ethiopian dollars. Tons are in the metric system = approximately 2,200 pounds. Feed grains are defined to include barley, maize, and sorghum; in Ethiopia, however, all grains are considered "food" grains.

Quintal — 100 kg — 220 lbs
10 quintals = 1 metric Ton - 2200 lbs
hectare = 2.5 acres

TABLE OF CONTENTS

Page

FIGURES

Page

PART B*

* Part B was originally issued in December, 1971, as "Production and Marketing of Pulse Crops in Ethiopia".

APPENDICES

APPENDIX A
TABLES AND FIGURES

APPENDIX B
OUTLOOK FOR EXPORTS TO FAR EAST AND NEAR EAST MARKETS

APPENDIX C
PROSPECTS FOR MECHANIZATION IN PULSE PRODUCTION

REPORT NO. I

PART A

Technical, Economic, and Financial Analysis of Pulse Production and Export Marketing With Emphasis on White Haricot Type Beans

I. SUMMARY OF RECOMMENDATIONS

Experience, Incorporated was requested by the Ministry of Agriculture of the Imperial Ethiopian Government to structure a pulse development project that will result in exports of such magnitude and quality that the balance of trade for the Empire would be significantly improved.

The Experience, Incorporated consultants determined that it is feasible to immediately implement the production of white haricot beans for export. They identified the general areas of the Empire where the beans will be produced, by whom, and in what quantities. A ten-fold increase of haricot bean exports is expected within ten years.

Income to the Empire, as a gain attributable to the project through increased exports, could amount to an estimated Eth. $300,000,000 over the ten-year period. Costs including project funding, as well as production and marketing expenses, will be about Eth. $185,000,000; leaving net benefits (undiscounted) of Eth. $115,000,000.

Total direct funding for the project, including reimbursable, self-liquidating and revolving funds (over 70% of total), is estimated to be about Eth. $39,000,000. A benefit-cost analysis shows a 1.66 ratio, and the calculated internal rate of return exceeds 50 percent. By assuming other less favorable combinations of income and costs, the benefit/cost ratio is reduced to 1.36 and 1.11 but the internal rate of return remains relatively favorable.

To accomplish the above project objectives and projected results, the Experience, Incorporated team recommends that:

1. A specially designed, semi-autonomous Pulse Development Unit be established to administer the project. This is to be a temporary unit and the functions are to be transferred to permanent IEG agencies as rapidly as practicable;

2. An expatriate staff be contracted for five years to provide technical assistance in establishing the project and to furnish temporary management for the Pulse Development Unit (Eth. $4,700,000);

3. An Ethiopian administrative staff of professional assistants be employed who will assume management responsibility for the Unit and project within five years (Eth. $2,200,000);

4. The Ethiopian Grain Corporation, through its regional and area facilities, process and store the pulses, provide facilities for making commodity and production loans, and supply necessary production inputs not otherwise available (Eth. $5,400,000);

5. A research program be established, coordinated and funded by the Pulse Development Unit but conducted by the Institute of Agricultural Research. Specific research, locations for conducting research, and type of research needed are outlined and estimates have been made of required funding. The research component of the project must be funded immediately and fully (Eth. $1,800,000);
$720,000

6. The existing Addis Ababa and field extension staff be increased to provide maximum and necessary assistance to pulse producers and handlers. Additions to staff are suggested. This essential element of the project requires early funding (Eth. $3,800,000);
$1,520,000

7. A production credit system emphasizing short-term loans be immediately activated in cooperation with the Ethiopian Grain Corporation. Supervisory personnel and methods of operation are suggested. Funding covers the revolving loan fund and the temporary subsidy on administrative expenses (Eth. $12,900,000, substantially all recoverable);
$5,160

8. A commodity loan program be provided for producers. Such a program is required to assure producers that the price of haricot beans, which is a "new" crop to most producers, will be supported at a specific predetermined level. These loans will be in the nature of a standby guarantee and may not require the funding indicated (Eth. $8,300,000, substantially all recoverable);
$3,320

9. The implementation of the project be phased in stages. This is necessary because of limitations imposed by availability of personnel, expertise and services. During the first year, emphasis will most logically be placed on the Awasa area, with Nazaret and Dire Dawa to follow shortly thereafter. In the Awash area, the rapidity of implementation will depend heavily upon the speed of the acceptance of double-cropping. Significant gains in bean production in the Dese area are not expected until the fourth or fifth year of the project;

10. All funded supporting elements of the pulse project, with the exception of the commodity loan program, be initiated on an appropriate scale immediately (within 90 days) following the arrival of the technical assistance team and the selection of the local administrative staff of the Pulse Development Unit.

II. INTRODUCTION AND GENERAL BACKGROUND

A. Introduction

During the 1960's Ethiopia experienced a steadily declining balance of trade which reached an extreme negative position of over Eth. $166 million in 1968; in 1969 and 1970 it was moderately less unfavorable. In these circumstances, there has been increasing interest in the possibility of producing substantially greater quantities of goods for export. Historically, exports from Ethiopia have been almost wholly agricultural products (over 90 percent) and there is little prospect of this situation changing materially in the near future. Coffee has dominated Ethiopia's exports for many years, and recently, has accounted for over half of the income from external trade. Pulses, along with livestock products and oilseeds, have also been important sources of foreign exchange. Since 1966, pulses, as a group, have provided from 5.4 to 8.2 percent of the total export income of the Empire.

The Imperial Ethiopian Government (IEG) has focused attention on exports in its planning activities but the growth rate for such trade has been averaging only about 2 percent in recent years. In the Third Five Year Plan (TFYP), some emphasis was placed on exports of pulses as one means of meeting the balance of trade problem. Targets adopted in the TFYP call for a 9 percent growth rate in pulse exports from 1969 to 1973 with a goal of over 97,000 tons at the end of the period; performance for the plan period through 1971 has been considerably below expectations. In 1970 pulse exports fell off drastically to 51,100 tons but there is some indication that this may have been only a temporary setback.

A recently completed feasibility study of producing pulses for export states that the outlook is promising for both production and export of considerably larger quantities of the pulse crops.[1/] Another study completed earlier indicated substantially the same finding on prospects for pulse exports.[2/] The findings reported in these studies plus the considered opinions of both IEG and outside observers have led to a recommendation

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1/ "Production and Marketing of Pulse Crops in Ethiopia", Final Report Phase I (See Part B of this report), Experience, Incorporated, Minneapolis, Minnesota, December 1971.

2/ Report No. 6, "Ethiopia's Export Trade in Major Agricultural Commodities", Stanford Research Institute, Menlo Park, California, January 1969.

that definitive plans be made immediately to increase the production of pulse crops for export from Ethiopia. It is in response to this interest that planning of the project outlined in this report was undertaken.

B. General Background

Ethiopia is almost totally an agricultural country with a land area of 1,221,900 square kilometers, or over 122 million hectares. Agricultural land is estimated to total 84 million hectares of which 66 million are in pastures. Crop land totals about 10 million hectares, but probably as much as 33 million hectares of pasture land could be cultivated. About 8 million hectares are used for cereal grains and pulse production. The potential for increased crop production is generally believed to be great.

C. The Farm Pattern

There are about four million farm units in Ethiopia and 90 percent of the total population is rural. Farm units are the subsistence-type with 75 percent or more of the output consumed at home; this is especially true of the cereals that form the mainstay of the Ethiopian diet. Traditionally, cereal grains are used exclusively for human consumption and not as animal feed. Large commercial farms are still few (less than 5 percent) and contribute perhaps 5-10 percent of the total farm production.

Farms in Ethiopia are heavily concentrated in the highland areas where cereals and other crops such as coffee and pulses are the major enterprises. Topography and weather conditions vary greatly from place to place, often within a very short distance, and contribute to transportation and communication problems. The bulk of Ethiopian farmers do not have ready access to roads of any kind. This complicates marketing.

D. Agricultural Production

Based on IEG estimates, more than 75 percent of the crop lands are devoted to cereals with teff and barley occupying the largest areas. Sorghum, wheat, and maize are the other major grain crops. Production data are in Tables A-1 through A-3 of the Appendix. 3/

3/ Official IEG statistics on production, plantings and yields are not believed to be an accurate indication of actual conditions prevailing in Ethiopia; however, they are the only comprehensive series of estimates currently available and they do provide a useful order of magnitude in evaluating the agricultural situation. The year-to-year pattern of area and yields from which production is derived, does not show normal deviations due to weather and response to price variations.

With fewer than 250 extension agents in the field, communicating improved technology is slow and difficult. Other major constraints to increased output include limited availability of improved seed and fertilizer, lack of adequate credit, a limited marketing system, and transportation difficulties.

E. Farm Income and Tenure

Agriculture is credited with some 55 percent of Ethiopia's GDP which reached Eth. $3,860 million in 1969.[4/] On this basis alone, it appears that the rural population, particularly the smaller, subsistence-type farmer, is a disadvantaged sector with a total per capita income of less than Eth. $100 annually. The national average is closer to Eth. $150 which is indicative of the considerable disparity between rural and urban levels of living. Lately, however, the terms of trade appear to have shifted somewhat in favor of agriculture. This is primarily the result of a marked rise, both absolute and relative, in the price of certain agricultural products. For example, cereal prices, sparked first by a drought in 1965-66 increased to levels considerably above world prices; in effect, domestic prices of these important food products have been import oriented in the past two years. Starting in January 1972, however, the price trend for crops such as maize and sorghum has been reversed.

Development of agriculture in Ethiopia is seriously handicapped by the tenure situation which is an important disincentive to adoption of improved practices by farm operators. Small holdings, periodic redistribution, share cropping and communal ownership characterize this situation. Land tenure reform has been proposed and if undertaken, will obviously require exceptionally strong administrative action by the IEG if the program is to be effective.

F. Organization for Agricultural Development

At the present time, the principal mechanism being employed to develop the agricultural plant is the so-called "package" program and area development schemes such as CADU, WADU, and Ada. In these programs, which vary somewhat in their makeup, the basic technique is

4/ CSO Statistical Abstract 1970, IEG, Addis Ababa.

to concentrate inputs, technical services and auxiliary services in a limited area to achieve maximum impact. Aside from the increased output, and presumably improved level of living resulting from these regional projects that have only limited area coverage, there will be substantial multiplier effect through the demonstration of gains to be made through adoption of the new procedures and methods. In the Pulse Development Program, most production for increased exports will come from commercial scale farms. 5/

5/ For purposes of this project proposal, neither commercial nor subsistence scale farms have been suitably described previously. This report will use the following definitions:

Subsistence Farm - Any farm unit selling 25% or less of its produce for cash or barter.

Commercial Farm - Any farm unit selling more than 25% of its produce for cash.

Large Commercial Farm - Any farm unit with more than 1 gasha (40 hectares) of cultivated land, and operated without tenants.

III. TECHNICAL ANALYSIS

A. Project Description

The primary objective of this project is to stimulate production of pulse crops in Ethiopia to increase the quantity available for export. By increasing pulse exports substantially, an important contribution will be made to correction of the seriously unfavorable balance of trade. At the same time, farmers and others involved in production and marketing of pulses will benefit measurably from the program. In the beginning, the production program will be centered on white haricot beans in five areas that appear to offer favorable conditions for producing much larger quantities of this crop. [6/] In these areas it is estimated that plantings of haricots [7/] might be increased from less than 16,000 hectares during 1965-72 to over 52,000 hectares in 1977 and 105,000 hectares in 1982. Yields could advance from 8.2 quintals per hectare to 12.6 and 18.9, respectively. This would move export availability of haricots in the project areas from 13,000 metric tons in the base period to over 66,000 metric tons in 1977 and 198,000 metric tons in 1982. (see Table 2).

It is planned that the bulk of the increase in output will come from medium and large scale commercial farms. In the Dire Dawa-Jijiga and Dese areas, however, the small, peasant-operated farms will be an important factor in the pulse production program. Although emphasis is to be on haricot beans, it is anticipated that as the research and extension services gain knowledge on other pulse crops, they too will gain momentum and contribute more importantly to Ethiopia's export trade. Pulses other than haricot beans are currently produced largely by the subsistence farmers. This pattern is not expected to change greatly in the near term, even though the pulse project may induce some shifts in production.

A number of closely coordinated measures will be used in the implementation of the proposed pulse production project. The major components of the integrated program and those that require varying degrees of funding are:

6/ The areas are Awasa, Awash Valley, Dese, Dire Dawa-Jijiga and Nazaret (south).

7/ Throughout this report the term "haricot" refers to the medium and small size white, haricot-type bean.

1. A semi-autonomous Pulse Development Unit (PDU) will be established. This unit will be responsible to the Minister of Agriculture. The inter-ministerial liaison committee will determine basic operating policy of the PDU and for the pulse development project. The PDU may carry on its activities through its own personnel; or certain phases of the project may be carried out by other agencies, with policy direction, coordination, and funding provided by the PDU.

2. Technical assistance in specialized fields will be provided through the medium of a 5-year contract. These technicians from abroad are expected to have managerial and fiscal responsibilities for at least the first three years. As Ethiopian personnel become qualified, the role of the foreign technician will become advisory in nature. A six-man team, supplemented by consultants, and a modest amount of equipment, materials and participant training will constitute the technical assistance element of the contract.

3. Production inputs associated with necessary improved practices will be provided in limited amounts. These inputs will include improved seed of desired varieties, fertilizer, and certain agricultural chemicals.

4. Supplemental marketing facilities, mainly cleaning and calibrating equipment and storage space, will be required as production for export increases. These facilities may be added to the Ethiopian Grain Corporation (EGC) plants in the five selected production areas or they may be set up independently by the PDU.

5. An especially designed unit of professional extension workers will be set up to work with and advise participating pulse growers in the five selected areas. This staff may or may not be attached directly to the Extension and Project Implementation Department (EPID) or EGC in the field, but in any event, it will be controlled and coordinated by the PDU.

6. An intensive research effort on haricot beans and other pulses will be sponsored by the pulse production project. The Institute of Agricultural Research, in cooperation with the PDU, will design and conduct a program of applied research aimed at both increasing output and improving quality of pulses for export. Attention will also be given to the introduction of pulse crops that are new to Ethiopia but which are in demand abroad.

7. Production credit, tailored especially to meet the needs of pulse growers, will be a central factor of the production program. This credit will be important in determining the success of the project. It will be supplied with supervision involving the use of a farm plan. Primary emphasis will be on short-term loans to cover production costs but provision will also be made for intermediate-term loans (up to 5 years) on a more limited scale. Production credit supervisors are to be stationed in each of the five areas selected for the pulse production effort.

8. To provide a minimum level of effective price assurance to farmers participating in the pulse production program, the PDU will set up and operate a commodity loan program that would initially be available to all bona fide growers of haricot beans. This program may be channeled so that storage facilities of the EGC are used for beans pledged under the commodity loan program. Such loans would usually be made in an amount approximating the estimated average cost of production. They would run for 10 months and if not redeemed, the beans pledged would be taken over by the lending agency.

Recent annual exports of haricot beans have ranged from 17,000 to 19,000 metric tons. Using Eth. $500 metric ton fob Ethiopian ports, an 18,000 metric ton export represents Eth. $9 million. We estimate that Eth. $300 million in added exports will be realized by Ethiopia through the proposed pulse development project during the 10-year period from 1973 through 1982. This increase in foreign exchange earnings can be achieved through a total incremental commitment of less than Eth. $40 million in new, direct project funding.

B. Organization and Management

1. Policy and Coordination

A pattern of organization and administration for agricultural development centering on package projects appears to be well established in Ethiopia. Examples of these projects include the Chilalo Agricultural Development Unit (CADU) and Wolamo Agricultural Development Unit (WADU), and the Ada Agricultural Development Project near Debre Zeit. The objective of these projects is to improve the status of farm families within the development unit boundaries.

Since the Pulse Production Project is concerned primarily with a commodity (initially white haricot type beans) for export rather than the development of an area, a somewhat different type of organization and management is necessary.

The inter-ministerial liaison committee will determine basic operating policy, and provide guidance for the project. The committee will also provide coordination assistance at the ministerial level and will review functions and progress of the project. This committee also provides guidance to all projects associated with the EPID in the Ministry of Agriculture, such as WADU, CADU, etc.

2. Project Organization

Budgetary provision for a contract technical assistance staff has been made for a period of five years, and is shown in Table 4. It is generally agreed that the transition from a joint operation including the contract staff of expatriate administrators, to complete direction by the Ethiopian staff should take place as soon as practicable within the five year period. The day-to-day management of the PDU will likely be in the hands of the expatriate director for at least the first three years, but he will be supported by an Ethiopian deputy director. By the fourth year the expatriate will be expected to function as an advisor to the Ethiopian director. The project director will be responsible to the inter-ministerial committee for all policy matters and will report administratively to the Minister of Agriculture.

Figure 1 shows the relationships of the PDU with other IEG units and with the autonomous and semi-autonomous IEG units. We recommend that the PDU be administratively responsible to the Minister of Agriculture directly as shown rather than through the head of EPID. The inter-ministerial committee will be the final arbitrator in all policy matters.

The EGC is the link between the farmer and the export purchaser so direct contact lines must be arranged for.

The Institute of Agricultural Research (IAR) will conduct research either through contract or direct funding so direct contact lines must be open at all times.

Direct contact lines are shown with the extension division of the EPID, but not with EPID as such. It is only the extension activities that the PDU is directly concerned with.

Close liaison must be maintained with the Agricultural and Industrial Development Bank and with agencies concerned with quality control and export of beans.

Figure 2 shows proposed organization for the Pulse Development Unit.

The Pulse Development Unit (PDU) Director will be assisted by the heads (assistant directors) of four departments: Finance and Accounting, Marketing and Supplies, Credit, and Extension and Research (see Figure 2).

The Finance and Accounting Department will handle the project accounts and receive and disburse funds on behalf of the Director.

The Marketing and Supplies Department in cooperation with EGC, will be responsible for developing policies to guide export marketing, accumulation and dissemination of market information, accumulation of information on sources and prices of supplies and making logistic arrangements for moving these supplies to Area Service Centers at EGC branch/regional locations.

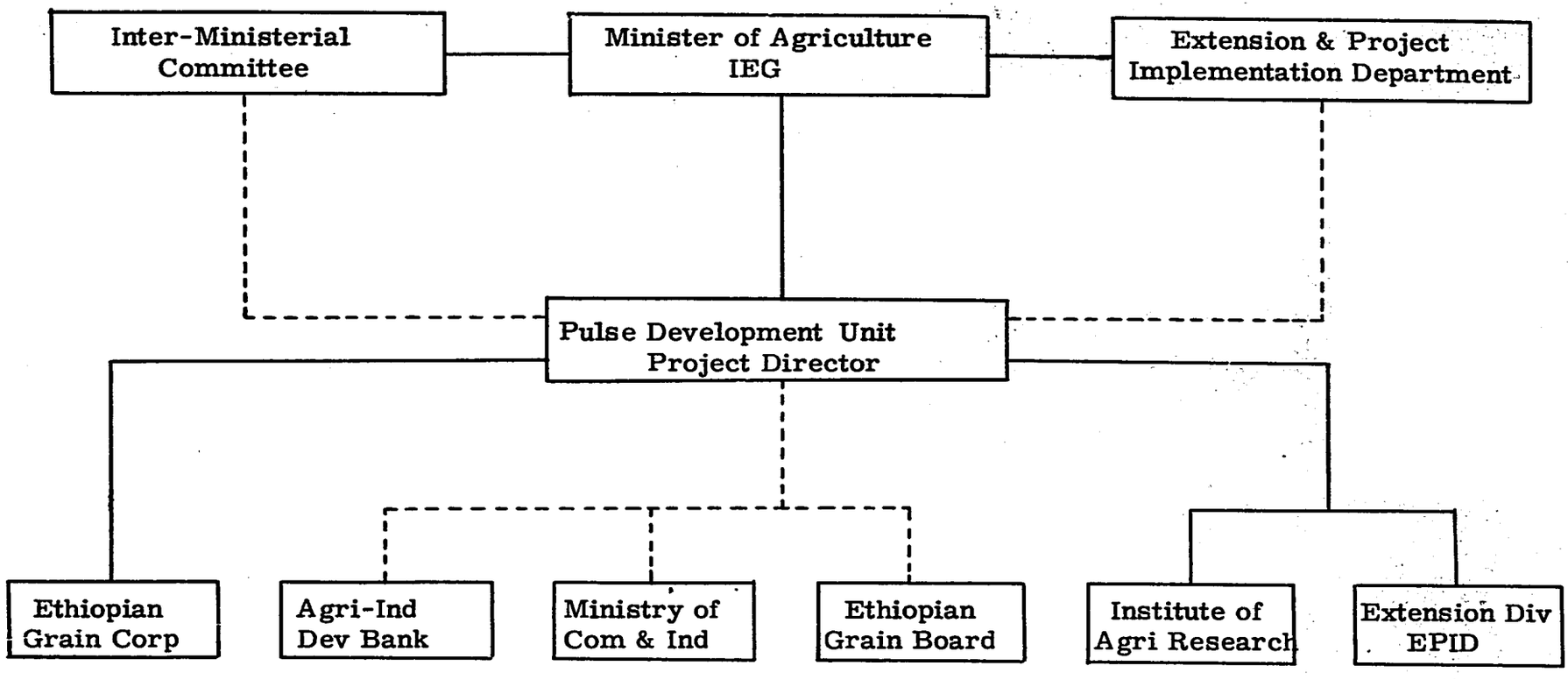
The Credit Department will be responsible for developing loan and credit policies and will also be responsible for supervising loans and credit arrangements.

The Research and Extension Department will be responsible for accumulating, interpreting, and effectively distributing production practice information to all farmers participating in the project. It will also cooperate with the Extension Service Division of EPID. Research will be done by IAR in accordance with a contract specifying work to be done, locations of work, and report specifications.

There are several different procedures which could be used to establish an effective organization at the field level. The Ethiopian Grain Corporation through its local and regional units, offers an interesting possibility. For the purpose of this report, these local units will be called Area Service Centers, with the understanding that they will include pulse processing and storage facilities. Area field personnel will have their office facilities at these Service Centers. All area personnel will, however, be free to provide service to other pulse processing and handling facilities.

Field research technicians may be assigned to the IAR by the PDU. The research technicians may have their headquarters at an Area Service Center if there is no IAR experiment station in the area identified as needing research activities.

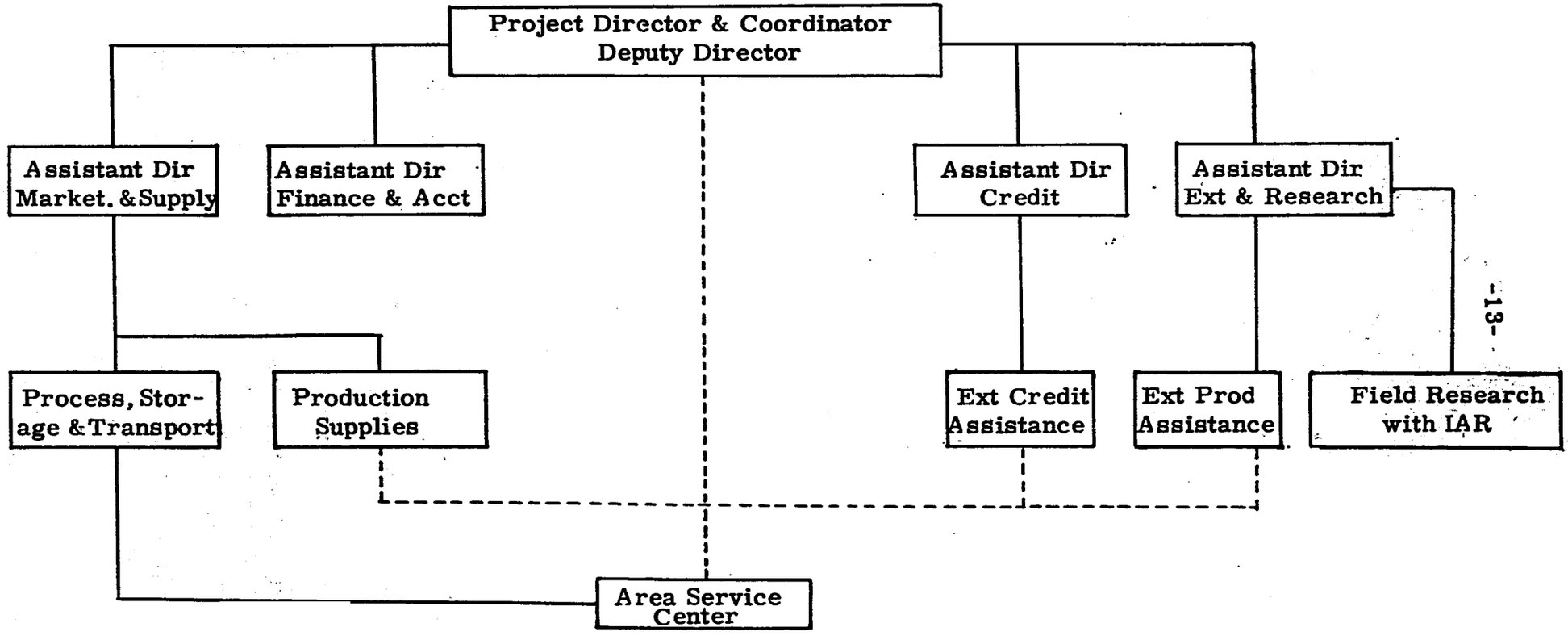
FIGURE 1. PULSE DEVELOPMENT UNIT -- POLICY, DIRECT CONTACT, AND LIAISON LINES



--------- Liaison and Information Lines

———————— Policy and/or Direct Contact Lines

FIGURE 2. PROPOSED ORGANIZATION PATTERN OF THE PULSE DEVELOPMENT UNIT (PDU)



Production supplies such as seed, fertilizers and chemicals can be handled at the Area Service Centers, thus providing more nearly full-time employment to grain processing and storage personnel. For estimated funding requirements for principal Ethiopian staff of the PDU see Table 3.

3. Technical Assistance

To be successful, the pulse production project will require a high concentration of special knowledge and skills at several crucial points in the program. Certain salient features of the effort are entirely new or relatively untried in Ethiopia. In this setting it is considered necessary to provide outside technical assistance over a 5-year period to ensure that the Ethiopian staff will have readily available additional sources of information and supplemental guidance needed to implement the proposed program (see Table 4 for funding).

Services provided by the contract personnel will be managerial in nature during the first years of the project. Managerial and fiscal responsibilities will be relinquished to Ethiopian personnel when a satisfactory level of competence has been achieved, and the contract personnel will then function in an advisory capacity.

Contract personnel at the professional level would logically include the following types of individuals:

1. Chief of Party and Project Coordinator
2. Pulse Production Officer
3. Pulse Research Officer
4. Agricultural Credit Officer
5. Marketing Officer
6. Pulse Processing and Storage Officer
7. Consultants for Training and Other Special Services

To have maximum impact on program planning and implementation it may be advantageous to retain these advisors beyond a single 2-year tour of service in Ethiopia.

Briefly stated, the advisory staff would have these major functions to perform in cooperation with IEG staff and others who may be involved in the pulse development project.

The Chief of Party (COP) is to be responsible for coordinating advisory staff activities and for discharging the administrative duties related to the party's operation in the pulse program. In addition, the COP will work closely with the IEG Project Planning and Implementation Department (MOA) in devising ways and means of furthering the pulse

production and export effort.

The Pulse Production Officer will be involved in all extension activities relating to the project. He will have an important training function to perform in connection with programming of the special extension staff assigned to the pulse project. He will provide subject matter guidance to extension and to some extent, to research workers as well.

The Pulse Research Officer will work with IAR and other agricultural research personnel in determining what pulse crops should be tested, and where and how research is to be performed. He will advise on research methods and on making results available for adoption in the pulse development program. The research officer will also have an important part to play as an associate in designing the program of the pulse production advisor, and vice versa.

The Agricultural Credit Officer will assist the EGC in providing production and commodity credit, in developing policies and designing operating procedures for this segment of the pulse development program. This officer must be thoroughly grounded in the concept and practices of the supervised credit technique. He will also need comprehensive knowledge of procedures employed in managing agricultural credit. In this position, training of credit supervisors assigned to the project areas will be an especially important part of the work program.

The Marketing Officer will have a broad-based responsibility for participating in industry-wide efforts to improve quality in Ethiopia's pulse exports and encouraging promotional efforts in export markets. He will work not only with IEG officials and agencies but also with the private sector which plays a dominant role in the pulse export trade. Some attention will also be given to prices, costs and margins in an effort to improve pulse marketing efficiency. This officer must have had some exposure to export marketing policies and practices.

The Pulse Processing and Storage Officer will train local personnel in the installation and operation of facilities used in the processing of pulse crops for sale. He must be able to provide at least a limited amount of on-the-spot assistance in solving problems, in plants where pulses are cleaned, calibrated, packed, stored and otherwise treated before movement from Ethiopia to markets abroad. It is obvious that this officer must have a very practical background in the mechanical and engineering aspects of pulse handling and marketing.

The Consultants will be required during the initial two years of the pulse production project when the need for training and provision of special instructions to IEG personnel will be especially heavy. Consultants will be employed for short terms to supplement the efforts of the contract advisors, particularly in the extension, research and credit programs.

4. Production Inputs

There was essentially no production of improved haricot bean seed in Ethiopia in 1971. The pulse production project will, therefore, require importation of white haricot type bean seed during the first 3 years. After the third year, it is anticipated that all seed requirements will be met from seed produced within the designated areas.

Fertilizers and weed or insect control chemicals will be continuing items, increasing as the hectares increase. Fertilizer requirements have been estimated and are shown in Appendix Table A-19; subsequent research work may require some adjustment in these figures. These fertilizer requirement figures are based on an application of 75 kilogram/hectare of diammonium phosphate at a cost of $38 per quintal.

It is not possible at this time to predict which or how much chemicals may be needed for weed, insect, or disease control. However, these items will not have extensive budget requirements, at least not in the near term.

The Pulse Development Project has been designed to provide personnel and funding to achieve a rapid start in haricot bean production to improve the balance of trade for the Empire. We firmly believe that the recommended organization, staff, facilities, and funding should be terminated as quickly as possible and the segments taken over by existing governmental units and private organizations. If the government agencies are to assume these responsibilities they must be in full operation within 5 years. If private companies are allowed to assume these responsibilities they will have done so within 5 years. Based on these considerations we recommend funding for imported production inputs to be terminated at the end of 5 years.

a. Fertilizer Needs for Pulse Production Project. Research information on rates and type of fertilizer for pulses is essentially nonexistent in Ethiopia. Excellent yield response has been obtained at the Awasa Experiment Station using 100 kilogram/hectare of diammonium phosphate on white haricot beans. In one trial on late planted beans,

the fertilizer treatment increased the yield from 10 quintal per hectare to 16 quintal per hectare, or about 60 percent. In an earlier and more optimum planting date, the same fertilizer treatment increased the yield from 19 quintals per hectare to 40 quintals per hectare, or about 110 percent.

It is not anticipated that this type of response will be general in the Awasa area. However, it is expected that the use of fertilizer will be highly profitable.

There is considerable probability that a fertilizer application of a similar rate of triple superphosphate would be adequate for beans. In most countries this would be much cheaper than the DAP which is mainly used for cereals. However, in Ethiopia under present conditions, the DAP sells at a lower price than triple superphosphate. This situation may change if a larger volume of fertilizer is purchased or other conditions change.

It is probable that only negligible amounts of fertilizer will be used in the near term in the Awash and Dire Dawa-Jijiga areas. It is estimated that fertilizer will be used on only about 5 percent of the bean hectarage the first year in the Awasa, Dese and Nazaret - South areas and that this will increase progressively to 25 percent by the fifth year.

Appendix Table A-19 gives the estimates of hectarage of beans attributable to the project, the percentage of this area that will be fertilized by years, and the cost of the fertilizer.

b. Seed Requirements. Most of the seed requirements for the project will likely be supplied from imports during the first two years and less than half in the third year. The total requirement of seed, if domestically produced, would take 8 percent of the crop area the first 2 years, then gradually decrease to 6 percent the fifth year and 4 percent the tenth year.

It is presumed, that the influence of the project will increase the seed requirements by the following amounts, shown here and in Table A-20 of the Appendix.

PROJECT YEAR AND TONS OF SEED NEEDED

	1	2	3	4	5	6	7	8	9	10
Metric Tons	158	479	791	1,305	1,768	2,195	2,445	3,456	3,845	4,290

These seed requirements are based on a seeding rate of 60 kilograms of seed per hectare in the Awasa and Awash Valley areas, and 70 kilogram seeding rates in the other areas. No allowance has been made for clean-out. It is assumed that most of the seed will be grown especially for this purpose, the crop will be better tended, and higher yields will compensate for the clean-out.

The estimated hectarage of land required for seed produced was calculated on the basis that seed will be produced in the area where it is to be used (Appendix Table A-21). This may not always be the case, but seed should not be transported over 100 kilometers due to high transportation costs, and possible problems of adaptation.

It is assumed that amounts of seed imported will be at least 150 tons the first year, 400 tons the second year and 300 tons the third year. After the third year, it is assumed that the Ethiopian seed production efforts will meet the domestic needs. The cost of imported seed is estimated to be Eth. $800 per ton.

The funding for needed imported production inputs are shown in Table 5.

5. Extension Services

The Pulse Development Unit expects to depend on small and large scale commercial farmers to meet the established production goals of haricot beans in the early years of the project. Any farmer may participate in the project and receive the benefits from it. At the present time, the extension service of the EPID has neither the staff nor the skills to work effectively with commercial farmers.

The Third Five Year Plan (TFYP) of the Ministry of Agriculture recognized the need for supplying commercial farmers with agricultural services, but through 1971 no direct attempt had been made to satisfy these needs. Indirectly, through the research efforts of the Institute of Agricultural Research (IAR), the commercial farmers have benefited just as have other farmers. Appreciable additional research will be needed to supply a suitable educational base for efficient pulse production.

The funded staff of extension specialists must have the technical background, skills and ability to work effectively with commercial farmers as well as with peasant farmers. The staff, as a group, must not only understand pulse production and financing problems, but also be able to help farmers solve these problems. The agronomy staff members must be able to conduct any needed "off station" research under the direction of the IAR. The credit and loan staff must be able to provide farm management assistance and credit counseling (Table 6).

It is anticipated that this unique and specialized extension service staff will provide a new dimension to the services offered to farmers of Ethiopia. Indirectly, through in-service training, the Minimum Package personnel will benefit measurably. It is through these efforts that the peasant farmers will be phased into the pulse production project after the initial expected lag time.

6. Research Services

The primary objective of this project is to increase production of white haricot beans for export, and the research services recommended here are largely directed toward that end. There are also export opportunities for other pulses so research activities on these crops must be conducted at the same time.

The term "Haricot" bean in Ethiopia is used to designate a wide range of varieties, shapes, sizes, and colors of dry beans. For this project the term must be restricted to consider the medium and small size white haricot beans with specific attention to the varieties represented by the Michigan Pea Bean, Mexican 142 and Tenguru 16.

Research in the early years of the project will involve mainly a screening program to select varieties of haricot beans and other pulses best suited to the principal areas of production. A minimum of three years will be required to obtain reliable data even for presently available germ plasm.

The Institute of Agricultural Research must conduct this research. The present staff and facilities are not adequate for this added responsibility. This project will recommend types of activities necessary to obtain the necessary information and provide funds we believe will be required to carry out the necessary activities. The following details are included as a guide for the IAR. If the necessary data can be obtained with a different "mix" of personnel, activities, and equipment, this is the prerogative of the IAR. The required information must, however, be obtained on schedule. Funding for this research can be handled as shown here or a similar amount of money can be made available to the IAR on a contract basis.

Concurrently with the screening program, there must be adequate agronomic studies to solve the problems of:

1. Plant spacing - both between rows and within rows
2. Time of planting
3. Method of seedbed preparation
4. Method of planting

5. Fertilizer kind, rate, and time of application
6. Use of inoculants
7. Weed control - chemical, mechanical, and hand
8. Chemical control of insects and diseases
9. Interplanting of beans with sorghum or maize in some areas
10. Any other studies necessary to promote efficient production of the crop

By the fifth or sixth year of the project, there should be sufficient information obtained on some of the above items, including selection of varieties, that a portion of the effort and expense could be diverted to a breeding program.

In addition to the agronomic studies listed, there must be a program of testing for methods of harvesting, grading, and storage of the product.

These studies must be conducted at 6 locations in the 5 project areas. Demonstration work on farmer's fields which will incorporate the most promising results of the research work, will be conducted by the extension service under direction of the IAR.

To meet the needs of this research program, the following personnel are suggested:

1. One expatriate pulse research agronomist with an M. S. or better training will be required. This person will be provided by the technical assistance contract and assigned to the IAR.

2. One Ethiopian counterpart research agronomist with an M. S. degree will be required. After 3 to 5 years, the expatriate might be phased out leaving the counterpart to be in sole charge.

The research agronomist will have the duty of preparing specific research plans for each center, and insuring that such plans and materials are at the appropriate centers in ample time for inclusion in the program. In consultation with the Director of Research and Extension, and the manager of the IAR, the research agronomist must arrange for adequate land, equipment, labor, and other facilities at each center to get the required studies underway. He will also have the duty to regularly visit each center to ascertain that the studies are being properly conducted and to consult on any new problems which may develop.

3. Each of the 6 locations will require a research technician. This technician will be responsible for conducting and supervising the actual

field operations needed to carry out the research outlined by the research agronomist. They will regularly take notes and make reports to the research agronomist and consult on any unexpected problems which may develop.

Salaries and expenses, equipment, etc., needed for the research personnel, are shown in Table 7.

7. Production Credit

Pulses for export will not be produced in quantity without the strong support that can result from a credit program tailored to fit the needs of pulse producers. In this proposed project, credit is clearly a key factor as it will facilitate the use of improved practices needed to increase production and also serve as a management tool through use of supervised credit techniques. With emphasis on commodity production rather than farm units as such, the credit approach is suggested as the vehicle through which those participants lacking sufficient resources to increase their output will be able to borrow needed funds on favorable terms. It is not intended, for example, to program a specific number of tractors for pulse growers but rather to base acquisition of machinery on a case-by-case basis. Credit would be provided only where it can be demonstrated conclusively that it will further the objective of the program; i.e., increased production of pulses, including improved seed.

In broad outline the suggested credit segment of the pulse production program is as follows:

a. Channel. The Ethiopian Grain Corporation (EGC) can serve as the administrative agency through which special loans for pulse production are to be channeled. Because the EGC is already making some loans to pulse growers, as well as the expectation that the Corporation will be heavily involved in pulse marketing services, it appears that the EGC may be in better position to integrate the credit activity into the entire production and marketing operations. If at some later date there is a change in conditions or in IEG policy on agricultural credit, it may be necessary to consider other alternatives in operation of the pulse credit.

b. Terms. Primary emphasis will be on short-term production loans running up to 18 months. Intermediate term loans for 18 months to 5 years will also be needed on a much more limited scale for the purchase of machinery, construction of on-farm storage, etc. It is anticipated that the longer-term loans will not make up more than 20 percent of the total. On a selective basis and only where other sources are not available, credit may occasionally be extended to dealers who handle production inputs or who provide necessary marketing services. Interest should be at a rate consistent with rates charged by banks and other agencies. Security for loans could consist of a pledge of the crop or a mortgage on

real or personal property. Another possibility is to require one or more co-signers. The security requirements must not be so stringent, however, that they dampen the loan program effectiveness. It may be necessary to place an upper limit on individual loans but if this is done, the limit must be set in full realization that this program will succeed only if the larger scale farmers become involved; and their needs are much different than those of subsistence farmers.

c. Supervision. Borrowers would generally be required to operate on the basis of a farm plan developed jointly with the local production loan supervisor. Loan funds would normally be released in installments upon a showing that the farm plan is being implemented properly.

d. Staff. Key personnel in the credit program are the production loan supervisors stationed in each of the five areas where pulse production is to be stimulated. With the help of local advisory committees and possibly the local EGC staff, the loan supervisors must have a reasonable degree of authority to screen applications and approve loans; otherwise, the program may bog down in bureaucratic procedures. In the central office administering the loan program, provision must be made for senior staff consisting of a production loan director with a small group of subordinates and an accounting group. Exact staffing requirements will need to be determined by the Pulse Development Unit, the EGC (or whatever other organization is involved) and the contract credit advisor. It is essential that the field supervisors be well trained and aware of farming techniques and practices applicable to pulses. Salaries must be high enough to attract and hold qualified personnel; this would imply an annual salary of perhaps Eth. $8,000 or more. Field personnel must also have access to transportation if they are to be effective in their assignments.

e. Funding. Funds from which loans will be made to pulse producers will be allocated to the selected lending organization (EGC or otherwise). The fund so created will be a revolving account subject to separate accounting. During the initial two or three years of the project, income from interest may not cover administrative costs, especially with a relatively heavy early outlay for equipment, supplies, etc. For this reason, it will undoubtedly be necessary for the pulse project to cover all or a major part of the administrative costs for perhaps 18 months and a smaller proportion during the following year. Just how large a loan fund may be required to accomplish the desired results is a highly problematical question, It is complicated by the fact that little progress has been made in providing institutional credit. It is safe to assume that a substantial number of pulse growers will not seek credit because they do not need it or have other sources available. Others will require financial assistance in varying degrees.

In view of the indicated uncertainties, about the only approach to estimating credit needs is to fall back on experience in certain other developing areas. Where heavy reliance is placed on credit in stimulating production it is often necessary to provide loan funds equivalent to 20 percent or more of the value of the commodities produced. Another consideration is the fact that the larger, commercial-type producers generally require proportionately more credit than the operators of smaller units. This approach to estimating production credit requirements is used as a first stage in arriving at the funding needed for this purpose in the pulse production program; adjustment may be in order after experience indicates the adequacy of the estimates. Carryover, because of loans running for more than 12 months, is estimated at 25 percent of loans made. By using this formula and estimating the assistance needed on administrative outlay in the beginning, Table 8 was prepared to indicate the order of magnitude of funds required to support the credit phase of the haricot bean production program. Although the pulse production project initially concentrates on haricot beans, it is entirely possible that other pulses will, at a later date, come in for credit support.

8. Price Maintenance

No other single factor concerns present and prospective pulse producers, particularly those who operate on a commercial scale, more than the assurance of a reasonable return for their crops. In the past the price of pulses has fluctuated considerably from year to year and even seasonally within a year. Haricot beans, for example, were depressed in price from 1967 to 1968. This may have slowed production and thus contributed to the decline of exports in 1969. Conversely, the price of haricots was unusually high in 1971 and interest in the crop was stimulated measurably. Such response to price is not unique to Ethiopia; it is found many times in both the advanced and less developed areas.

In connection with the pulse production program suggested for Ethiopia, it is believed both necessary and desirable to include certain measures for price maintenance. This is suggested in full recognition that price support programs are often controversial and at times have been very costly. In general, there are two principal means of approaching this type of program. One is through a price support-purchase program and the other is a commodity loan mechanism. The basic difference in these methods is that in the purchase approach, ownership of the commodity is transferred immediately to whatever government agency is operating the program. Where the commodity loan is used, the owner (usually the farmer) retains title and can redeem the pledged goods in case the price improves. Even in the loan programs, however, the commodity

generally reverts to the lending organization in case the borrower does not pay off the loan; this happens especially when prices do not improve or decline. For the most part, the purchase program is more expensive to operate and involves more risk to the operating agency, partly because the support purchase price may include a profit incentive or subsidy, whereas the loan is often related more closely to cost of production. The purchase method frequently places the government in direct competition with the private marketing sector. Commodity loans are less likely to create this type of interference.

To encourage Ethiopian farmers to grow more haricot beans for export it will likely be necessary to provide a price guarantee of some kind. At present the Ethiopian Grain Corporation is purchasing beans in the country markets. This activity should be encouraged; particularly if the EGC is providing a degree of price leadership. In the pulse production project, however, the commodity loan may have greater merit than outright price support through purchase (the EGC has already had one unfortunate experience in this field). It is suggested, however, that the EGC might serve as the agency through which the loan program is to be operated. The Corporation will probably be involved in the production loan activity and will also be providing cleaning, calibrating, and storage services. To a considerable extent, both personnel and funds can be used in a dual capacity for the production and commodity loan program.

Major features of the commodity loans on haricot beans would be as follows:

1. Loans would be made to any bona fide grower in the Empire, whether or not his farm is in the project areas, who brings beans for storage at the EGC or Area Service Center plants located in the five project areas. A minimum of perhaps 20 quintals might be required. At some later date it may be practicable to consider loans on beans stored in warehouses not controlled by the EGC.

2. The loan rate (per quintal or metric ton) would be specified in advance of planting, if possible, and the level would be at or slightly above the cost of production. On the basis of information currently available, the loan rate on haricots might be in the Eth. $25-30 per quintal range on uncleaned beans. $10-12

3. Commodity loans would be for a maximum of 10 months at interest consistent with the risk involved and with rates charged by banks and other agencies. These loans would also be non-recourse in type; that is, the beans would revert to the lending agency (EGC, PDU, or otherwise) if

the loan was not paid at maturity. Beans that are not redeemed would be sold to exporters or exported by the lending agency itself. In the latter case, it is assumed that such exports would be facilitated by all IEG agencies involved.

This type of price maintenance is a limited program aimed mostly at minimizing the sometimes drastic seasonal price fluctuations. At the same time it gives growers an assurance that they are taking a minimum risk of losing money through participation in the pulse production effort. It will not, of course, assure high cost operators of a break-even return. In light of the very favorable outlook for pulses during the 1970's and beyond, there is little liklihood that a minimal price maintenance program such as is suggested, will prove to be a financial burden to the IEG. As in the case of production loans, details of how this program is to be administered will need to be considered by the Pulse Development Unit, the EGC, and the contract advisors on credit and marketing.

Funding of the commodity loan program must necessarily be on somewhat of a standby basis. This is the case because from year-to-year there is no way of knowing what the price behavior will be or if indeed, any growers will seek loans on their beans. Proceeding on the assumption that 15 percent of the haricot beans produced for export in the five project areas might be offered for commodity loans, an estimate can be made of the funding that may be required from 1973 to 1982. This type of loan is relatively easy to administer and it should not be necessary for the pulse project to defray any administrative costs other than those involved in setting the program up for operation. Beyond that, interest income and storage fees should be ample to cover the expenses on the commodity loans. It should be possible to use the production loan supervisors to provide the bulk of the field services in the commodity loan program. The initial assumption on the proportion of the crop that might be placed under loan may or may not be realistic. Adjustments should be made as experience is gained in operating the program. Even though few growers may actually place beans under loan, there is strong justification for carrying the program on a standby basis. This would require a modest outlay of project funds for maintenance of a minimum administrative structure (see Table 9).

9. Marketing Services -- Processing and Storage

An orderly, efficient marketing system for export of beans or other pulses requires a network of handling, processing and storage facilities. Four types and sizes of units will eventually be needed:

1. Small commercial farm storage, 5 to 12 tons.
2. Large farm storage with processing facilities, 600 to 1,200 tons.
3. Area Service Centers with processing facilities and storage expandable

to 20,000 or 30,000 tons.

4. Port holding or warehousing facilities for 10,000 to 20,000 tons.

The larger farm and Service Center units will probably serve for more than one crop. They would be built initially with multiple use in mind. To meet the needs of the pulse project, it will be necessary to construct the facilities specifically to handle beans. Processing (cleaning, sizing, and special grading) requires bulk handling within the plant for efficiency of operation, even though the beans will continue to be transported and exported in bags.

Beans harvested and threshed during the dry season in Ethiopia are dried naturally to 11 percent or less moisture content. In the United States the white navy pea bean is usually harvested and threshed with moisture content of 16 to 18 percent. Beans at 16 percent are readily accepted at most markets with no moisture discount, and the moisture content of processed beans in market channels commonly varies from 16 to 17 percent. Beans below 15 percent are considered more fragile and subject to abrasion and breakage when handled and processed by mechanical equipment, but there is little in the way of experience or test observations in the US involving the handling of beans at low moisture content.

Special studies will need to be conducted in Ethiopia at the beginning of this program to determine the best methods of handling beans having a low moisture content. Acceptable methods of handling, elevating, spouting, cleaning, processing, etc. must be determined and developed. The type and limitations of bulk handling methods for processing and storage of pulses should be determined as soon as possible so that sound planning can proceed in the expansion programs at the marketing centers.

Initial facilities at all Area Service Centers will provide for warehousing or holding lots of sacked beans without loss of identity. Commodity loans at a supported price will likely be available for a limited time (10 months). These loans are to be secured by pledge of beans stored at the Area Service Centers and can be redeemed by repayment plus interest with release of commodity to owner, or by surrender of the beans to the lending agency. While a system of maintained identity is considered necessary at the start of this project and physically feasible for limited numbers of small lots of sacked grain, consideration should be given to longer range plans to establish eventually a warehousing system to provide for comingling or common bin storage of beans. In the bulk system all deliveries are weighed, sampled (with all sacks preferably dumped) and graded. As comingling develops and where maintained identity is requested or desired, a special charge for this special service may be warranted; this might discourage the practice. The planting of better, more uniform seed and improved harvesting and processing practices should result in a higher quality

of beans with little or no dockage or grade discount, which would facilitate comingling as a standard practice.

The plan-sketch in Appendix Figure A-2 illustrates a systematic development plan suitable for any of the five Area Service Centers. Starting with a recommended minimum of 3,000 tons of sack storage and minimum equipment, additional capacity may be provided as required by extending the unit which is an expandable, convertible type. The first 4 bents (sections) of the plan provide 2,000 tons sack storage plus a suitable working area for handling and processing beans. Increments of 3,000 tons can be added by each 4 additional bents constructed. The maximum size recommended for this type design is about 16,000 tons storage capacity. By utilizing an auxiliary 30 x 32 warehouse entirely for sack storage 4,000 tons additional can be stored, the two units would then have a total capacity of 20,000 tons.

An additional 6,000 tons (26,000 total) can be provided by converting the large warehouse structure to bulk storage by placement of 30 round steel bins as shown in the maximum unit layout in Appendix Figure A-2. The increased estimated cost per ton of additional storage capacity by converting to bulk is Eth.$11/ton. Before such large storage units and bulk handling facilities are built, it is highly desirable to have experience in operating the type of processing and storage facilities recommended for initial use in the Area Service Centers.

Funding for this project is restricted to handling, processing, and storage facilities at the five Area Service Centers. Estimated costs for building and equipping these facilities are based on the unit costs for warehouse storage as given in Appendix Table A-22, bulk bin storage prices as given in Appendix Table A-25 and typical fob prices for equipment listed in Appendix Table A-23. The total costs according to the size or capacity and type of storage, based on these unit costs and prices, are presented in Appendix Table A-24 for a range of capacities that can be built as required. On the basis of per-ton storage capacity, costs vary from Eth.$20 for the sack warehouse with minimum equipment to Eth.$31 for the fully mechanized bulk (and sack) facility.

Estimated funding for marketing service facilities listed in Table 10 is based on projected production shown in Table 2, assuming that all of the incremental gain under the project might be channeled through the area centers. Only the initial outlay requires a firm funding figure. If total requirements are less in the fourth year than shown in Table 10, the funds will not be used. However, if total funding requirements are greater in the fourth year than shown in Table 10, it will be necessary to draw on funding allocated for the seventh year of the project.

C. Estimated Potential Pulse Production

1. Selected Production Areas

Ethiopian production statistics for white haricot-type beans are neither current or accurate. Dalton and Christensen[8/] suggest that this is because most of the haricot beans are grown on commercial size farms which are not included in production surveys. In the absence of any precise production information, the Experience, Incorporated team made judgment estimates. These estimates were based on contacts with commercial farmers, pulse merchants, machinery dealers, IAR personnel, Ministry of Agriculture employees, and other sources. Five general areas have also been delineated where rapid expansion of haricot bean production appears most promising for the near and intermediate terms (0-5 and 5-10 years).

Other pulses such as chick peas, field peas, lentils, horse beans, etc. are a part of the traditional Ethiopian diet and are produced mainly on the small commercial and subsistence farms for home consumption. There is presently essentially no research or extension effort to stimulate increased production. For this reason, there does not seem to be much prospect that these other pulses will improve their position in Ethiopia's export markets in the near term. Consequently, primary emphasis in this report is being placed on white haricot beans. The five areas selected for detailed study and as sites for implementation of a possible Pulse Production Project are identified below (see Figure 3).

These areas are located so that existing irrigation, roads, and other infrastructure, except as detailed later, are deemed adequate to obtain the anticipated production.

1. Awasa Area

Sidamo Province. West and North part of Sidamo and East part of Wolamo Awrajas

Arusi Province. Southwest part of Chilalo Awraja

Bale Province. Northwest part of Genale Awraja

Shewa Province. South one-fourth part of Haykoch and Butajira Awraja.

8/ Dalton, J. H. and Christensen, Hans, "Prominence of Pulses in Peasant Farming in Ethiopia". February 1971, Planning Unit, IEG, Ministry of Agriculture.

FIGURE 3.

------- Approximate Boundaries of Development Areas

1. Awasa Area
2. Awash Valley Area
3. Dese Area
4. Dire Dawa-Jijiga Area
5. Nazaret South Area

* Area Service Centers

There are seven specific locations in the Awasa area from which the anticipated 25,000 hectares of bean production may be selected.

(a) The Awasa Agro-Industrial estate comprising 4,000 hectares, much of which is in sisal and producing very low returns.

(b) About 20,000 hectares of good land bordering the west side of Lake Awasa. This is partly used for maize, partly for pasture, and some mainly brush covered.

(c) The Bilate River Valley, comprising a total of 80,000 hectares suitable for irrigation if sufficient water was developed. About 4,000 hectares is now under irrigation with much more being readied. Considerably more could be dry-farmed for beans with a lesser yield.

(d) A tract comprising around 20,000 hectares 20-40 kilometers southwest of Awasa is presently mainly used for pasture.

(e) A tract comprising around 20,000 hectares east of Awasa, extending to the present site of Ethiopian Livestock Development ranch.

(f) A tract of around 30,000 hectares along both sides of the highway between Shashemene and Alaba. Some of this is now producing beans, some produces maize,and a considerable portion is used for pasture.

(g) A small area of up to 5,000 hectares in low land about 15-20 kilometers southeast of Awasa.

2. Awash Valley Area

Arusi Province. Northeast part of Arbagugu Awraja.

Harerge Province. Northwest part of Chercher and southwest part of Adal, Isa & Gara Gurcha Awrajas.

Shewa Province. East part of Yere and Kereyu and southeast part of Tegulet and Bulga Awrajas.

The middle and lower Awash projects have a potential of around 200,000 hectares of land suitable for irrigation when they are completely developed. Out of this amount it can reasonably be expected that 22,000 hectares, or about 10-12 percent, could be used for haricot bean production, either as a primary crop in rotation with cotton or as a double crop with cotton.

3. Dese Area

Tigre Province. West part of Raya & Azebo Awraja.

Welo Province. Eastern escarpment and associated valleys.

In the eastern escarpment of Welo and Tigre provinces, south and north of Dese, there is an estimated total potential of 147,000 hectares suitable for haricot bean production. About 30,000 hectares of this is south of Dese between Kombolcha and Robi, and 17,000 hectares is in several small valleys - between Haik and Weldya. The largest tract of an estimated 60,000 hectares is on the Raya and Kobo valley of northern Welo Province. Another large tract of an estimated 40,000 hectares is in the Chercher Valley of southern Tigre Province.

4. Dire Dawa - Jijiga Area

Harerge Province. Chercher Plateau, north part of Gursim and central part of Jijiga Awraja.

This area has two types of production. In the Chercher Plateau, bean production is mainly from inter-planting with sorghum and there is an estimated total of 80,000 hectares possible for this purpose.

East of Harar in the Babile District an estimated 5,000 hectares suitable for beans is now used for maize, groundnuts, and pasture. North and east of Jijiga there is a large region of several hundred square kilometers of good land but rainfall is limited. This region is only recently being developed by large scale commercial farmers for sorghum. Probably 150,000 hectares could be developed that is suitable for beans within 10 years. From these three totals, 18,000 hectares for beans within 10 years seems to be a reasonable expectation.

5. Nazaret - South Area

Shewa Province. East half of Haykoch and Butajira and southwest part of Yerer and Kereyu Awrajas.

Potential bean land in the Nazaret area includes a few thousand hectares along the Awash River within 20-30 kilometers of Nazaret which could be irrigated. The major portion of the area involves relatively level land on the floor of the Rift Valley from Zuai Lake south for 100 kilometers or more.

In each of the five areas selected, it is necessary to arrange an Area Service Center for purposes of collection, storage, distribution, research, extension, and other administrative matters. The suggested

Service Center locations are: (1) Awasa area - Awasa; (2) Awash Valley area - Awash Center; (3) Dese area - Dese; (4) Dire Dawa-Jijiga area - Dire Dawa; and (5) Nazaret - South area - Nazaret. It is desirable that the areas being considered should in general not extend more than 100 kilometers from the Service Center location. An exception might have to be made for the Nazaret - South area and the Dese area. However, the areas served generally would not have a 100 kilometer radius.

In the Awasa and Awash Valley areas, large scale commercial farmers will predominate. In the Dese and Dire Dawa-Jijiga areas, there will be both large commercial farms and small subsistence size farms, and in the Nazaret - South area the small and medium size commercial farms will predominate. This mix of types of farmers should provide the needed production and give important experience with peasant and small scale, commercial farmers, in a program to increase production.

In addition to the five major identified areas it is expected that the Extension and Project Implementation Department (EPID) Minimum Package areas, Demonstration areas, and Observation areas will be phased into the Pulse Production Project to make a significant contribution within five years. This will be possible through the use of special contract personnel in training efforts with existing EPID personnel as well as in the expanded research efforts by the Institute of Agricultural Research (IAR).

2. Estimated Projected Yields

Based on the best information and estimates available, base yields were established for each of the five identified areas. The base yields for the "present" are considered to be an average of the yields obtained for the 1969 and 1970 production years. The 1971 production year was not used because complete export data were not available to assist in making production judgments.

Tables 1 and 2 both show the "present" or base yields believed reasonable in the selected areas. It will be noted that Awasa, Awash Valley, and Nazaret - South areas have the same base yields. Growing conditions tend to be favorable for beans in these areas, and farmers use somewhat higher levels of technology and better varieties. Farmers on the Chercher Plateau of the Dire Dawa-Jijiga area produce much of their bean crop interplanted with sorghum. The Jijiga portion of this area has limited and sometimes deficient rainfall and interplanting is not practical. The Dese area is very new in white haricot bean production and production technology is at a low level.

Under the proposed program only small increases in yields can be expected in the first two years. Most producers will have had little experience with the crop, and production technology will also be very limited. By the third and through the sixth years new production technology is

expected to be generated from research, and extension personnel are expected to have contacts with all producers on a regular basis. Furthermore, farmers are expected to respond quickly to this improved technology. By the seventh year some variety improvement can be expected. Such improvement could be new varieties or selection from older varieties with better disease or insect tolerance or more tolerance to adverse environmental conditions. By the ninth or tenth year yield improvement is expected to be much more difficult to achieve and yield levels will be determined primarily by weather conditions. The dominating influence of weather is shown in the ninth and tenth years with lower yields expected in the Dese and Dire Dawa-Jijiga areas and higher yields in the more favorable and dependable Awasa and Nazaret - South areas. Highest attainable yields with comparable levels of technology can be expected under irrigation as represented by the Awash Valley area.

Table 1 shows the anticipated yields without the Pulse Production Project. Percentage increase in yields is expected to be greater in the areas dominated by large commercial farmers and where environmental conditions are more favorable and reliable. Thus, the Dese and Dire Dawa-Jijiga areas do not show the same percentage increase in yield as is shown in the other three areas. Yields in the irrigated Awash Valley are expected to double in the ten year period even without the program. This is because of lack of dependence on rainfall, and more importantly because of higher management levels.

With or without a special program effort the estimated yields do not approach yields already reported on the IAR experiment stations. In the longer term one should expect the best farmers to equal or surpass some of the experiment station yields.

3. Estimated Projected Hectarage

In the absence of any published information relating specifically to hectarage of white haricot beans in the identified areas, the Experience, Incorporated team agronomists and extension personnel along with their counterparts made a judgment estimate on the hectares planted to this crop in 1969 and 1970. This judgment was based on discussions with all known producers in the Awash Valley area, total purchases of pulses in the Dese and Dire Dawa-Jijiga areas and the best estimates available in the Awasa and Nazaret areas. Since the base or "present" hectarage appeared compatible with exports it is believed that the estimates are reasonable.

TABLE 1. ESTIMATED POTENTIAL AVAILABILITY OF HARICOT BEANS IN SELECTED AREAS FOR EXPORT FROM ETHIOPIA, WITHOUT SPECIAL PRODUCTION PROGRAM, 1973 - 1982

	1965-72 Assumed Base	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AWASA:											
Plantings (ha)	4,000	4,000	4,000	4,500	5,500	6,000	6,500	7,000	7,500	8,000	8,000
Yield (q/ha)	10	10	10	10	11	12	12	13	14	15	15
Production (m t)	4,000	4,000	4,000	4,500	6,050	7,200	7,800	9,100	10,500	12,000	12,000
AWASH VALLEY:											
Plantings (ha)	600	1,000	1,500	2,000	2,500	3,000	4,000	4,500	5,000	5,500	6,000
Yield (q/ha)	10	10	11	12	13	15	16	17	18	20	20
Production (m t)	600	1,000	1,650	2,400	3,250	4,500	6,400	7,650	9,000	11,000	12,000
DESE:											
Plantings (ha)	500	600	800	1,200	1,600	2,000	2,500	2,500	3,000	3,000	3,000
Yield (q/ha)	7	7	7	7	8	8	8	9	9	10	10
Production (m t)	350	420	560	840	1,280	1,600	2,000	2,250	2,700	3,000	3,000
DIRE DAWA-JIJIGA:											
Plantings (ha)	6,600	7,000	7,000	7,500	7,500	8,000	8,500	9,000	10,000	11,500	12,000
Yield (q/ha)	6	6	6	6	6	6	7	7	8	8	8
Production (m t)	3,960	4,200	4,200	4,500	4,500	4,800	5,950	6,300	8,000	9,200	9,600
NAZARET-SOUTH											
Plantings (ha)	4,000	4,000	4,500	5,000	6,000	7,000	7,500	8,000	9,000	10,000	10,000
Yield (q/ha)	10	10	10	11	11	12	12	13	13	14	14
Production (m t)	4,000	4,000	4,500	5,500	6,600	8,400	9,000	10,400	11,700	14,000	14,000
TOTALS (FIVE AREAS):											
Plantings (ha)	15,700	16,600	17,800	20,200	23,100	26,000	29,000	31,000	34,500	38,000	39,000
Production (m t)	12,910	13,620	14,910	17,740	21,680	26,500	31,150	35,700	41.900	49,200	50,600
Average Yield (q/ha)	8.2	8.2	8.4	8.8	9.4	10.2	10.7	11.5	12.1	12.9	13.0

TABLE 2. ESTIMATED POTENTIAL AVAILABILITY OF HARICOT BEANS IN SELECTED AREAS FOR EXPORT FROM ETHIOPIA, WITH SPECIAL PRODUCTION PROGRAM, 1973 - 1982

	1965-72 Assumed Base	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AWASA:											
Plantings (ha.)	4,000	5,000	6,000	7,000	9,000	11,000	13,000	16,000	20,000	23,000	25,000
Yield (q/ha)	10	10	11	11	12	15	16	19	20	21	22
Production (m t)	4,000	5,000	6,600	7,700	10,800	16,500	20,800	30,400	40,000	48,300	55,000
AWASH VALLEY:											
Plantings (ha.)	600	1,000	2,000	3,000	5,000	7,000	9,000	12,000	16,000	20,000	22,000
Yield (q/ha)	10	10	11	12	14	17	18	21	23	24	25
Production (m t)	600	1,000	2,000	3,600	7,000	11,900	16,200	25,200	36,800	48,000	55,000
DESE:											
Plantings (ha.)	500	1,000	3,000	5,000	8,000	10,000	12,000	14,000	17,000	19,000	20,000
Yield (q/ha)	7	7	8	8	9	11	12	13	14	14	15
Production (m t)	350	700	2,400	4,000	7,200	11,000	14,400	18,200	23,800	26,600	30,000
DIRE DAWA-JIJIGA:											
Plantings (ha.)	6,600	7,000	8,000	9,000	10,600	12,600	14,000	16,000	17,000	18,000	18,000
Yield (q.ha)	6	6	6	7	7	8	8	9	9	10	10
Production (m t)	3,960	4,200	4,800	6,300	7,420	8,820	11,200	14,400	15,300	18,000	18,000
NAZARET-SOUTH:											
Plantings (ha.)	4,000	5,000	6,000	8,000	10,000	12,000	14,000	16,000	18,000	19,000	20,000
Yield (q/ha)	10	10	11	12	13	15	16	17	18	20	20
Production (m t)	4,000	5,000	6,600	9,600	13,000	18,000	22,400	27,200	32,400	38,000	40,000
TOTALS (FIVE AREAS):											
Plantings (ha.)	15,700	19,000	25,000	32,000	42,600	52,600	62,000	74,000	88,000	99,000	105,000
Production (m t)	12,910	15,900	22,600	31,200	45,420	66,220	85,000	115,400	148,300	178,900	198,000
Average Yield (q/ha)	8.2	8.4	9.0	9.8	10.7	12.6	13.7	15.6	16.8	18.1	18.9

Table 2 shows the base hectarage and the estimated projected hectarage by years, assuming a Pulse Production Project and firm export prices. Due to anticipated firm prices, bolstered by an increasing demand in the European region, it is expected that price alone will bring a gradual increase in hectarage planted to beans during the first two years of the program. As improved technology becomes available and if yields increase and prices remain firm, a more rapid increase in hectarage appears inevitable. This effect is expected to continue until about year nine of the program when yields level off and competition from other crops is expected to intensify. The total hectarage at the end of ten years is relatively modest in relation to existing cultivated land. As pressure for additional crop production increases, pasture and occasionally-used land will be readily drawn into cultivated status.

Tables 1 and 2 show not only the base "present" hectarage estimated for the areas, but also the estimated increased hectarage by years. The irrigated cotton area is expected to gradually increase double-cropping practices (cotton and beans) even if there is no program. The Dese area is also expected to increase hectarage more rapidly on a percentage basis than the other non-irrigated areas. Lower cost of transportation to port gives this area a relative price advantage over the other areas except the Awash Valley area. We believe that the Dire Dawa-Jijiga area will have the greatest relative advantage in bean production compared with other crops. This is not due to an absolute yield advantage, but because yields of traditional crops are relatively low when compared with other production areas. As additional land in the Chercher Plateau is "row planted" to sorghum, the supplemental income from inter-planted beans is expected to find increasing favor.

4. Estimated Production by Years

The base for "present" production estimates used in Tables 1 and 2 is the product of the estimated yield times the estimated hectarage. Through personal contacts, team members arrived at total production figures for the Awash, Dese and Dire Dawa-Jijiga areas. The total estimated "present" production for the five selected areas accounted for approximately 75 percent of Ethiopia's exports of haricot beans in 1969 and 1970. The production figures used are believed to be reasonable estimates.

With a Pulse Production Project (Table 2), production is expected to rise only slowly during the first two years. The greatest percentage increase in the first two years is expected in the Dese area and the lowest in the Dire Dawa-Jijiga area. Production in the five areas is expected to increase less than 60 percent in the first two years (12,900 metric tons to 22,600 metric tons). It is estimated that by the end of the fifth year, however, there will be more than a 500 percent increase from the base

production period. As a result of new technology and improved varieties developed through research, and an intensive educational effort through the extension educational services, nearly 200,000 metric tons is believed achievable by the tenth year of the proposed project. If such a quantity of haricot beans are of acceptable export quality, this amount could supply more than 10 percent of the anticipated European imports of all pulses. This is expected to create a competitive condition and may require a "selling job" for Ethiopian beans. The conclusion remains that Ethiopia can become a major factor in supplying the European demand for haricot beans.

Table 1 shows the estimated production by years without a specific program effort. It is estimated that five years may be required to double production of beans from the "present" level and that the largest percentage increase will come from the irrigated Awash Valley area. It is further believed that it may require an additional 5 years to obtain an additional doubling of production. Thus, the Pulse Production Project as outlined, could bring about a four-fold increase beyond what would be possible without such a project. Such an increase is believed to be a conservative estimate of what would actually happen.

5. Outlook for Production of Other Pulses

Other pulses produced in Ethiopia include horse beans (Vicia faba), chick peas (Cicer arietinum), lentils (Lens esculenta), field peas (Pisum sativum),and numerous beans other than white (broadly classified as haricot beans). These pulses are a part of the day-to-day diet of the rural population and it is believed that domestic consumption will increase as incomes improve and/or prices are lowered. Since most subsistence farmers produce one or more of these pulses and few commercial farmers grow them, production beyond consumption needs is not expected to increase appreciably in the near term.

The principal problem in increasing production of these pulses is a total lack of a production and variety research base. Even if an intensive research program was undertaken immediately, any new technology generated could not find general acceptance within five years. Since research efforts beyond those described in the Pulse Production Project are not anticipated, it does not appear wise to use an appreciable amount of scarce resources on these "other" pulses when the prospects for the white haricot beans appear more promising.

It is with this background that the proposed Pulse Production Project will concentrate on the white haricots for immediate production for export. The research phase of the project, however, will give appropriate, and immediate consideration to the other pulses as well as to the haricots. In

the five to ten year term after starting the research, new technology may become available which could have a significant impact on production of one or more of the other pulses.

D. Impact of the Project on the Environment

The Pulse Development Project is designed to increase the hectarage and yields of pulses, especially white haricot beans in Ethiopia.

The proposed production areas have soils of relatively high clay content and less than three percent slopes. Both of these conditions limit wind and water erosion problems. The Chercher Plateau region of the Dire Dawa area has soils with greater slopes, but beans will be interplanted with sorghum in this region. The beans will function as a cover crop, thus retarding rather than accentuating potential erosion.

Fertilizer is little used in Ethiopia and beans respond less to fertilizer than crops such as maize, cereals, and cotton. Nitrogen fertilizer is not needed and phosphorous fertilizer increases yields only where soil levels of phosphorus are abnormally low. We believe that less than 30 percent of the bean hectarage will receive any commercial fertilizer within the next 10 years. Suggested rates of application are low (less than 40 kg/ha of P_2O_5) and soil incorporation is expected to be thorough. The combinations of minimal slopes, high clay content soils, low application rates, and thorough incorporation all mitigate against even minimal phosphorus movement.

Agricultural chemicals are used even less than fertilizer in Ethiopia. There are no presently recognized common root disease or insect problems with haricot beans. Fungicides may be needed to control leaf diseases, and weed control chemicals may eventually be used. We do not visualize a significant use of agricultural chemicals in the production of beans in the next 5 years. The combination of minimal known need, high cost of the chemicals, availability of "new" land, low cost of labor, and the fact that these beans have not and will not be grown on a large land area indicate little use of agricultural chemicals.

Land planted to beans or other pulses is no more subject to erosion than when planted to other row crops on comparable slopes. The crop will grow in the rainy season, and when properly planted, will provide a cushion against the impact of the raindrops. The plants do not lose their leaves, and the crop is not harvested until the dry season. Neither wind nor water erosion can be expected to be accentuated by this project. Farm income is expected to increase, which can result in more effective land protection for other crops through better management, conservation measures, and more suitable machinery.

IV. PULSE DEVELOPMENT PROJECT FUNDING

A. Introduction

This section shows the estimated funding requirements for personnel maintenance, equipment, and facilities. This project has been developed to attain a rapid increase in production of white haricot beans and certain other pulses for export. The recommended structures and funding are considered temporary and will be phased out and or terminated as soon as possible, but not later than 10 years after initiation of the project. For example, technical assistance is funded for five years, acquisition of imported bean seed for three years and imported fertilizer for 5 years etc. We do not recommend the perpetuation of autonomous or semi-autonomous agencies within the IEG. By phasing out specific segments of the project and terminating all direct funding within a 10-year period, Experience, Incorporated is intentionally discouraging perpetuation of unnecessary proliferation of independent government bodies.

B. Estimated Funding Required

1. Principal Ethiopian Administrative Staff

Table 3 shows the estimated funding required to support the principal administrative staff of the PDU. Included in this group are the director's office and the four assistant director positions.

TABLE 3. ESTIMATED FUNDING REQUIRED FOR THE PRINCIPAL ETHIOPIAN ADMINISTRATIVE STAFF OF THE PULSE DEVELOPMENT UNIT

Year	Salaries[a/]	Maintenance[b/]	Total
		(Eth. $1,000)	
1973	118	90	208
1974	124	57	181
1975	130	59	189
1976	136	61	197
1977	143	62	205
1978	150	91	241
1979	157	66	223
1980	165	68	233
1981	173	70	243
1982	182	72	254
Total	1,478	696	2,174

a/ Only top level Ethiopian administrative staff salaries and certain expenses are shown here. Other personnel including secretarial staff will be provided by the IEG. Funding for the technical assistance contract staff is shown in Table 4.

b/ Includes purchase of vehicles with 20 percent trade-in value each 5 years, per diem for salaried personnel shown, salaries of non-professional IEG personnel and other overhead costs. . .

2. Technical Assistance Contract Staff

Table 4 shows the estimated funding necessary for the technical assistance contract. The principal personnel are funded for 5 years though certain of these men may not be required for the full 5 years.

TABLE 4. ESTIMATED FUNDING REQUIRED FOR THE TECHNICAL ASSISTANCE CONTRACT - PULSE DEVELOPMENT PROJECT a/

Position or Purpose	1973	1974	1975	1976	1977	Total
			(Eth.$1,000)			
Chief of Party and Project Coordinator	$50,000 125	127.5	130	132.5	135	650
Pulse Production Officer	120	122.5	125	127.5	130	625
Pulse Research Officer	120	122.5	125	127.5	130	625
Agricultural Credit Officer	120	122.5	125	127.5	130	625
Marketing Officer	120	122.5	125	127.5	130	625
Pulse Processing and Storage Officer	120	122.5	125	127.5	130	625
Consultants - Training and Special	120	120	-	-	-	240
Equipment and Supplies	25	25	25	25	25	125
Participant Training	$150 25	25	25	25	25	125
Local Hire Personnel	75	79	83	87	91	415
	970	989	888	907	926	4680 $1.9

a/ Costs indicated include salaries, allowances and all expenses associated with posting and maintaining foreign advisors, including contractor's overhead.

In funding the technical assistance contract, we consider it desirable to provide a modest amount for equipment and supplies that may be required by the officers in their program activities. Also, a limited participant training program is included so that in special cases, Ethiopian personnel may be sent abroad to receive instruction that cannot be provided through on-the-job training. It is intended, however, to rely heavily on training within Ethiopia in conducting this technical assistance program. Over the 5-year period during which the contract is to be operative, the budget is estimated at approximately Eth. $4 million (see Table 4). This estimate is based largely on cost of a US contract group.

3. Funding for Imported Production Inputs

Table 5 shows the estimated funding required for imported production inputs for the pulse production project. Seed requirements will be satisfied domestically by the beginning of the fourth year. Fertilizer needs will continue to increase during the program, but government agencies or private firms will take over this import function after 5 years. Chemicals for weed, insect, and disease control are not expected to be needed during the first five years of the project so no funding is allocated for chemicals. All expenditures for production inputs, including procurement overhead, are considered to be reimbursable items.

TABLE 5. ESTIMATED FUNDING REQUIRED FOR IMPORTED PRODUCTION INPUTS FOR THE PULSE DEVELOPMENT PROJECT

Year	Seed a/		Fertilizer a/		Total Funding
	Metric Tons	Eth. $1,000	Metric Tons	Eth. $1,000	Eth. $1,000
1973	150	120	9	3	123
1974	400	320	43	16	336
1975	300	240	105	40	280
1976	-	-	209	79	79
1977	-	-	338	128	128
Total	850	680	704	266	946

a/ We assume that white haricot bean seed can be imported for Eth. $80 per quintal and that diammonium phosphate fertilizer can be purchased by farmers for Eth. $38 per quintal.

4. Funding for Extension Services

Table 6 shows the estimated funding required to provide production and credit guidance for the principal producers of haricot beans to meet the export goals of the pulse development project.

Salaries shown allow a 5 percent annual increase for all personnel. Field personnel salaries allow for an additional 10 percent hardship increment. After the first five years, the salaries and other costs of the area credit supervisors will be charged directly against the credit program and are excluded from the funding shown in Table 6. After the first five years, the area processing and storage specialists salaries and other costs will be absorbed into the commercial operations of the Service Center, so these items are not shown in the funding after the first five years.

TABLE 6. ESTIMATED FUNDING FOR EXTENSION SERVICES FOR THE PULSE DEVELOPMENT PROJECT

Year	Salaries and Allowances	Maintenance	Total
	Eth. $1,000		
1973	219	213	432
1974	221	122	343
1975	231	161	392
1976	242	229	471
1977	254	150	404
1978	158	152	310
1979	166	171	337
1980	174	213	387
1981	182	168	350
1982	191	175	366
Total	2,038	1,754	3,792

Included in the salary column are two years of foreign training (M.S. degree) for the first three specialists listed below, and 6 months of foreign, intensive on-the-job training for processing and credit specialists. All personnel are phased into their jobs as they become available.

Maintenance items in Table 6 include per diem, (200 days at Eth. $20/day for 5 of the central staff specialists, and Eth. $20/day for 100 days for two of these specialists. Area pulse production specialists and credit supervisors are allowed 30 days per diem at Eth. $16/day), and vehicles, to be purchased tax free, and be replaced each 4 years at 80 percent of the original cost. Salaries of non-professional IEG personnel and other overhead costs are also included.

We believe that the EPID can be expected to provide operating expenses for the vehicles as an exchange for the in-service training contributions from this staff of specialists.

Base starting salaries for the specialists funded in Table 6 are shown here. It will be necessary for these Ethiopian contract personnel to have a 10 to 20 percent higher salary than comparable permanent employees.

1 Pulse Agronomist, M.S. degree equivalent Eth. $12,000/yr.

1 Weed Control Specialist, M.S. degree equivalent, Eth. $11,000/yr.

1 Pulse Pathologist, M.S. degree equivalent, Eth. $11,000/yr.

1 Processing & Storage Specialist, B.S. degree, Eth. $11,000/yr.

1 Export Marketing Specialist, B.S. degree, Eth. $11,000/yr.

1 Production Credit Specialist, B.S. degree, Eth. $12,000/yr.

1 Commodity Credit Specialist, B.S. degree, Eth. $11,000/yr.

Pulse Production Service Center Area Specialists:

5 Area Pulse Production Specialists, B.S. degree (each) Eth. $8,400/yr. base

5 Area Credit Specialists, B.S. degree (each) Eth. $8,400/yr. base

5 Area Processing and Storage Specialists, Certificate (each) Eth. $7,200/yr. base.

5. Funding for Research Services

Table 7 shows the estimated funding required for generating research information needed to successfully operate the pulse development project.

TABLE 7. ESTIMATED FUNDING FOR RESEARCH SERVICES FOR THE PULSE DEVELOPMENT PROJECT

Year	Salaries and Allowances	Maintenance	Total
	Eth. $1,000		
1973	61	266	327
1974	64	65	129
1975	79	58	137
1976	83	103	186
1977	87	64	151
1978	91	67	158
1979	96	70	166
1980	101	115	216
1981	106	77	183
1982	111	80	191
	879	965	1,844

The research service costs as shown assure research technicians, a research agronomist, 2 years of training for the research agronomist, a 5 percent incremental salary increase each year, equipment and vehicles which are tax free, are traded each fourth year with a 20 percent trade-in value. Personnel are contracted so their salary is at a level of 10 to 20 percent above comparable positions in the Ministry of Agriculture in any year.

Personnel, salaries, and equipment funded are shown as follows:

6 Research Technicians at Eth. $700/mo plus 20% hardship, plus 5% annual increment.

1 Research Agronomist at Eth. $12,000/year plus 5% annual increment

7 Pickup trucks at Eth. $53,000 initial cost

6 Tractors with equipment at Eth. $120,000

6 Small threshers at Eth. $24,000

6 Seed cleaners at Eth. $7,500

The research agronomist will have Eth. $3,200 per diem allowance annually. The research agronomist is funded for Eth. $12,000 annually for two years of training abroad, probably in the USA. He is phased into the program in the third year. Maintenance costs include salaries of non-professional IEG personnel along with other overhead expenses.

6. Funding for Production Credit and Commodity Loans

Tables 8 and 9 outline the provisions for credit components of the pulse production program. Notes appended to these tables explain the rationale and bases of the estimates. Reference should also be made to the text in Section III (B) for further details on the production credit and commodity loan programs.

TABLE 8. ESTIMATED FUNDING OF PRODUCTION CREDIT PROGRAM FOR HARICOT BEANS

Year	Loan Funds Required[a]	Carry-Over[b]	Increase Over Previous Year[c]	Contribution to Administration[d]	PDU Funding Required[e]	Administrative Costs[f]
			(Eth. $1,000)			
1973	161	0	161	200	361	215
1974	539	40	418	100	518	150
1975	945	135	501	50	551	150
1976	1,659	236	815	-	815	165
1977	2,779	415	1,299	-	1,299	275
1978	3,773	695	1,274	-	1,274	375
1979	5,579	943	2,054	-	2,054	555
1980	7,448	1,395	2,321		2,321	745
1981	9,079	1,862	2,098		2,098	900
1982	10,318	2,270	1,647		1,647	1,000
Total			12,588	350	12,938	4,530

a/ Based on 20 percent of the estimated farmgate value (Eth. $35 per quintal) of the increase in production of haricot beans above the 1965-72 base in the five project areas (see Table 11).

b/ Allowance for loans running over 12 months; based on 25 percent of loans made the previous year.

c/ Represents the amount that must be added annually to the revolving loan fund to encourage increased output.

d/ In the first three years of "tooling up", the credit unit will need to be subsidized in an amount greater or less than the indicated contribution. In 1973 as much as 90% of the administrative costs, including equipment, may need to be defrayed from pulse project funds. The proportion will decline in the second and third years and complete self sufficiency should be possible beginning in the fourth year.

e/ With proper management and barring unforeseen contingencies, the revolving loan fund should be substantially intact at the end of the 10-year period.

f/ Costs of administering the supervised credit program are expected to be approximately 10 percent of the loans made; this would include the salaries of assistant area credit specialists, office staff and other employees, operating supplies, transportation, office space and equipment, and other business expenses. Also included in administrative costs is an allowance for uncollectible accounts. It is intended that after the loan program is established, it will be self-sustaining, except for extension-type credit specialists, and that the loan funds will be kept substantially intact on a revolving basis.

TABLE 9. ESTIMATED FUNDING OF COMMODITY LOAN PROGRAM FOR HARICOT BEANS

Year	Loan Funds Required[a/]	Increase Over Previous Year[b/]	Contribution to Administration[c/]	PDU Funding Required[d/]	Administrative Costs[e/]
			(Eth. $1,000)		
1973	832	832	50	882	115
1974	1,106	274	25	299	115
1975	1,474	368	-	368	120
1976	2,074	600	-	600	160
1977	2,936	862	-	862	235
1978	3,720	784	-	784	295
1979	4,939	1,219	-	1,219	400
1980	6,240	1,301	-	1,301	500
1981	7,504	1,264	-	1,264	600
1982	8,242	738	-	738	660
Total		8,242	75	8,317	3,200

a/ Based on loans at Eth. $25 per quintal for approximately 15 percent of all haricot beans produced in the Empire.

b/ Represents the amount by which the revolving loan fund must be increased annually to compensate for the anticipated gain in output of haricots and corresponding increase in commodity loans.

c/ The commodity loan is relatively easy to administer and should be completely self supporting after two years.

d/ With good management and no serious decline in haricot bean prices in the world market, the revolving loan fund should be substantially intact at the end of the 10-year period.

e/ Costs of administering the commodity credit program are not expected to exceed 8 percent of the loans made; this would include the salaries of assistant area credit specialists, office staff and other employees, office space and equipment, operating supplies, transportation and other business expenses. Also included in administrative costs is storage of beans under loan. It is intended that after the loan program is established, it will be self-sustaining, except for extension-type credit specialists, and that loan funds will be kept substantially intact on a revolving basis.

As was noted above, the EGC is now buying haricot beans for its own account. This activity can be a very helpful supplement to the proposed commodity loan program. Through judicious purchasing in the open market the Corporation can exert influence on grower prices and even on dealer margins. The loan program on the other hand is

designed to assure growers that they will not suffer severe losses from price declines; also, it will introduce a new stabilizing influence on seasonal price fluctuations. It is assumed that the EGC or Area Service Center will be able to fund its market operations without specific assistance from the Pulse Production Project.

7. Funding for Processing and Storage

Table 10 is an estimate of the funding necessary for handling, cleaning, grading and storage of haricot beans at the five locations identified. Provision is made for project funding of a part of the administrative expenses of the marketing services in the Area Service Centers during the first three years of the project. The processing, and especially the storage facilities, will be used for other crops when not needed for beans. It would therefore be reasonable to reduce the costs chargeable to the pulse project by some amount, but this has not been done in estimating the funding.

TABLE 10. ESTIMATED FUNDING REQUIRED FOR HANDLING, PROCESSING AND STORAGE IN THE PULSE DEVELOPMENT PROJECT

Year	Facilities for Processing & Storage a/	Contribution to Administration b/	Funding Required
		(Eth. $1,000)	
1973	350	100	450
1974	-	50	50
1975	-	25	25
1976	955	-	955
1977	-	-	-
1978	-	-	-
1979	2,955	-	2,955
1980	-	-	-
1981	-	-	-
1982	-	-	-
Total	4,260	175	4,435

a/ Represents a three stage expansion; facilities funded in 1973 would accommodate planned production increase through 1975, those added in 1976 would be adequate through 1978 and the 1979 increment would carry through 1982.

b/ The marketing facilities will be operated on a fee basis and are expected to be entirely self-supporting after three years; maintenance of the area marketing specialists will also be defrayed from operating income after the first five years.

V. ECONOMIC ANALYSIS

A. Export Market Outlook

Ethiopia is not a newcomer in the pulse export markets; in fact, the Empire has been shipping these commodities abroad in volume for more than 20 years (Appendix Table A-6). This fact alone is an important consideration in efforts to increase such trade. The trade channels and contacts are already established and this facilitates any future promotional efforts. Unfortunately, there is also an adverse side in this case; in the past, Ethiopian pulses have not always been noted for their quality and dealers abroad have often discounted the products from the Empire. This tendency is still apparent in a number of markets, particularly those in Europe where quality demands tend to be high.

Among the pulse crops exported, the haricot beans have recently displayed the most strength but other pulse crops taken together still account for the bulk of the export income. Haricot beans are produced primarily for export by commercial or semi-commercial growers whereas horse beans, chick peas, lentils, and field peas are important crops in the subsistence sector. Pulse exports reached an all-time high of 80,200 tons in 1961. During the late 1960's exports of pulses have trended upward but the growth has been very slow (Appendix Table A-4). Ethiopia's markets for the several pulses are highly differentiated; e.g. haricot beans are sold almost exclusively in Europe, chick peas go mostly to Ceylon, and horse bean exports are concentrated in neighboring countries and Japan.

Pulse exports in the 1960's averaged only about 12 percent of the officially reported production but it is generally recognized that the production data are not a reliable indicator of actual output. It is known, for example, that virtually all haricot beans are exported; yet, the official statistics indicate that exports are only about 25 percent of total production. It is not known with any certainty just why pulse exports have lagged behind expectations. It may be that domestic requirements, except for haricots, have been increasing as rapidly as production or it is possible that crops have been short. In any event, local prices of certain pulses showed a marked increase in 1970 and 1971, and these higher prices persisted for green peas and haricot beans into 1972.

1. General Outlook

Prospects are good for a favorable world supply-demand balance in pulses during the 1970-1980 period. Based on FAO projections, there will be an increase in demand from about 35 to 47 million tons during the decade. 9/

9/ FAO "Agricultural Commodity Projections, 1970-1980", Rome. 1971.

This represents an increase of about 3 percent per year but the rate of increase is expected to be much higher in the less developed areas than in the more advanced (3.3% vs 1.2%). It is anticipated that production will lag behind demand and this should result in a strong price situation during most of the decade. In the high income countries there may be a slight decline in per capita consumption of pulses but this will likely be offset by population growth and shifts toward convenience foods, including canned pulses.

In some of the major producing countries, the USA for example, land formerly used for pulse production is being diverted to other uses. This may lead to a smaller exportable surplus that would favor other exporters such as Ethiopia. Failure of local production to keep abreast of demand is at least partly responsible for the rise of pulse imports in Europe from 860,000 tons in 1967 to 1,235,000 tons in 1969. [10]

2. Regional Prospects

A 1.1 percent growth rate for pulses is forecast for the EEC area of Europe during the 1970's. A somewhat higher rate would prevail elsewhere on the continent. Computations based on FAO estimates indicate that total demand in Western Europe would increase from 2,600,000 tons in 1970 to 2,900,000 tons in 1980. As much as half of the requirements may be imported.

In the areas located near Ethiopia, the demand for pulses in the Near East would increase at almost 5.0 percent annually from 1,300,000 tons in 1970 to 1,910,000 tons in 1980. From the standpoint of total needs, this region is significant and close proximity adds to its importance as a potential outlet for Ethiopian pulses. Israel, for example, is expected to need 40 percent more pulses by 1980 and other countries such as Sudan, UAR, Saudi Arabia, and Yemen will also have relatively high growth rates in their pulse requirements. Furthermore, all of these countries are pulse importers and in varying degree, are already buyers of pulses from the Empire.

Asia, including the Far East, is by far the principal region in the consumption of pulses but with a few important exceptions such as Japan and Ceylon, the countries of the region are not large importers. For the region, growth in total demand during the 1970's is expected to move from 17,100,000 tons to 24,300,000 tons, or 4.2 percent annually. Japan, the largest single importer in the region, is expected to need 540,000 tons in 1980 vs 480,000 tons in 1970. Ceylon's requirements may increase from 1,120,000 tons to 1,440,000 tons during the decade. Both Japan and Ceylon have been important outlets for certain types of Ethiopian pulses.

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[10] It should be noted that edible nuts are combined with pulses in most FAO data. This does not seriously diminish the value of the data as an order of magnitude for pulses.

Africa itself (other than the Near East) is expected to show a relatively high growth rate of 4.1 percent which will advance pulse requirements from 3,800,000 tons in 1970 to 5,360,000 tons in 1980.[11/] By and large, however, the African countries are not likely to be significant importers of pulses from the Empire but they should not be overlooked as potential new outlets for at least modest quantities of certain products. In Ethiopia, it is forecast that domestic requirements for pulses will increase from 500,000 tons in 1970 to 720,000 tons in 1980 (net consumption).

In an effort to determine, with more certainty, the outlook for sale of Ethiopian pulses in the Near and Far East areas, firsthand surveys of nine markets were conducted as a part of this project. It was found that an opportunity exists to increase exports to these regions providing the types, price, and quality of pulses offered by Ethiopia are in line with the preferences of these markets. Ethiopia now produces and sells to the Near East substantial quantities of the pulses regularly consumed in that area but in the Far East the situation is very different; there it was found that most of the pulses consumed are not presently produced by Ethiopia. To develop an outlet in the Far East, Ethiopia must be able to offer the types of beans and peas preferred in that region. Detail on the findings in these market surveys is noted in Appendix B.

3. Commodity Situation

Pulses exported from Ethiopia have consisted almost entirely of haricot beans, horse beans, chick peas, field peas, and lentils. Among these crops, the haricot beans have recently displayed greater stability in volume exported than the other products; possibly due to the combination of being produced almost totally for export and of commanding a more favorable price. Taken in combination, however, the "other" pulses still provide the bulk of the export income. It can readily be seen from Appendix Tables A-7 through A-11 that certain markets are dominant for each product. In this section it is intended to examine some of the factors that have affected and may in the future influence the movement of Ethiopian pulse crops into markets abroad. Particular emphasis is placed upon haricot beans moving into Europe; for one reason, more is known about this market and secondly, these beans are believed to have excellent prospects on both the production and marketing sides in-country. The two sections that follow are excerpts from the recent report by Experience, Incorporated on pulse production and marketing cited above.[12/]

11/ The FAO classified Libya, Sudan, and UAR as "Near East" countries.

12/ "Production and Marketing of Pulse Crops in Ethiopia", Experience, Incorporated, Minneapolis, Minnesota, 1971.

a. Ethiopian White Haricot Beans. In the prevailing situation and anticipated future developments (strong price structure due to tight supply situation) on the world pulse markets, Ethiopian white haricot beans, particularly the small type, hold the best potential to warrant a large increase in production with a view to increasing exports. The white haricot beans are grown almost exclusively for export and Ethiopia has worked its way up to become an important supplier of white haricot beans to European markets, which take some 80 to 90 percent of all white beans exported by Ethiopia. This advance has been favored by the fact that consumption of pulses is steadily shifting from the traditional way of preparation to consumption of canned pulses. Ethiopian white haricot beans, once reprocessed (i.e.,recleaned, graded, and well calibrated) in Europe are well liked by canning factories because of their low moisture content and, consequently, greater return to the canning industry. The moisture content of Ethiopian beans is about 11 - 11.5 percent, where other similar bean varieties contain up to 15 - 16 percent. The size of Ethiopian haricots, especially the small type, and the beans' good flavor are preferred by the canners.

While consumption of beans sold in consumer packages is decreasing, the canning factories report an increasing sales volume for their canned beans. Since a large percentage of the Ethiopian white haricot beans imported by Europe are canned, it can be assumed with certainty that due to the reasons outlined above, the use of Ethiopian white beans will continue to increase.

According to the export statistics, Western Germany is the largest importer of Ethiopian white beans. The figures given are somewhat misleading; while the beans are purchased by trading houses in Hamburg, Germany,a substantial share is resold mainly to French, Dutch, and Belgian importers and shipped into these countries. The United Kingdom is one of the biggest markets for small white beans in Europe. Exports of Ethiopian white haricot beans to the UK have, however, been limited due to the stringent quality requirements of English canning plants.

b. Competitive Conditions on Haricot Beans. The necessity to improve the quality and appearance of Ethiopian white haricot beans has been pointed out by the trade, and some progress has been noted in this respect over the last few years. Partly as a result of the failure to improve sufficiently the quality and appearance of Ethiopian haricots, prices received continue to be discounted over competing beans for an obvious reason; the beans have to be reworked in Europe before they can be processed by the canners. The necessary upgrading of quality consists mainly of recleaning, i.e., removing any discolored, malformed beans, bean splits and admixture as well as calibrating the beans into a uniform size product.

Well calibrated and better cleaned beans of uniform quality will also encourage the use of Ethiopian haricot beans for sale in consumer-size packages. Then, with a minimum of recleaning in Europe, the beans could be packed for sale in small units. Most packers have given preference to beans from other sources which deliver a well cleaned and uniform product although often at a considerably higher price.

A major effort should, therefore, be made to upgrade the quality of Ethiopian beans with respect to both purity and calibration. In the cleaning process, the beans are run over specially perforated metal sieves of a calibrating machine until the beans are separated into uniform sizes. Then they must be hand-picked, cleaned, or electrically sorted to remove any malformed, discolored, broken and damaged beans, including any remaining foreign material. Most exporters in Ethiopia do not presently have the sizing equipment necessary for effective calibration. Both canners and packers in Europe consider uniform size necessary; not only for better appearance of the beans, but also because of the uniform cooking time. Ethiopian haricot beans, recleaned and calibrated by European cleaners, are often sold to the trade at an added value of 10 to 15 percent above the normally discounted cif price.

Higher relative prices and an increase in volume of trade will result from improved quality. Western European markets are characterized by relatively uniform market practices including grading. Once a canner adopts a formula to process a certain grade or type of bean he is likely to continue using the same product and methods; the same applies to bean packers. As a matter of interest, Ethiopian small haricot beans are re-exported from European destinations as far as Puerto Rico; however, prior to reshipment, the beans are recleaned and calibrated. This confirms the need for upgrading quality if Ethiopia is to enter into new markets and/or expand present outlets.

Another effective approach to the quality problem would be the wide distribution of improved seed stock among growers. This would give better returns to the growers through increased yields and better varieties. The seed program should include varieties of both small and medium size white haricot beans, and also those other types of pulses that have a market overseas but are not yet grown commercially in Ethiopia. This program could be initiated by the PDU, Grain Corporation, or Grain Board in close cooperation with the IAR experiment stations, commercial growers, and, possibly, exporters.

c. Other Pulse Crops. Although the pulse crops, other than haricot beans, have been an important export item over the years, little factual information is available on either the production or marketing of these

products. It is known that horse beans, chick peas, field peas, and lentils are grown primarily for domestic consumption by the small-scale, subsistence farmers. The small quantities that are surplus to their consumption requirements are then sold to local dealers. Eventually they find their way into the hands of exporters. Sales of the "other" pulses abroad tend to be highly concentrated in a few markets. Little is known concerning preferences, acceptance, quantity, and quality requirements, prices and other important aspects of the market situation in the present and potential export outlets. This is an area of study deserving high priority if Ethiopia is to give serious consideration to promoting the exports of pulses, especially those pulse crops other than haricot beans.

(1) Horse Beans have been exported in some quantity, averaging over 21,000 tons from 1965 to 1970, but their unit value has been less than the returns from other pulses (Appendix Tables A-4 and A-5). Although the nearby countries in the Near East and in Japan, as well, have been the principal destinations; there may also be some opportunity to enter certain smaller markets. Not enough market information is currently available to permit objective evaluation of alternative outlets.

(2) Chick Peas have been sold largely to Ceylon (80 to 90 percent) but recently, the sales to that market have declined drastically and overall exports of the product are now at a low level. In 1970, only 2,148 tons were exported, in 1968 the total was almost 14,000 tons. It is not clear whether Ceylon has deliberately curtailed its purchases or whether Ethiopia simply has not had as many peas available for export as previously. Other markets, including Europe, may be receptive to chick peas from Ethiopia, particularly if new types can be produced.

(3) Lentils moved up rapidly among the pulse exports from 1966 to 1969 (from 5,800 tons to 24,500 tons) but declined to about 16,000 tons in 1970. As with chick peas, Ceylon is by far the major outlet for lentils although sizable quantities have been sold to such nearby countries as Egypt and Sudan as well as to Mauritius and the United Kingdom. Ethiopian lentils are the black type that has a limited market. In Europe for example, the green lentil is usually preferred. Serious consideration should be given to the possibility of growing lentils other than the traditional black varieties.

(4) Field Peas are exported from Ethiopia in small quantities. Italy and Yemen have been the principal buyers. Further study of possible markets for this crop is needed before an objective opinion can be expressed on the export potential. At the moment, it does not appear to be particularly promising.

Pulses other than those currently exported from Ethiopia are in demand both in those markets that have been importing Ethiopian products and in outlets that are totally new to the Empire's exporters. Research is necessary to determine which of these pulse crops, new to Ethiopia, may be adapted to production in the Empire and which also offer prospects of profitable sale abroad. Recently, representatives of a large canner in Europe have visited Ethiopia endeavoring to arrange for production of the particular beans used in the company's products.

4. Marketing Strategy

With few exceptions, Ethiopia's exports of pulses have not represented a significant part of the total market supply in the importing countries. Appendix Table A-15 shows the relative position of Ethiopian pulses among the imports of the more important markets for the Empire's products. In the important European market, it is only in West Germany that imports from Ethiopia are a significant factor; and even there the proportion has declined from 8.8 percent in 1967 to 6.9 percent in 1969. Further, it is known that a part of the purchases by German importers are diverted or re-exported. On an overall basis, Ethiopia supplied only about 1.6 percent of Europe's total pulse imports in 1969.

In the Mid-East region, Ethiopia is a major supplier of pulses but the total quantities imported are not as great as in such areas as Europe and Asia. In 1969, pulses from Ethiopia made up over 60 percent of the imports of Jordan, South Yemen, Saudi Arabia, and Sudan. The Empire was also an important supplier to Israel although the share of the imports there has been declining steadily. It would appear that sales to nearby areas have been emphasized by Ethiopia's exporters and this policy is a logical one.

Ethiopia is a major element in the pulse imports of only two other countries, Ceylon and Mauritius, where the proportion of imports provided has ranged up to 42.5 percent. As much as 6.7 percent of Japan's large imports have been supplied by Ethiopia. In 1970, however, sales to both Ceylon and Japan fell off drastically.

As a proportion of world trade in pulses, Ethiopia has accounted for about 4 percent of the total imports reported from 1967 to 1969.

From the standpoint of prices received for Ethiopia's pulse exports, it is apparent that certain markets are much more advantageous than others (Appendix Table A-16). Generally, the fob returns are much better on the sales made to neighboring countries in the Mid-East. The other generalization, but one that is not so clearly evident, is that the larger importers of Ethiopian pulses tend to pay lower prices. In regard to the latter observation, there are likely causal factors that are not readily evident. It is of interest, however, to note that returns on lentils in 1970

ranged from Eth. $293 on sales to the UK to Eth. $544 on exports to Sudan. During the same year, the range on haricot beans, shipped mostly to Europe, was much narrower (from Eth. $336 to Eth. $426). It is perhaps elementary to suggest that Ethiopian exporters are showing only good business judgment in catering to those buyers who pay the higher prices on the fob basis. At the same time, of course, this policy is helpful in providing additional foreign exchange and presumably, better returns to growers.

A number of the important pulse importing countries are also among the major suppliers of the imports that have contributed heavily to the Empire's adverse balance of trade. The IEG would be fully justified in approaching increased sales of pulses to some of these countries through country-to-country negotiations. Bilateral trade agreements may not necessarily be required but less formal trade agreements could be employed to achieve the desired results. Prominent among the candidates for negotiations leading to substantially increased exports of pulses are most of the Western European countries and Japan where the trade imbalance is especially one-sided. To a lesser extent, similar efforts might also be made with Israel, Kenya, Lebanon, Malaysia, Singapore, Hongkong , and Taiwan.

5. Competition and Prices

With particular reference to haricot beans which appear to offer the most promising prospects among Ethiopia's present pulse crops for a relatively quick increase in exports, it is important to consider both the competitive and price situation affecting this commodity. Western Europe is now the principal importer of haricot-type beans and this market is in the best position to absorb substantially increased exports from Ethiopia. Ethiopia's pulse shipments to Europe in recent years have provided less than 2 percent of the total imports by the region. Ethiopian beans are therefore in no way a major determining factor in the European market at the present time.

In looking to the future, it is anticipated that Europe's imports of pulses may be up to 1.3 - 1.4 million tons by 1977 with a further increase to perhaps 1.5 - 1.6 million tons by 1982. If, through a successful pulse production program, Ethiopia should have 100,000 tons of haricot available for export to Europe by 1977, it is obvious that Ethiopia's participation in the market would change drastically. Instead of being only a minor supplier, as at present, the Empire would be able to provide about 8 percent of the imports. This would automatically place Ethiopia in a position of influence and leadership, with greatly intensified competition from present and potential suppliers. If projections were extended to 1982 and Ethiopia then had 175,000 tons of haricots for export to Europe, the impact would be even more acute. The Empire would then be able to provide about 12 percent of Europe's total pulse imports and an even larger part of haricot imports alone.

On the basis of all evidence presently available, it is not unrealistic for Ethiopia to plan in terms of supplying the European markets with as much as 150-200 thousand tons of haricot beans by 1982.

If Ethiopia is to expand its share of the European market for haricot beans, quality must be maintained at a high level and prices must be competitive. There will be active competition in the European market despite prospects for declining production of haricots in certain countries; e.g., USA and Canada. If Ethiopia gains a position of importance in the European market, it is obvious that present relative shares of suppliers must be rearranged. Ethiopia will need to observe sound marketing procedures in order to meet increased competition and probable resistance by present suppliers and others.

Most observers expect pulse prices, on a world basis, to show strength throughout the 1970-1980 period. During the latter part of 1971, haricot beans reached and for a time held at a cif level of Eth.$700 in Europe. Since then, the price has weakened somewhat. For forward planning on a constant price basis, it is reasonable to assume a cif price of Eth. $600 per metric ton for Ethiopian haricot beans exported to Europe.[13/] This price level is based on the best available trade opinion together with projections by such agencies as the FAO. Appendix Tables A-17 and A-18 relate this price to possible farmgate returns in several present and prospective bean producing areas of the Empire. Farmgate values computed in this manner range from about Eth.$350 to Eth.$460 per ton for clean beans of improved quality, depending upon the level of marketing costs and location of the production area. The average would be Eth. $410 per ton which is reasonably close to the average wholesale price of uncleaned haricots in Addis Ababa during 1971. On the basis of this analysis, coupled with a desire to utilize a conservative approach to pricing, a farmgate value of Eth.$35 per quintal (uncleaned) and an fob port value of Eth. $500 per ton (cleaned basis) are used for haricot beans in evaluating the proposed production project.

6. Domestic Supply-Demand Implications

Except for the haricot beans, which are primarily for export, pulses in Ethiopia are largely subsistence crops that are consumed domestically. In the near term (up to 5 years), there is little prospect that the subsistence sector will be able to produce horse beans, chick peas, lentils, and field beans at a rate much greater than the 3 percent increase required to meet domestic needs alone. In the longer term, as better practices and improved technology become available for adoption, even by the subsistence sector, there should be some improvement in output of the pulses other than haricot beans. Time will be required, however, to achieve any significant increase. This is one of the principal reasons why it is generally accepted that the more important gains in pulse exports during the 1970's must come from the haricots.

13/ In the section that follows on benefit-cost analysis, the effect of cif prices of Eth. $500 and Eth. $550 is also indicated. In line with the basic assumptions in this project, these prices are based on an exchange ratio of US$1 = Eth. $2.5.

In the domestic markets, pulses are usually priced on an export basis and stay reasonably close to the net returns from sales abroad. This is not the case, however, with the all-important cereals that are the mainstay of the Ethiopian diet. In recent years the Empire has not been totally self sufficient in grains and the price structure of these commodities is now import oriented. The relatively high prices prevailing on grains create a situation in which it is difficult for other crops, including pulses, to compete effectively. Appendix Table A-13 illustrates the problem involved where pulses are competing directly with cereals in the cost-price circumstances of 1971. Very recently (during January 1972), however, there has been a sharp drop in certain grain prices; e.g., maize has declined from Eth.$20 to less than Eth.$13 per quintal. If this shift should continue it could have a distinct bearing on efforts to increase pulse production, particularly haricot beans.

B. Estimated Export Income Attributable to the Project

It is estimated that exports of white haricot beans, the focal point in the pulse production project, can be increased from a base of 19,000 to almost 220,000 metric tons at the end of ten years under the proposed program. Without the project, exports might move upward from 19,000 to 72,000 metric tons during the same period. As is indicated in Table 11, the cumulative incremental gain in exports over the ten years exceeds 600,000 metric tons, having a gross fob value of Eth.$ 300 million.[14/] Converted to farmgate value (uncleaned basis), these incremental gains would be equivalent to Eth.$210 million. Foreign exchange earnings of this magnitude would benefit the Empire's economy.

Another benefit not precisely measurable, but likely to accrue, is the salutary effect on the production and export of other pulse crops resulting from the rapid increase of haricot bean production. It will be noted that growth in output attributable to the project, moves upward at a modest rate during the first five years but thereafter picks up momentum rapidly as the various implementing factors begin to play a more decisive role.

Coincident with the probable publicity attached to the Pulse Production Project and the more active involvement of IEG agencies in the program, there should be an improvement in marketing efficiency and a more equitable distribution of returns from exports. It is reasonable to expect that prices paid producers, particularly commercial growers, may improve in comparison to margins taken by handlers.

C. Estimated Funding Required for the Project

Funds required for activities associated directly with the pulse production program over the 10-year period from 1973 to 1982 have been estimated at Eth.$39.1 million (see Table 12). By years, the range in

14/ On this basis, the cumulative value at the interior point of production in Ethiopia is Eth.$235 million. Other assumptions on income and/or costs alter the projected project benefits.

TABLE 11. SUMMARY OF ESTIMATED EXPORT INCOME ATTRIBUTABLE TO THE PULSE PRODUCTION PROJECT IN ETHIOPIA [a/]

Year	Without Project [b/]	With Project		Total Output	Incremental Gain Due to Project	Value of Gain fob Port [d/]
	All Areas	Five Areas	Other Areas [c/]			
	(metric tons)					(Eth. $1,000)
1965-72 Base (Average)	19,000	13,000	6,000	19,000	-	-
1973	19,900	15,900	6,300	22,200	2,300	1,150
1974	21,800	22,600	6,900	29,500	7,700	3,850
1975	25,800	31,200	8,100	39,300	13,500	6,750
1976	31,600	45,400	9,900	55,300	23,700	11,850
1977	38,600	66,200	12,100	78,300	39,700	19,850
1978	45,300	85,000	14,200	99,200	53,900	26,950
1979	52,000	115,400	16,300	131,700	79,700	39,850
1980	60,000	148,300	18,100	166,400	106,400	53,200
1981	70,400	178,900	21,200	200,100	129,700	64,850
1982	72,400	198,000	21,800	219,800	147,400	73,700
TOTAL					604,000	302,000

a/ Includes only white haricot beans of exportable quality; beans produced for seed are excluded.

b/ Growth rate for all areas without project is the same as for the five selected areas.

c/ Growth rate for "other" areas with project is same as without project.

d/ A value of Eth. $500 per mt is assumed fob Assab/Djibouti.

TABLE 12. SUMMARY OF ESTIMATED DIRECT FUNDING REQUIRED FOR THE PULSE PRODUCTION PROJECT IN ETHIOPIA [a]

Year	Implementation Unit	Technical Assistance	Production Inputs [b]	Marketing Services [c]	Extension Services	Research Services	Production Credit [d]	Commodity Loans [e]	Total
				(Eth. $1,000)					
1973	208	970	123	450	432	327	361	882	3,753
1974	181	989	336	50	343	129	518	299	2,845
1975	189	888	280	25	392	137	551	368	2,830
1976	197	907	79	955	471	186	815	600	4,210
1977	205	926	128	-	404	151	1,299	862	3,975
1978	241	-	-	-	310	158	1,274	784	2,767
1979	223	-	-	2,955	337	166	2,054	1,219	6,954
1980	233	-	-	-	387	216	2,321	1,301	4,458
1981	243	-	-	-	350	183	2,098	1,264	4,138
1982	254	-	-	-	366	191	1,647	738	3,196
Total	2,174	4,680	946	4,435	3,792	1,844	12,938	8,317	39,126

[a] For detail on funding of project sectors see Tables 3 to 10 along with related text. Funding represents the financial commitment required to conduct the special activities contemplated by the Pulse Development Unit. Funding is not synonomous with costs; e.g., the former includes reimbursable, revolving or self-liquidating outlays such as credit, marketing facilities and production inputs whereas the latter represent the elements that are directly chargeable to production, marketing, and program operations or are otherwise non-recoverable.

[b] Advances of project funds to initiate the inflow of needed seed and fertilizer will be reimbursed in full through sale of the inputs.

[c] Amounts indicated represent a self-liquidating investment in facilities that will be supported through services fees collected on beans processed and/or stored. Such fees are included in production and marketing costs.

[d] Includes the revolving loan funds and the subsidy needed initially in the form of a contribution to administrative costs. Interest collections are expected to cover normal administrative expenses, including bad accounts, after the first three years; the revolving fund should remain substantially intact throughout the life of the project.

funding is from a low of Eth. $2.8 million in the early years to a high of Eth. $ 7.0 million in the seventh year; after which the annual increments of additional funding are expected to begin declining. As noted, it is expected that during the second five-year period of the project, there will be a deliberate and substantial phasing out of the Pulse Development Unit and a shift of most activities in the pulse production program to appropriate, regular IEG agencies. As these activities are absorbed in the ongoing programs of other agencies, there will be less need for specific delineation of funds to support the pulse program in itself. This is one reason for limiting the analysis of the project to a 10-year period.

In designing the project strategy, major emphasis during the initial years has been placed on credit, technical assistance, and extension as the principal facilitating factors expected to induce increased output of haricot beans for export. In the latter part of the decade, credit and extension will continue to be highly important but there will be some shift toward greater expenditures for marketing services and production inputs. In this project, credit will be the medium through which on-farm needs for equipment, storage, and similar intermediate-term investments will be met; i.e., specific funding of such items by the project is not contemplated. A limited program of price maintenance is included in which the commodity loan mechanism is recommended.

There is a distinct prospect of using fund allocations for particular activities during a given year, for other purposes where the timing of the use of funds is such that manipulation among allocations is possible. A good example of this possibility would be the use of funds from the commodity loan allocation, for purchase of fertilizer during the early season before harvest time when farmers would be expected to seek these loans. Sales of fertilizer would then be made in time to replenish the loan fund. The PDU would necessarily have to exercise a high degree of financial management to engage in this type of operation. It should not be viewed as a certain means of reducing funding requirements for the project.

Several of the major categories of funding required in implementing the pulse project represent reimbursable expenses or income-earning activities. Funds allocated to these phases of the program are more in the nature of an investment rather than a direct cost or expense item. Imports of seed and fertilizer for resale, provisions for marketing services on a free basis and extension of credit at realistic interest rates are examples of self-liquidating or income-earning segments that would be an important part of the pulse development project. It is recognized, of course, that even these activities require a commitment of funds and that such funds are then generally not available for other alternate uses.

Methods and sources of financing for the pulse production project are considered to be outside the scope of the present study; thus, the subject is not covered in this report. It is logical to expect, however, that a part of the funds required may be generated by the IEG through sale of notes or other internal borrowing. Outside assistance may be available from such bilateral

and multilateral sources as AID, IBRD, African Development Bank, SIDA, individual governments, etc.

In estimating the cost of imported supplies and equipment required in several phases of the project, it is assumed that such commodities will be given duty-free status.

D. Production and Marketing Costs

In analyzing the relationship of benefits to costs in the proposed project, it is necessary to include the in-country charges involved both in producing the incremental gain in output and in marketing the added quantity. Data relating to costs of producing individual crops is difficult to obtain even in the developed countries since very few farmers keep detailed records on production inputs for individual crops and farm management men are seldom concerned with this type of analysis. Thus, it is not surprising that data relating to the costs of producing haricot beans in Ethiopia are limited. A few studies have been made as cited elsewhere in this report, also there are estimates of costs and returns on haricot beans in certain program documents relating to area development projects and package programs. The production cost estimates shown below are based on field interviews and observations and in the judgment of the Experience, Incorporated team are reasonable and the best that can be made. On the marketing side, major reliance is placed on information gathered and estimates prepared by the team; e.g., see Appendix Table A-17.

For the purposes of the benefit/cost analysis it is estimated that the costs incurred in producing haricot beans and moving them to the point of first sale (farmgate) will be:

1973 - 75	Eth.$	27.50 per quintal (clean basis)
1976 - 78		22.50 per quintal
1979 - 82		17.50 per quintal

In adopting these cost levels for haricots on a clean basis, it is assumed that the shrink in cleaning and processing will be about 10 percent. Included in these cost estimates are all purchased inputs (seed, fertilizer, chemicals), charges for land and buildings, labor, local transportation, and other operating expenses (including costs associated with credit programs). The substantially lower costs of production anticipated as the pulse project progresses will be due to the increased yields expected as a result of the improved practices employed by growers; such practices will include better seed, fertilizer, chemicals, cultural methods, etc.

From farmgate or point of first sale to fob ship at Assab or Djibouti, the costs involved in processing, bagging, transporting, and loading the beans are estimated at Eth. $110 per ton for 1973-77 and Eth. $100 per ton for 1978-82 (transaction tax not included). Increased unit costs attendant to quality improvement (grading, calibration, etc.) are expected to be offset by lower costs of transportation as the highway system is expanded and upgraded. Bulk handling may also lead to savings eventually.

TABLE 13. ESTIMATED COSTS OF PRODUCING AND MARKETING WHITE HARICOT BEANS IN ETHIOPIA

Year	Incremental Gain Due to Project	Costs Incurred to Farmgate[a/]	Costs From Farmgate to Port[b/]	Total
	metric tons	Eth. $1,000		
1973	2,300	632	253	885
1974	7,700	2,117	847	2,964
1975	13,500	3,712	1,485	5,197
1976	23,700	5,332	2,607	7,939
1977	39,700	8,932	4,367	13,299
1978	53,900	12,127	5,390	17,517
1979	79,700	13,947	7,970	21,917
1980	106,400	18,620	10,640	29,260
1981	129,700	22,697	12,970	35,667
1982	147,400	25,795	14,740	40,535
Total	604,000	113,911	61,269	175,180

a/ Based on average costs of Eth. $27.50 per quintal from 1973 through 1975, Eth. $22.5 for 1976-78 and Eth. $17.50 for 1979-82 (clean basis). These estimates were obtained in part through field inquiries by the Experience, Incorporated team and from the United States Agency for International Development and other sources cited in the text of this report. It is assumed that unit costs will decline as the production program gains momentum and yields increase.

b/ Marketing costs in-country from farmgate or first point of sale to delivery on ship at Assab or Djibouti are estimated at Eth. $110 per metric ton from 1973-77 and Eth. $100 for 1978-82 (transaction tax not included). Also see Appendix Table A-17.

In formulating these estimates of production and marketing costs, it is probable that certain elements may have been overvalued. Labor, for example, was not adjusted to reflect opportunity cost; nor was any effort made to sort out profit from among the marketing and transportation charges. This results in some overstating of costs in the economic sense, but a more exact estimate is not possible in view of time and data limitations. In any event, the net result is a more conservative benefit/cost ratio. Table 13 summarizes the production and marketing costs attributable to the increased exports of haricot beans resulting from the pulse production program.

E. Benefit - Cost Analysis

The relationship of benefits derived from the pulse production project, in terms of added export earnings, to the anticipated allocation of funds directly to implementation of the program is indicated to be very favorable; i.e., Eth.$302 vs. Eth.$39.1 million for the 10-year period (undiscounted). This is not a particularly meaningful measure, however, because it reflects only a portion of all the costs applicable to the added output of beans expected to result from the project. At the same time, certain of the funding included is reimbursable, self-liquidating and/or of a revolving nature and thus should not be considered as a current cost. Among the items that are to be funded but which do not represent direct project "costs" for purposes of the benefit/cost analysis are the procurement of inputs, provision of processing and storage facilities, and normal operation of the loan programs.

When all costs of production, marketing, and program activities that are incurred in obtaining the anticipated increase in exports are related to the value of the added exports, the resulting benefit/cost ratio is about 1.7 to 1 at a discount rate of 10 percent over a 20-year period (see Table 15). On the same basis, the net present worth of the project is computed at Eth.$128 million based on discounted income of Eth.$321 million and discounted costs totaling Eth.$193 million. It is estimated that the internal rate of return based on this analysis is over 50 percent.

The returns expected from the proposed project are sufficiently high that even a drastic fall of up to 40 percent in estimated income from the added exports of haricot beans would not reduce the benefit/cost ratio below 1 to 1. Costs properly chargeable to the project could also be substantially higher than indicated without diminishing entirely the favorable showing. The IRT would, of course, be much lower if either the income was lower or the costs higher than estimated. For example, if the analysis is based on income of Eth. $400 per ton fob (down 20%) for haricot beans and costs are assumed to be 20 percent above the estimates used above, the benefit/cost ratio would then be reduced to 1.11 (10%, 20-years) and the internal rate of return would be approximately 25 percent. Similarly, alternate analyses based on an fob return of Eth.$450 per ton (down 10%) with costs unchanged, would reduce the benefit/cost ratio to 1.50; whereas a simultaneous increase of 10 percent in the costs would then drop the ratio further to 1.36. In these cases the internal rate of return would continue to be favorable (ranging up to 50 percent).

TABLE 14. SUMMARY OF COSTS INVOLVED IN THE PULSE PRODUCTION PROJECT IN ETHIOPIA [a/]

Year	Project Costs						Product Costs		Total
	Management	Technical Assistance	Extension	Research	Production Credit	Price Maintenance	Production	Marketing	Costs
				Eth.$1,000					
1973	208	970	432	327	200	50	632	253	3,072
1974	181	989	343	129	100	25	2,117	847	4,731
1975	189	888	392	137	50	-	3,712	1,485	6,853
1976	197	907	471	186	-	-	5,332	2,607	9,700
1977	205	926	404	151	-	-	8,932	4,367	14,985
1978	241	-	310	158	-	-	12,127	5,390	18,226
1979	223	-	337	166	-	-	13,947	7,970	22,643
1980	233	-	387	216	-	-	18,620	10,640	30,096
1981	243	-	350	183	-	-	22,697	12,970	36,443
1982	254	-	366	191	-	-	25,795	14,740	41,346
TOTAL	2,174	4,680	3,792	1,844	350	75	113,911	61,269	188,095

[a/] See Tables 3 - 10 and 13 for details on costs. Production and marketing costs include allowances for purchase of inputs, storage and processing charges and payment of interest; thus the project costs are adjusted to avoid duplication where reimbursable, self-liquidating and revolving funding is involved.

TABLE 15. RELATIONSHIP OF ESTIMATED EXPORT INCOME DERIVED AND COSTS INCURRED IN THE PULSE PROJECT IN ETHIOPIA [a/]

Year	Income	Costs	Net Benefits	Discount @ 10%	Discounted Income	Costs Discounted	Net Present Worth
				(Eth. $1,000)			
1973	1,150	3,072	- 1,922	90.9%	1,045	2,792	- 1,747
1974	3,850	4,731	- 881	82.6	3,180	3,908	- 728
1975	6,750	6,853	- 103	75.1	5,069	5,147	- 78
1976	11,850	9,700	2,150	68.3	8,094	6,625	1,469
1977	19,850	14,985	4,865	62.1	12,327	9,306	3,021
1978	26,950	18,226	8,724	56.2	15,200	10,243	4,957
1979	39,850	22,643	17,207	51.3	20,443	11,616	8,827
1980	53,200	30,096	23,104	46.7	24,844	14,055	10,789
1981	64,850	36,443	28,407	42.4	27,496	15,452	12,044
1982	73,700	41,346	32,354	38.6	28,448	15,960	12,488
1983				35.0	25,795	14,471	11,324
1984				31.9	23,510	13,189	10,321
1985				29.0	21,373	11,990	9,383
1986				26.3	19,383	10,874	8,509
1987				23.9	17,614	9,882	7,732
1988				21.8	16,067	9,013	7,054
1989				19.8	14,593	8,187	6,406
1990				18.0	13,266	7,442	5,824
1991				16.4	12,087	6,781	5,306
1992				14.9	10,981	6,161	4,820
TOTAL	1,039,000	601,555	437,445		320,815	193,094	127,721

[a/] Refer to Tables 13 & 14 for details of income and costs by years.

NOTE: Benefit/Cost Ratio at 10%: 1.66

Internal Rate of Return: Over 50% NPW = 127.7 million

Under alternate assumptions the Benefit/Cost Ratio would be: 1) fob value Eth. $450 and costs unchanged - 1.50; 2) fob value Eth. $450 and costs increased 10% - 1.36; 3) fob value Eth. $400 and costs increased 20% - 1.11.

REPORT NO. I

PART B

Reconnaissance Survey of Pulse Crop Production in Ethiopia and Potential Export Markets *

* Part B was originally issued in December, 1971 as "Production and Marketing of Pulse Crops in Ethiopia".

I. SUMMARY AND RECOMMENDATIONS

A. Summary

According to official statistics, production of pulse crops in Ethiopia increased from 520,000 tons in 1961 to 628,000 tons in 1970, an average increase of about 2 percent annually. During the same period, crop lands planted to pulses increased about 1.5 percent per year, and average yields increased less than one-half quintal per hectare, or about one-half of one percent per year. However, all data derived from official IEG agricultural statistics are of doubtful accuracy and should be employed only as general indicators.

During the past ten years, exports have ranged from a high of 80,200 tons in 1961 to a low of 51,100 tons in 1970; they averaged 68,500 tons, or about 12 percent of officially reported production.

White haricot beans, shipped largely to Europe, ranked first in importance in exports; followed closely by lentils to Ceylon and horse beans to Saudi Arabia and Japan.

Accurate and complete costs of production per hectare of pulse crops are generally not available, and yields and costs per quintal cover a wide range. There seems to be no significant difference in the magnitude of production costs per quintal between some pulses (e.g. haricot beans) and cereals.

In general, the average per-quintal prices received for pulse crops do not vary significantly from those received for grains. Both types of crops are believed to yield a profit to the grower at present prices.

Prices received for haricot beans are greater than those received for other pulse crops. Horse beans receive the lowest price of the major pulse crops and the limited data available indicate that lentils may yield the lowest net return to the farmers.

Prices paid farmers for pulses fluctuate widely from the harvest low to the post-harvest high. Wholesale prices generally fluctuate less during the year, indicating that wholesaler margins fluctuate considerably. In country markets, dealer prices fluctuate less than producer prices but more than Addis Ababa wholesale prices.

Ethiopian pulses are generally priced at a level that makes them competitive in the export market; the domestic prices are generally export-oriented.

Domestic consumption of pulses, except perhaps haricot beans, is generally growing at about the same rate as the population increases, plus an added increment for increased per capita income. Domestic demand for pulses to 1980 is expected to increase about 3 percent per annum with a population increase of about 2.2 percent.

World consumption of pulses is generally increasing. According to FAO projections, demand in 1980 is estimated to total 47 million tons as compared with 35 million tons consumed in 1970. This is an increase of about 3 percent per year. Forecasts indicate that production for the decade ahead may lag behind demand and therefore furnish a strong price situation during most of the 1970's.

Pulses for human consumption are handled in bags throughout the world to avoid damage that would come from bulk handling. No significant changes in transportation and storage methods are indicated in the decade ahead.

More and better storage at points of production in the decade ahead is expected to improve returns to growers. Improved "farm-to-market" roads will improve efficiency of marketing. Mechanized loading at ports is expected to decrease handling costs.

The present organization of the Ministry of Agriculture, with its several semi-autonomous departments, may result in coordination difficulties. It also makes communications and flow of technology difficult.

The staff of the Extension Project Implementation Department (EPID) appears well-suited to their present assignments; but more technical training, assistance and supervision will be required to maintain and improve field staff competence. The extension field staff has been well-trained at the College of Agriculture and Institutes of Agriculture. Course work and instruction are impressive.

General in-service training for field staff members of EPID appears well done and adequate, but technical training is not sufficient to meet anticipated needs of Ethiopia's agriculture in the near future.

The technical and field staffs of EPID are neither adequate nor qualified to work effectively with commercial farmers. Additional technical staff, trained at a higher level, must be supplied to assist this group of farmers if Ethiopia is to realize its export potential.

B. Recommendations

Experience, Incorporated recommends that: The Ministry of Agriculture encourage the increased production of pulse crops, particularly haricot beans, by increasing both hectarage and yield;

The IEG (through appropriate agencies) encourage production credit programs and assist both cooperatives and private entrepreneurs to improve efficiency of production and marketing;

The Ministry of Agriculture encourage multiplication of seed stocks of improved varieties of haricot beans (Mexican 142, Tenguru and others) and assist in establishment of a seed multiplication and distribution program to ensure that farmers produce the types and quality of beans required in both the world and domestic markets;

The Ministry of Agriculture establish a research station to serve the large agricultural area of north central Ethiopia in a location such as Gondar, Bahar Dar or in the Dese-Waldya-Maychew region;

The Ministry of Agriculture and affiliated agencies coordinate research efforts in pulse crops and provide facilities, staff and funds to initiate new and additional research in varietal improvement, production practices and disease and insect control;

The IEG, acting through the Grain Board and the National Bank, administers export license and currency controls to encourage exports. This would mean that prices required for IEG clearance always be abreast of market changes and that there be some degree of flexibility in application. The need for price clearance by both the EGB and the NBE should be examined critically. Standards on quality that provide for greater uniformity in all pulse exports should be established and enforced by the Ethiopian Standards Institution (ESI);

The Imperial Highway Authority or another appropriate agency provide more farm-to-market roads in major producing areas by utilizing lower cost designs and construction;

The Ministry of Agriculture and other organizations provide wider and more rapid dissemination of prices for pulses and general information on both domestic and overseas markets. Market surveys at home and abroad are needed to serve as the basis for decisions on how best to promote export trade;

In order to achieve better and continuing research and education, establish direct lines of administration, rather than depend on a liaison system;

A new dimension be added to the Extension Projects Implementation Department (EPID) so the commercial farming sector can be effectively served. Additional well-trained technical staff be added to EPID; then the present field staff can be better trained and supervised, and the commercial farmers can be assisted in meeting their specific needs.

II: GENERAL BACKGROUND

A. The Farm Pattern

See page 4 of Part A.

B. Agricultural Production

See page 4 of Part A.

C. Farm Income and Tenure

See page 5 of Part A.

D. Organization for Agricultural Development

See page 5 of Part A.

E. External Trade in Agricultural Products

At one time (1945-55), Ethiopia exported a considerable quantity of cereals (153,000 tons in 1947), but this trade has fallen off to less than 5,000 tons in recent years (Appendix Table A-6). In the immediate post-World War II period, exports were stimulated by favorable prices quaranteed by a British-backed firm that was catering to a market characterized by short supplies. Actually, the nation has been importing more grains than were exported all through the past decade. Both oilseeds and pulses have been trending upward as earners of foreign exchange, but neither of these crops has reached the point of providing much more than 10 percent of the income from all exports. Pulse exports declined in 1970 but appear to be increasing again.

III. PULSE CROP PRODUCTION

A. Haricot Beans (Phaseolus vulgaris)

1. Production Areas

The term haricot beans is a general designation of most beans, other than horse beans, that are harvested and marketed in the dry form. Although in Ethiopia the primary type produced is white (mostly of medium and small seed-sizes), other types of different colored seed coats can be included in the "haricot bean" designation.

Haricot beans are produced in Ethiopia primarily for export, not for consumption,and are grown mainly by the commercial farming sector. The CSO Provincial Rural Sample Surveys of 1965-67, which did not cover the relatively large-scale farm units or commercial farms, showed that haricot beans occupy only 0.2 percent (7,400 hectares) of the total crop area covered by the surveys. Virtually all of the peasant production was located in only seven awarjas.

The main haricot bean production is in the southern areas of Shewa Province, the western side of Arusi Province and northern Sidamo Province, including the trade territories surrounding the towns of Nazaret, Shashemene, and Awasa. A more limited volume is produced in the Chercher Plateau area of Harerge Province and marketed through facilities in Dire Dawa.

The official reports on area in haricot beans (Appendix Table A-2) show the 5-year average as 91,800 hectares.[3/]

2. Cost Production[4/]

The cost of producing pulses is influenced by yields and by methods of production. The quality of seed, variety grown, use of fertilizer, ecological factors and possibly even scale of production are determining factors.

3/ The IEG (CSO) statistics would indicate substantial domestic consumption of haricot beans, but this is not believed to be the case. It is known that other varieties of beans (Adenguarie, for example) have been included in reported production as haricot beans.

4/ Much of the data indicating low cost per hectare represents the situation for subsistence farms where exact area in irregular fields, often on hillsides, is not known. Considerable production is consumed on the farm and total output, even if known, may not be divulged for various reasons. Therefore, these particular data cannot be given undue weight.

On haricot beans, the costs of production per hectare (reported by various sources) ranked from a low of Eth. $82.50 to a high of Eth. $185.00, with an average of Eth. $154.12.[5] The costs per quintal varied from Eth. $17.00 to Eth. $52.00, with an average of Eth. $30.00. Yields varied from 3.5 to 10 quintals per hectare.

In a 1971 forty-hectare trial on a commercial farm where careful cost records were kept (including seed, tractor time, fuel, irrigation, insecticides, weeding, harvesting, land rental, water and management), costs were Eth. $318.00 per hectare.[6] The yield was 12 quintals per hectare, with an average cost of Eth. $26.50 per quintal.

Still another study reports costs at Eth. $260.00 per hectare, with a yield of 10 quintals per hectare and a cost of Eth. $26.00 per quintal.[7] Agronomic field trials at Awasa Experiment Station have produced yields as high as 30 quintals per hectare, but costs are not available. It should be noted that little or no research has been conducted on costs of producing crops in Ethiopia; consequently, the limited data available must be treated largely as estimates.

3. Potential for Increased Production

The potential for increased production of haricot beans for the immediate short-term, as well as long-term, is favorable. They are grown almost exclusively for export by larger-scale commercial farms who have the incentive, resources and know-how to use improved seed and production practices and who can often expand the area devoted to the crop if it is to their advantage. This is the only pulse crop in Ethiopia for which improved varieties, agronomic practices and other inputs for increased production are presently available.

Haricot bean production can be increased substantially, possibly doubled or more in three to five years, by both increased hectarage and improved yield per unit of land. These immediate and near-term gains must be accomplished primarily by the commercial farming sector. To obtain volume production of a uniform, high-quality bean such as the export trade requires does not appear to be feasible from the small subsistence farming sector in the immediate future. Additional appreciable research and effort in extension, credit and marketing organizations will be required before nationwide production for export can be obtained.

5/ Unpublished study by W. G. Eichberger, US/AID (based largely on SRI data).

6/ Abadir Farm near Metehara

7/ US/AID Capital Assistance Paper, Shashemene Agricultural Development Program. 1970.

In the small-farming sector, the practice of interplanting haricot beans with maize or sorghum should be encouraged. The bean crop can thus be increased. The bean crop can be harvested in October, and serve as a cash crop during a time of year when food supplies are low, the main crop is not yet harvested and money to provide necessities is difficult to obtain. This method of bean production is already practiced to a limited extent in Harerge Province but could be extended to many maize and sorghum growing areas.

From the limited number of field trials at research stations, Minimum Package Demonstrations and farmers' plantings in various areas, it is quite evident that haricot beans can be grown successfully in most medium-altitude (1,500-2,200 meters) areas of the Ethiopian highlands. Rainfall is sufficiently high and relative humidity low enough to assure a reasonable crop without excessive problems of diseases and insects.

With an assured price incentive, commercial farmers in the main bean growing areas around Nazaret, Shashemene and Awasa will quickly expand their bean hectarage and adopt the necessary practices to produce a high-quality product.

In other areas such as the Kombolcha-Dese-Maychew region (Welo Province), the area surrounding Jimma (Kefa Province), and possibly others, trials may be necessary to show the feasibility and to familiarize farmers with the crop.

B. Other Pulses

1. Production Areas

All other pulse crops, including horse beans, chick peas, lentils, and field peas, are produced primarily by the small peasant farmers. Although considerable quantities are going into the export trade, the bulk of the production is used for domestic consumption. Official hectarage estimates for these crops are given in Appendix Table A-2.

a. Horse Beans (Vicia faba) are mainly produced in the higher elevations of the highlands at altitudes of 1,500-3,000 meters. Main areas of production are in western Welo and northern Shewa Provinces and in the Lake Tana region of Gojam and Begemdir Provinces. Other areas of production are in Tigre, Harerge, Ilubabor and Kefa Provinces.

b. Chick Peas (Cicer arietinum) are grown widely as a cool- and dry-season crop at elevations from 1,500-2,500 meters. Its rapid growing characteristic and relative drought resistance make it a good crop on relatively poor soils with low moisture capacity. The main chick pea producing areas are in Eritrea, Tigre, Begemdir, western Welo, Shewa and eastern Gojam Provinces.

c. Lentils (Lens esculenta) are apparently produced mainly in northwestern Tigre, western Welo and eastern Gojam, as well as in Shewa and Arusi Provinces. Production is more reliable in the cooler climates at altitudes of 2,000-2,500 meters.

d. Field Peas (Pisum sativum) are also a cool-climate, medium-high altitude crop, which grows best at 1,500-2,500 meters. Main areas of production are in western Welo, eastern Begemdir, eastern Gojam, Shewa, western Arusi and eastern Ilubabor and Kefa Provinces.

2. Cost of Production

a. Lentils. One analysis indicates average costs of Eth. $118.00 per hectare and a yield of 6.4 quintals per hectare, or a per quintal cost of Eth. $18.44 and a 1970 farm price of Eth. $29.53 per quintal (Appendix Tables A-12 and A-13. The farm price of lentils in the Debre Zeit area varied from Eth. $24.50 to Eth. $30.33 during the period of October, 1969 through January, 1970.[8/]

b. Horse Beans. Costs of producing horse beans range from Eth. $142 to Eth. $168 per hectare without fertilizer and depending on the soil type.[9/] The SRI study indicates that yields on the poorest soils can be increased from 6.8 to 8.8 quintals per hectare with Eth. $25 per hectare in fertilizer costs. In a study of traditional farming in the Gondar and Ambo regions, a cost of Eth. $104.50 per hectare was found with yields averaging about 7 quintals.[10/]

c. Chick Peas. Per hectare costs of producing chick peas in the Debre Zeit area range from Eth. $138 to Eth. $167 with yields of 7.3 to 15.1 quintals.[11/] On the poorer soils, yields are estimated to increase from 7.3 to 10.3, with application of fertilizer costing Eth. $42 per hectare. In the Gondar and Debre Tabor areas, traditional small farmers report a cost of Eth. $104 per hectare, with yields of 7 to 8 quintals.[12/]

d. Field Peas. Costs of producing field peas, in one study of four areas, varied from Eth. $100 to Eth. $162 per hectare, and yields range from 4 to 10 quintals, but yields were not related directly to variations in produc-

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8/ Ethiopian Grain Corporation

9/ SRI "Systems Analysis Methods for Ethiopian Agriculture", Ethiopian Agricultural Study, Vol. 1, April, 1968.

10/ Eichberger, W.G., "A Study of Traditional Farming in Four areas in the Ethiopian Highlands", US/AID, circa 1969.

11/ ibid. 9

12/ ibid. 10

tion costs.[13] The average cost per hectare was Eth. $126.15; average yield, 7 quintals per hectare; and average cost, Eth. $18.02 per quintal. Farm prices are not available for this product, but even wholesale prices in Addis Ababa and Nazaret were generally below this figure in 1969; though higher throughout the year of 1970, ranging from Eth. $19.29 in January to Eth. $35.76 in October.[14]

2. Potential for Increased Production

Although a considerable volume of horse beans, chick peas, lentils and field peas has been exported from Ethiopia, a substantially increased production of these crops will be more difficult to realize than for haricot beans. These crops are produced by the semi-commercial and subsistence farm sector, primarily for on-the-farm and local consumption. This production is not expected to contribute substantially to increased exports. No substantial break-through in production of horse beans, chick peas, lentils and field peas can be expected in the near future. Even with concentrated efforts in research on varietal improvement, production practices, disease and insect control and other factors, there is no assurance of significant increases in production.

Much of the attainable increased production will be required to satisfy the growing internal demand. Every effort must be made, however, to assist and encourage the peasant farmer to increase his production of pulses; both through increased hectarage, where possible, and by improving yields through better seeds and production practices.

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[13] Unpublished study by W. G. Eichberger, US/AID (based on SRI data).

[14] Ethiopian Grain Corporation.

IV. MARKETING OF PULSES AND FEED GRAINS

In Ethiopia, all cereals, including maize, barley and sorghum, as well as most pulse crops, are actually used for human food. Little or none is fed to livestock and poultry. The bulk of these crops is consumed on or near the farm where produced. The small amount that is marketed off the farm is moved from areas of surplus production to areas of deficit production within the country, or into the export trade.

A. Domestic Requirements - A Preliminary Evaluation

A comprehensive survey has never been conducted to determine the food consumption pattern of Ethiopian households. Estimates of per capita utilization and/or demand have been made by US/AID and FAO; also, there have been estimates of required production growth rates in the Five-Year Development Plans.[15/] Per capita consumption of cereals and pulses has been estimated as follows:

1. US/AID (per W.G. Eichberger)

	1966	1973
	(Kg. per Annum)	
Teff	35.17	39.86
Wheat	9.89	12.04
Barley	17.45	22.35
Maize	25.67	35.50
Sorghum	32.29	40.94
Pulses	24.70	25.76

2. FAO (per 1970-80 Projections)

	1965	1970	1975	1980
	(Kg. per Annum)			
All Cereals	160.8	163.4	167.4-171.7	170.1-175.0
Wheat	23.6	23.7	24.8-26.5	25.8-28.9
Maize	25.0	25.1	25.6-26.1	25.9-26.3
Sorghum	29.1	29.2	29.9-30.4	30.2-30.6
Other grains	82.9	85.1	86.9-88.5	88.0-89.1
Pulses and Nuts	19.6	19.7	20.3-21.2	20.8-22.4

15/ Eichberger, W.G., "Food Production and Utilization", US/AID, Addis Ababa, 1966.

FAO, "Agricultural Commodity Projections, 1970-1980", Rome, 1971.

IEG First, Second and Third Five-Year Development Plans, Addis Ababa.

Under the US/AID projection, the total caloric intake per capita would advance from 1,920 per day in 1966 to 2,250 in 1973; in the FAO series, the average daily intake increases from 2,152 calories in 1965 to about 2,300 in 1975.[16/]

Converting these indicated requirements to total demand in terms of gross quantity produced,[17/] the indicated domestic needs would be:

	Cereals (Metric tons)	Pulses (Metric tons)
Report production 1969-70	5,593,000	628,000
Indicated requirements, 1973, US/AID[18/]	6,535,000	732,000
Projected requirements, 1980[19/]	8,036,000	899,000
Indicated increase, 1970-80	2,443,000	271,000

It is of significance to note the considerable differences between 1969/70 production (Appendix Table A-1) and the projections of requirements; however, it must be realized that the production and consumption data on which the estimates are based are of doubtful validity, and the projections cannot be considered precise. The more important indicator in this case is the required rate of growth in domestic requirements.

16/ In its projections of demand, the FAO assumes that population and income are the major shifters of demand. As a starting point, the annual per capita consumption of all items in the diet, by country, during 1964-66 was used in making the projections to 1980.

17/ Gross quantity produced is synonomous with disappearance, which includes harvest and storage losses, amounts used for seed, non-food purposes and home processing, marketing shrink, etc.

18/ Based on population of 26.4 million and a daily intake of 2,250 calories.

19/ Assumes a 3 percent annual growth rate (population and income effects combined).

B. Production Outlook - IEG Projections

In the Third Plan, the projected rates of growth for cereals range from 1.5 percent for teff to 4.0 percent for wheat.[20] The average for all grains would be about 3.0 percent per annum, which, even if achieved, would fall short of meeting the growth in domestic requirements. In these circumstances, cereals would be expected to continue on a net import basis, and only in special situations would grains be available for export. Present indications are that on an overall basis, agricultural growth during the first 3 years of the TFYP did not exceed the targets; for grains alone, the performance is not favorable.

Pulses, in contrast to cereals, have been and are now produced in quantities that exceed domestic consumption by a considerable margin. This margin is wide for haricot beans but narrow on peas; thus, the export trade in haricots is relatively more important than in peas. The TFYP adopted targets, calling for an annual growth of production, averaging about 3.6 percent; the range was from 2.3 for field peas to 5.2 for horse beans. If domestic needs are increasing at the rate of 3.0 percent, the Plan goals would not provide for any important increase in exports of either grains or pulses. As in the case of cereals, it now appears that the progress toward producing the quantities targeted for 1972-73 is not ahead of schedule.

It is recognized in the Third Plan that the great bulk of the market-oriented production must come from commercial and semi-commercial farms. Although completely dominant in terms of number and area cropped, the subsistence sector is expected to show a growth rate of less than 2 percent. At this rate, the sector would only care for its population increases; leaving the commercial producers the task of covering the requirements of the balance, which includes the growing urban sector. It was estimated in the TFYP that monetary agriculture should show almost a 9-percent growth rate if it is to provide the desired output. There has been a substantial development of large-scale production in cotton and sugarcane on commercial farms and plantations, but this development has not yet made any important impact on the output of cereals and pulses.

C. Supply - Demand Implications

Despite the poor crops of 1966, there has apparently been no substantial increase in the domestic price of cereals until 1970. However, prices of these commodities in Ethiopia have now reached a level considerably above the prevailing averages in North European markets. This

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20/ IEG. "Third Five-Year Development Plan, 1968-1973", Addis Ababa.

is perhaps best illustrated by the fact that, in 1970, the average wholesale prices of barley, maize and corn in Addis Ababa were at least 50 percent above the quotations in Rotterdam. This tends to prove only that Ethiopia's price structure on grains is now import-oriented. During recent years, very limited exports of cereals, virtually all to neighboring areas, have been made at prices closely in line with those prevailing domestically. It cannot be overlooked, however, that the relatively high cereal prices have served to improve the terms of trade for agriculture in relation to the urban population, which constitutes the bulk of the buying public.

The price situation on pulses is contrary to that prevailing on cereals; in this case, the local prices are export-oriented and closely related to the fob value of the products shipped abroad. For example, the 1970 average price of horse beans in Addis Ababa was Eth. $22.6 per quintal, whereas, the fob return from exports was Eth. $22.5 (Appendix Tables A-5 and A-14).[21/] There were greater differences in certain other cases but not enough to invalidate the observation on price relationships. This situation is not likely to change as long as pulses are exported in any quantity.

As long as the disparity in pricing bases for grains and pulses persists, it will not only be extremely difficult to export grains competitively, but grains will also be abnormally competitive with other crops such as pulses, which are priced on an export basis. Appendix Table A-13 was compiled to point out this competitive situation, and the analysis would tend to support the contention that grains are currently a competitor of pulses where production returns are concerned. A firm price in pulses compared to any decline in grains would thus work to the advantage of pulses.

It should be noted that, if and when Ethiopia reaches the point of self-sufficiency in cereals, there could be a very severe downward adjustment of grain prices. It is possible that the price of one or more of the cereals could decline without necessarily causing the prices of other grains to collapse. Much depends on the extent to which consumers will substitute one product for another and little factual information is available on this point. It seems likely, however, that a sustained drop in the price of maize, for example, would also tend to bring other cereal prices down. For some reason, seasonal price spreads on both cereals and pulses seem to have been widening in recent years. A more efficient marketing system should minimize some of these price swings.

21/ It is recognized that these prices are not exactly comparable; they represent different quality and different manner of pricing. These discrepancies, however, do not invalidate the comparison intended only to show that domestic prices of pulses are export-oriented.

D. Institutional Setting

The business "climate" of a country often determines whether export trade will be encouraged to expand or be hampered in its growth. Regulations and procedures governing the conduct of foreign trade are sometimes unduly burdensome to traders. Export promotion, if properly conducted, can be a strong element in selling commodities abroad. Services such as credit and market news also play an important role in facilitating trade. Taxes, duties and licenses can influence exports and even lead to increased smuggling in some circumstances. Another important element in the setting for external trade is the attitude of traders themselves and their ability to organize for aggressive action. In general, it appears that these various facets of the institutional setting, as they affect the export of grains and pulses from Ethiopia, are not a serious obstacle to increased trade; but neither are they a particular stimulus to such activity.

1. Ethiopian Grain Board (EGB)

After several years of being completely dormant, the EGB was revived in 1970 and is now playing a major role in the export of grains, pulses and oilseeds. The general objectives of the Board are to improve quality, to protect the nation's foreign exchange position, and to maximize export; it also has the power to regulate prices, counsel on production programs, and license grain cleaners and graders. Although organized as an autonomous IEG agency, the Grain Board is chaired by the Minister of Commerce and Industry. Several of the activities of the EGB are related directly to the export trade in grain and pulses; the more important are:

a. Issuance of export permits or certificates in which quality, origin and authorization to sell are listed. A permit will not be issued unless the Board believes the price is satisfactory; at times and for certain commodities, this permit provides the mechanism for efforts to maintain a minimum price on exports of commodities controlled by the EGB. In the institutional setting, this price control effort appears to be a source of some concern to certain exporters. The EGB certificate must be obtained as one of the steps in the process that includes certain other formalities involved in making an export sale, such as currency control and customs clearance.

b. Grain cleaners are licensed and their charges are controlled by the EGB; the maximum charge for cleaning services is currently Eth. $1 per quintal.

c. The current EGB regulations require that new bags of any type approved by the Board are to be used in exporting grains and pulses. Previously, some shipments were made in used bags that detracted from appearance and often led to loss through breakage. It should be noted that the cost of bags is increased by the tariff and tax on bags or raw materials imported. Some markets abroad are reported to prefer pulses packed in 50-kg bags; Ethiopian exporters generally use 100-kg bags.

At present, quality control consists mostly of certifying the volume of impurities in a shipment. In cooperation with the newly formed Ethiopian Standards Institution, the Grain Board is hoping to establish definitive grades that will provide a more rational basis for controlling quality in exports.

2. National Bank of Ethiopia (NBE)

Currency control regulations affecting external trade are administered by the NBE. A trader proposing to export grains or pulses must file an export declaration, covering the full value of the products to be shipped. Approval of the transaction is usually based upon a sales contract and the Bank must be satisfied that the price is in line with the going market. In some cases, forward and consignment sales are authorized. Payment for all exports must be made in convertible currency through the Bank or its authorized agents. It is reported that the NBE has recently liberalized its approval of properly documented applications for exchange to cover claims arising from differences between buyers and sellers. This has removed what was formerly a source of serious concern to foreign buyers.

3. IEG Customs Department

An export declaration supported by a series of documents, including the clearances by the EGB and NBE, must be filed at point of shipment by the exporter or his agent. It has been reported that paperwork is especially heavy on shipments through Djibouti and not much better at Assab.

A transaction tax of 2 percent ad valorem is collected on all domestic and export transactions, including those on grains and pulses. The tax on exports is payable at the time of customs clearance, and it is based on the value set by customs.

4. Ministry of Commerce and Industry (MOCI)

Aside from its role in the program of the Grain Board, the MOCI, at present, plays only a relatively minor part in the exporting of grains and cereals. However, this Ministry is primarily responsible for surveillance of all marketing in Ethiopia, and it has the potential of being a more important factor in the development of export trade. Dealers involved in the export trade are licensed by the MOCI.

The MOCI is now proposing to establish an Investment and Export Promotion Center that would be a Ministry agency, but would be attached to the Ethiopian Chamber of Commerce. Although authorized by the IEG, the Center has not yet been funded. In the opinion of some observers, export promotion might be conducted more effectively as an integral part of the COC program; in this way, the business community could be more directly involved and operations could be more flexible.

5. Ethiopian Chamber of Commerce

The COC is a general, semi-public organization composed mostly of individuals and firms engaged in all lines of business in Ethiopia. Aside from providing a clearing house for information of concern to businessmen, the Chamber functions as a spokesman or mediator in representing and presenting the position of the business community to the IEG and the general public. It also sponsors trade delegations, which go abroad, seeking to develop exports. At present, Ethiopia does not have permanent commercial representation in the form of trade representatives or commercial attachés stationed in foreign markets.

Associations of exporters that are organized along commodity lines are a very useful mechanism for unified action in the common interest, such as negotiating with IEG agencies, and for providing an element of self-policing within the trade. In Ethiopia, it may be possible for the Chamber to set up such subgroups within the structure of the general organization.

6. Ethiopian Grain Corporation (EGC)

Organized as an autonomous government agency, the Corporation is closely related to the Ministry of Agriculture, with the Minister of Agriculture serving as chairman of the EGC board. Although it is authorized to purchase and export grains, pulses and oilseeds, the EGC has not operated extensively in this trade, and there is little probability that it will soon enter the export field for its own account in any volume. Present activities of the Corporation are concerned mostly with domestic purchases; partly for price stabilization purposes but more for evening out supplies among regions. It also distributes the sizable quantity of cereals imported by Ethiopia.

Despite its primary attention to the domestic side, the EGC does, at times, supply pulses to exporters who may need additional quantities to meet sales commitments. The Corporation has also made loans to certain growers who are producing pulses for export, particularly haricot beans. A well-executed purchase program for pulses, in which price leadership aimed at giving the growers a better return is provided by the EGC, may be entirely practicable and it might be conducted at a relatively modest cost. Actually, the Corporation is currently engaged in such a program for haricot beans.

7. Commercial Bank of Ethiopia (CBE)

Financing of exporters is a major element in the credit program of the CBE. Loans for procurement of commodities are made against security in the form of facilities or inventory. The preferred type of credit, however, is based on the pledge of documents covering sales abroad. In the latter case, up to 100 percent of the proceeds may be advanced but 70 to 80 percent is more customary. Interest on short-term loans to exporters is usually 7.5 to 8.5 percent per annum. There is little or no indication that bank credit

would be readily available to enable an exporter to extend credit or supply inputs to growers, unless, of course, acceptable conventional security were provided by the borrowers. In fact, organized credit to enable farmers to engage in production for export is virtually nonexistent in most of Ethiopia.

The observations above are not intended to imply that the CBE is the only commercial bank involved in financing exporters; others also engage in it to a greater or lesser degree and on substantially the same basis.

8. Ministry of Agriculture (MOA)

Except for issuing certificates of health on foods, including cereals and pulses that are required for shipments to some markets, the MOA is not directly involved in export sales of cereals and pulses at the present time. However, the MOA, through its close working relationship with the Grain Corporation, does have some indirect influence on the export of cereals and pulses.

9. Ethiopian Standards Institution (ESI)

The Ethiopian Standards Institution was established in 1970 and is in the process of establishing standards on units and measures for the local and export trade and also for grades and quality control on coffee, hides and skins, as well as cereals and pulses, in this order of importance. The grade standards for these products are expected to be published by July, 1972. The publications by the International Organization for Standardization serve as the base for elaborating Ethiopian standards. The Experience, Incorporated project team has been of assistance to the ESI by informing them of the grade standards already established for cereals and pulses in international trade, the specifications regarding quality, and the procedures employed in inspecting the quality and issuing grade certificates.

V. EXPORT OF PULSES

A. Ethiopian White Haricot Beans - (See page 51 of Part A)

B. Competitive Conditions on Haricot Beans - (See page 51 of Part A)

C. Government Policies Affecting Export Prices

Competition among pulse suppliers is active, and new countries, attracted by the prevailing firm prices, have started to supply western European markets with beans. On the other hand, some traditional supplying countries have lost their share of the market due to lower production because traditional land devoted to growing beans is being used for other purposes. However, the situation remains competitive, and the free marketing system in Ethiopia should not be discouraged by government policies that have the effect of introducing undue rigidities in the price mechanism. At present (December, 1971), both the Ethiopian Grain Board and the National Bank must review and approve the prices at which pulses are contracted for sale abroad. It depends on how the clearance is administered, but it could lead to a situation whereby selling for export is hampered by maintaining a restrictive policy on approval of prices. This would allow other competing supplier countries to take advantage of the situation.[22/] In some circumstances, this could also accelerate speculation. Generally, the price level can best be determined by the supply and demand pattern.

Some exporters contacted during the study expressed their concern about the IEG price requirements, which, in their view, interfere in varying degrees with the free marketing system. However, they seem to agree that, the Grain Board's function should be to gather market information on prices of competing pulses and on the supply and demand situation from reliable sources overseas. This would guide producers and exporters and, therefore, encourage increased production. This news could be disseminated to the parties concerned by circulars, radio, or by means of regular publication in local newspapers.

22/ Substantially the same point was made by the Stanford Research Institute in their Final Report "Development of Agriculture and Agro-Industry in Ethiopia", dated December, 1969. In this report, it was stated, "One criticism by exporters and importers is that the National Bank sometimes refused to allow an export transaction if the price shown on supporting documentation appears to be significantly below world price. There are many reasons why the price on a particular transaction might vary significantly from the current world price, including differences in quality, in delivery time, or in conditions or quantities available. Price fluctuations in some commodities are so rapid that, unless the Bank had a large group exclusively devoted to monitoring world prices on a day-to-day basis, this method of assuring honesty in export pricing might easily hamper foreign trade transactions."

An unreasonably high "clearance" price enforced over a lengthy period of time would tend to furnish an "umbrella" for countries (Iran, Greece, Turkey, Yugoslavia, Sudan, Eastern Europe and Mexico) interested in supplying the Western European markets, who could increase their sales and consequently jeopardize Ethiopia's market position. It would also lead to intensified efforts on the part of exporters to evade the regulations.

D. Import Duties

As far as import duties in Europe are concerned, pulses from all origins are taxed in the same way, with the exception of the United Kingdom, which does not charge any duties on pulses shipped by Commonwealth countries The present duty on pulses imported by Common Market countries is 5.4 percent on the cif value, but, as a result of the Kennedy Round Talks, this will most likely be reduced to 4.5 percent in 1972.

E. Export Potential for Pulse Crops

Total world production of pulses to 1980 is projected to rise at a faster rate in developing countries (3.3%) than in high income countries (1.2%).[23] The FAO projects that total world demand will increase from 35 million tons in 1970 to about 47 million tons in 1980. An eventual slight decline in per capita consumption in high-income countries is expected to be offset by a steadily growing population and a changing pattern of consumer habits (an increased use of convenience foods that favors the consumption of canned pulses).This trend is likely to accelerate the demand, which is estimated to grow at a faster rate than supplies. Also, pulse production in some industrial countries, who are important exporters today, will probably decline owing to reduced acreage available for growing pulses. These factors will result in a smaller exportable surplus. For the same reason of reduced local production, some industrialized countries are likely to emerge as importers on a larger scale, since they will not be able to cover their domestic demand any longer. This applies particularly to Europe, where imports of pulses have risen steadily from 860,470 tons in 1967 to 1,010,600 tons in 1968 and 1,235,100 tons in 1969.

For Ethiopia, this will mean better prospects for exporting pulses. In the case of haricot beans, the possibility of doubling exports within the next five years is easily within reach, provided the buyers' quality requirements can be met. In addition, other varieties of pulses not yet grown,

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23/ FAO "Agricultural Commodity Projections, 1970-1980", Rome, 1971.

but which are suitable for export and have a market abroad, may be introduced. The expected strong price position of pulses in the decade ahead will offer enough incentive to the growers to warrant a substantial increase in production through larger acreage and increased yield from good seed stock.

The potential of expanding exports of other types of Ethiopian pulses, which are mainly grown for local consumption (chick peas, lentils, horse beans and field peas), does not look as promising as the expansion of white haricot beans. But the possibility of increasing exports of some items does exist (see Appendix B). Up to the present time, the combined exports of "other" pulses have considerably exceeded the trade in haricots (Appendix Tables A-7 to A-11).

Exports of chick peas are mainly to Ceylon; according to statistics, 80 to 90 percent of all chick peas exported move to this market, which indicates a strong dependence upon Ceylon. However, sales to this market have decreased from 12,365 tons in 1968 to 1,742 tons in 1970. With the introduction of new types of chick peas that can likely be grown in Ethiopia, additional markets can be entered, including Europe.

The principal buyers of horse beans are Saudi Arabia, Japan, Jordan, South Yemen and Lebanon. An effort to increase exports to smaller markets should be successful.

In adition to the small and medium-size white beans, there is an opportunity in the Empire to grow other types of pulses that have a good market potential overseas. Some experimental stations presently carry out trials with new varieties of pulses; however, a further in-depth study should be conducted on other types of pulses that are in demand in foreign markets to determine their adaptability to production in Ethiopia. A large canner in Europe has recently expressed an interest in particular types of beans. If these types can be grown successfully in Ethiopia in the large quantities required by the canner, a sizable export market can be developed with a corresponding increase in foreign exchange earnings.

Ceylon is the major customer for lentils, taking 20 to 75 percent of the total exports, with the quantity varying from year to year. Other important buyers are Sudan, the United Kingdom, Egypt, Mauritius and Saudi Arabia. Ethiopian lentils are consumed by the colored population. The large potential market for green lentils in Europe should be an incentive for Ethiopia to consider growing green lentils also.

Field peas are exported in small quantities and are presently of no significance to the overall trade.

The potential of increasing sales in the traditional and new markets for these and other types needs to be investigated. To do this effectively it will be necessary to visit the trade in these countries and conduct a market survey at first-hand.

VI. STORAGE AND HANDLING FACILITIES

A. Present Methods

Many different methods are used to store grains in Ethiopia. The subsistence farmer may store in baskets or gourds within the home and occasionally in underground pits (gudguads) where soil conditions are suitable. Small-scale commercial farmers often use small, round, above-ground structures made of local plant materials, sealed with Chika and roofed with thatch. Larger commercial farmers frequently have larger, but poorly ventilated, permanent buildings where maize is stored before shelling.

Grains from peasant and small commercial farms come to market in goatskins, small bags, and sacks tied to the backs of donkeys, mules, horses, and camels. In a few of the mechanized areas, tractor trailers are used extensively. Once the grains enter the market stream they are usually handled and stored in sacks.

Storage at the market centers is usually in the common warehouses. In general, the smaller warehouses are crudely built, but the large warehouses are well-built structures, utilizing field stone and cement-sand mortar for the foundation, floor, and walls. The walls are frequently massive, averaging 1/2 meter in thickness and about 6 meters in height (3 to 8 meters). Steel reinforcing is used in only the largest, best-type structures. Roofs are usually corrugated metal, fastened and supported by a wood pole or steel framework, which forms the purlins and roof trusses.

B. Present Storage Capacity

A recent survey of the amount and condition of marketing center storage facilities available in Ethiopia, conducted by US/AID in cooperation with the Ministry of Agriculture, revealed a large concentration of warehouses in Addis Ababa, Asmara, and Nazaret. A summary of this rather detailed survey presented in the table below shows the total warehouse capacity in these three principal marketing centers to be about 300,000 tons.

Adding an estimated 20 percent for the several smaller marketing centers not yet surveyed, increases this amount to 339,700 tons. When the total capacity of the metal silos owned and operated by the Ethiopian Grain Corporation is added on, the grand total of 371,200 tons of terminal storage capacity is found to be available. What percent of this overall capacity is actually utilized at any one time for food grains is not known. Very few of the warehouses were reported full at the time of the survey. Also, this figure does not include any storage facilities available at the ports, in the small villages, or on the farms.

Grain Storage Facilities in Ethiopia

		Tons	
1. Warehouses in Marketing Centers:			
	(1) Addis Ababa	104,600	
	(1) Nazaret	80,500	
	(1) Asmara	98,000	
		283,100	
	Plus 20% of above for other marketing centers	56,600	
	Subtotal		339,700
2. Silos:			
	(2) Addis Ababa	20,000	
	(2) Other Centers	11,500	
	Subtotal		31,500
(3)	Grand Total		371,200

NOTES: (1) From warehouse survey data by Dr. Kenneth W. Eubanks, US/AID.
(2) From EGC data.
(3) Does not include port and on-farm or village storage.

C. Harvest, Handling and Storage Losses

1. Handling and Storage Losses

Grain losses after harvest may be caused by either molds and/or insects. All harvested grains are contaminated with mold spores, and in continuously warm regions, most grains are field-infested with grain storage insects before harvesting.

Mold spores will remain dormant if the grain is "dry" (below 12% to 14% moisture content, depending upon the kind of grain) or if damp when harvested, is dried immediately and then kept dry. Grain losses due to mold development in stored grains in Ethiopia are small, due to highly favorable dry-weather conditions during and after normal harvest seasons.

Storage insects in grains do not remain dormant in normally dried grains, but several months (three or more) are required for serious damage to occur. In Ethiopia, there is little loss of grains due to insects during the first three to four months after harvest, but grains that are to be stored for longer periods will usually need to be disinfested by fumigation or other means to prevent serious insect damage. Control of insects in good bulk storage is easier and more efficient than when the grain is stored in sacks.

Pit-stored grains have been found to be frequently and severely damaged by both molds and insects.

2. Harvest Losses

Ethiopian farmers are favored in the harvesting of most crops by the dry weather and low humidity that prevails during and following the harvesting season. All of the cereal crops, most of the oilseeds and most pulses are now harvested during the dry (bega) season. Conditions at that time are also favorable for drying, threshing, and short-term storage. Most crops, except sesame and occasionally sorghum, have low harvest losses. This is because of hand-harvesting and gleaning. Machine harvest would be expected to increase field losses in some cases. Shattering is a very serious problem with sesame. Bird damage to sorghum before harvest can be very serious. Earlier and careful machine harvest could help to reduce losses in these two crops.

D. Some Economic Aspects of Storage

1. Value of Storage

The economic benefits of good storage, often taken for granted, may be summarized as follows:

1. Reduces harvest losses of some crops
2. Minimizes physical losses after harvest
3. Maintains quality and market value
4. Provides all-season supply for local consumption and sale
5. Limits undue seasonal price fluctuations, and this usually benefits both producer and consumer
6. Improves marketing efficiency

2. Cost of Storage

Since more profit is often the incentive to more production, and storage is, in reality, a charge against production, the economic objective becomes that of providing adequate storage at minimum or competitive cost. Too often the storage problem is viewed simply as making a judicious decision between sack storage and bulk storage. But more is involved in that the overall systems of handling, moving, and marketing are inseparable parts of the storage system. The most economical storage system for Ethiopia must, of necessity, include these types of storage:

1. Subsistence farm family storage
2. Small commercial farm storage
3. Commercial farm storage
4. Cooperative farm storage
5. Market center storage
6. Terminal storage
7. Port storage

All of these types of storage are subject to improvement in Ethiopia. On the assumption of annual per capita consumption of up to 175 kilograms of cereals, a 10-month storage period, and seven people per household-compound, a one-ton, minimum-capacity household grain storage unit is needed on some 4 million Ethiopian farms.[24] None of the several types of household storage now generally employed in Ethiopia is adequate for more than a 3-month storage period. The pit-type storage has much potential if it can be made moistureproof and airtight, which would cause asphyxiation of any insect life and prevent any mold development. This "if" clause must be resolved through a low-cost solution before pit storage can be widely recommended.

A specially adapted medium-size, combination bulk and sack-type storage is needed for the larger commercial farms and the farmer-cooperative centers now being established.

Most of the terminal storage space now consists of large warehouses suitable only for sacks, and many of these could not store sacks safely through a wet season. It appears that simple bulk storage could be introduced advantageously into several of these large warehouses. Several small metal silos, as developed by Hobbs at Alemaya but without roof or floor and with simple, bulk-handling equipment, could be progressively installed into these large warehouses. Such metal bins are easily aerated to control moisture, and fumigated when necessary to control insects by use of a gas-proof tarpaulin cover. In 1965, a grain storage program was proposed for Ethiopia, based on the construction of a range of sizes of steel, storage-silo units--from 5 to 100,000 quintals capacity, with estimated costs per quintal varying from 4 to 8 dollars. The metal wall for the 20-ton size alone costs only Eth. $0.75 per quintal capacity--less than half the cost of new sacks. Designs were also developed for rectangular warehouses suitable for either bulk or sack storage, with estimated costs around Eth. $4.00 per quintal.[25]

One of the recently completed, large, well-built warehouses inspected in the market area of Addis Ababa (7 x 27 x 32 meters) was reportedly built

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[24] FAO "Agricultural Commodity Projections, 1970-1980", Rome, 1971.

[25] Hobbs, W. & Berhe, B., A Construction Guide for Grain Storage Structures. IEC of Agr. & Mech. Arts Exp. Station Bulletin No. 24 (no date).

$1.72

at a unit capacity cost of Eth. $4.80 per quintal. These figures are for storage space only. No handling equipment of any kind is included. Total annual storage cost estimates require the inclusion of several other overhead and operational cost items.

E. Conversion to Bulk Facilities

Ethiopia is equipped and geared to sack handling and storage of grains and pulses. There may be definite economic advantages to converting to bulk handling of cereal grains and this is discussed in Report II and detailed in Report IV.

Sack storage, however, will continue to be required for handling the pulse crops, as handling beans and peas through bulk storage often causes a high percentage of breakage and abrasion. Dried beans are handled and shipped in sacks throughout the world.

VII. TRANSPORTATION FACILITIES

A. Background

Ethiopia's ability to increase its exports of pulses and feed grains depends considerably upon the progress that it can make in improving its transportation system. Especially important is the development of low-cost penetration and farm-to-market roads which will permit the substitution of wheel transport for pack animal transport in moving surpluses of crops from the farm to local or regional markets.

Although about 90 percent of Ethiopia's 24 million population is dependent upon agriculture for a livelihood, approximately 80 percent of this total population lives in areas that are inaccessible by modern transport. Many of these areas have a good production potential for various types of agricultural crops, including pulses and grains.

B. Means of Transport

The lack of both penetration and farm-to-market roads in Ethiopia, the most critical in Africa, results in the widespread use of slow and expensive pack animal transport; donkeys, mules, horses, and camels travel over distances ranging from 15 to over 100 kilometers. Some estimates indicate that the costs of pack animal transport are about three times that of trucks traveling on dry-weather roads and six times the truck rates on all weather roads.

Ethiopia has an adequate and competitive motor vehicle fleet consisting of large 10-ton trucks and 22-ton truck/trailer combinations. This equipment is readily available for hauling pulses, grains, and other commodities directly from the farms whenever access is provided.

The motor truck fleet is supplemented by rail transport, particularly on export and import traffic to the ports of Djibouti and Massawa. Assab, the third port serving Ethiopia, is an all truck port.

C. Quantities Transported

Total volume of cereals and pulses marketed off-the-farm is estimated to range from 600,000 to 850,000 tons. After allowing for local consumption near the source of production, there would be about 425,000 to 600,000 tons[26/] that could be transported by truck and rail.

26/ These estimates reflect allowance for post-harvest shrink; they represent net quantities consumed or exported.

About 35 to 45 percent of the pulses transported off-the-farm move to the ports for export; whereas, for cereals, tonnages exported were insignificant. Pulse exports now average about 70,000 tons annually, of which three-fourths move through the port of Assab and the remainder through Djibouti and Massawa.

The export movement for pulses is seasonal, being rather heavily concentrated in the five months of November through March. During this same period, other important crops such as coffee, oilseeds, fruits and vegetables are moving to export and competing for trucks and rail cars. The result is a very substantial increase in rail and truck transport rates during this heavy shipping season. These rates on export commodities are not presently regulated.

D. Possibilities for Increasing the Effectiveness of the Road System

1. Low-Cost Farm-to-Market and Penetration Roads

The substitution of truck transport for pack animal transport from the farmgate to the market is an important consideration in the marketing of grains and pulses, as well as for most of the country's agricultural development. This can be achieved through the construction of low-cost penetration and farm-to-market roads at standards very substantially below those presently being applied by the Imperial Highway Authority to their feeder road program. Nonsurfaced, well-drained roads such as those being constructed at the WADU project are adequate for the low traffic volumes expected over most of the country's farm-to-market roads during the next ten years. Since these roads are being constructed at a cost as little as one-tenth the cost per kilometer of the IHA's feeder roads, the same amount of money put into this type of construction could provide several times as many kilometers of road. This is a matter of extreme importance if Ethiopia is to increase its pulse and cereal exports.

2. Need for Connecting Centers of Production

Providing connecting links between the major production centers is another means of increasing the effectiveness of the transportation system in moving pulses, cereals and other agricultural crops. The present highway network is centered around the two large cities of Addis Ababa and Asmara with few or no connecting links in the rural areas. Links between the production centers would increase the exchange of commodities between the surplus and deficit areas, reduce transportation costs and tend to reduce price fluctuations.

3. Lower Empty Return Ratios

Better utilization of the truck fleet is necessary to improve transport effectiveness. On a number of major routes, trucks have rather high, empty return ratios. One reason is lack of knowledge and communication between truckers and shippers in terms of the supply of and demand for the equipment. Another is the seasonality of the export movement, which may be due to lack of storage facilities and/or lack of credit.

A means of improving communications between shippers and truckers is through the expansion and increased use of truck brokers. There are some truck brokers operating in the Addis Ababa and Dese areas who bring truckers and shippers together for a nominal fee. Further expansion of these brokerage services into other major production centers as the road system improves, should assist in reducing the large empty return ratios. Measures recommended elsewhere in this report concerning increased storage facilities and the expansion of cooperatives should assist the exporters in reducing the seasonal export peaks, and thus reduce the present seasonal peak transport rates by both truck and rail.

4. Removal of Restrictions on Truckers in Eritrea Province

Eliminating the restrictions imposed by the Northern Ethiopian Railway on the operations of trucks to the port of Massawa as well as throughout the Province of Eritrea will also improve the utilization of the truck fleet with reduced costs to shippers. Through a licensing system for trucks, the Railway is exercising a monopoly that has serious economic and social consequences on the development of the Province.

5. Opening of the Awash-Tendaho Highway

The opening of the Awash-Tendaho Highway, scheduled for September 1973, opens up a rich agricultural area. Of even greater importance, however, is the fact that it will provide a paved-surface route to the port of Assab with much easier grades and curves than the present Addis Ababa-Assab highway which has many gravel sections in difficult mountainous terrain. Calculations indicate that truck-trailer cost savings using the new route from such major centers as Addis Ababa, Nazaret, Shashemene, and Asella to Assab would permit a reduction, even in the low, off-season export rate, of about 30 percent. This assumes that the present high rates on inland movement of imports, set by the government, remain the same.

VIII. PRODUCTION AND MARKETING COOPERATIVES

Two principal difficulties facing developing nations are:

1. Inadequate, slowly available, and high-cost inputs, i.e., fertilizer, improved seed, equipment, credit, etc.

2. Lack of an available, orderly market which will provide a fair price for products produced, especially by the small and medium-size farm sector.

Most years, Ethiopia is generally self sufficient in staple food crops, though poor distribution frequently leads to near famine conditions in some areas and surpluses in others.

Agricultural production input (supply) and output (marketing) cooperatives appear to have an important potential for providing fair prices for needed inputs and for products marketed.

A. Present Situation

A cooperative law was passed in 1966, and a training center for cooperative organizers and personnel is presently operating at Awasa. Professional expatriate cooperative personnel are active in Ethiopia, particularly in the CADU project area.

An August, 1971, report lists 77 cooperatives registered or in the process of being registered in Ethiopia with 10,113 members. [27] Of this number, 51 are listed as multi-purpose, with 6,351 members. Few of these 51 are cooperatives in the modern sense. Several of those formed recently are concerned primarily with coffee marketing. None of these has as many as 1,000 members and all had less than Eth.$70,000 in paid up share capital in 1969. The National Coffee Board announced in December, 1971, that it is assisting in the formation of 12 new coffee cooperatives to be in operation in 1972.

Probably the largest marketing cooperative is at Setit Humera, with over 500 members, Eth.$230,000 in paid-up share capital, and an annual volume of over Eth.$3,000,000. The volume of business of this cooperative will vary from year to year, depending on production and price of sesame, sorghum, and cotton.

Present emphasis by the Community Development, Cooperative Development, and Extension Service Departments is on input (supply) cooperatives using fertilizer as the principal "vehicle". The best example of

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[27] Report by Mulugetta Kassa, IEG, Ministry of Agriculture, August 1971.

the formation of such a cooperative is the Dankaka cooperative in the Debre Zeit area. In the third year of organization effort, the cooperative was formed with a membership of 70 farmers who contributed Eth. $4,591. It appears to be on sound footing, is growing, and has expanded into product marketing, selling improved seed, and credit.

B. Apparent Difficulties in Organization

A recent report based on a sample survey of cooperatives in Ethiopia described the problems facing organization of new cooperatives or expanding existing ones.[28]

1. Inability of peasant farmers to read and write
2. Lack of cooperative education and educational facilities
3. Lack of knowledgeable cooperative workers
4. Inadequate feasibility studies before attempting establishment of cooperatives
5. Inadequate financing, especially in early stages of development
6. Problems of land tenure and small holdings
7. Suspicion toward any project requiring cash contributions before rendering service, basically a fear of loss of the contribution due to misappropriation or poor management

These problems are not listed in order of importance and there may be others. One other problem involves the lack of coordination or cooperation among government agencies and their personnel in the field. This may not be serious, but was found to exist.

C. Prospects for Establishing New Cooperatives

There are apparently no political deterrents to establishing either input, output or multi-purpose cooperatives in Ethiopia; nor are there such deterrents to increasing the size of existing cooperatives. There are, however, problems of educating farmers to take such action, and perhaps even greater problems of guiding and staffing the cooperatives in the beginning years.

Three groups of farmers might expect to encounter these and other problems in varying degrees.

1. The peasant farmer using the EPID Minimum Package as a base is receiving greatest attention from the government. This group is also expected to have the greatest problems of member education and funding

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28/ "Assistance in the Field of Promotion of Cooperatives", IEG, Ministry of Agriculture, October, 1970.

Peasant farmers are expected to move into the input or supply cooperative first, using fertilizer as the primary incentive. Based on recent experience in establishing cooperatives within this segment, it would appear possible to establish 7 to 12 cooperatives by 1977.

2. Certain commercial farmers are interested in output (marketing) or possibly multi-purpose cooperatives. There is no problem of education but there remains the problem of funding and staffing a larger and more sophisticated cooperative. It is believed that a cooperative made up of commercial farmers would have relatively few members. One to three cooperatives involving this segment of farmers may appear by 1977.

3. The medium-scale farmer is more difficult to analyze. They are frequently educated people but are neither large enough to own large machinery nor small enough to be efficient with primitive methods. Until more specific information is available on this segment of farmers, one would suspect they might join the supply cooperative of the primary peasant farmer and the marketing cooperative of the commercial farmer. This group would be expected to benefit most from a machinery input cooperative if such were established.

Due to the time required to establish, staff, and adequately fund peasant farmer cooperatives, the logical conclusion is that multi-purpose or marketing cooperatives of this group will have little impact on prices received during the coming 5 years. Prospects are more promising over the longer term, and in fact, this may be the only effective route toward bringing the peasant farmer into the monetary sector of the economy.

D. Agricultural Development Programs Related to Export Production

On January 1, 1972, there will be five area development projects functioning or approved for operation.

1. Chilalo Agricultural Development Unit (CADU) was established in September 1967 by agreement between the Swedish International Development Authority (SIDA) and the Imperial Ethiopian Government (IEG). Main crops are wheat, barley, teff, maize, pulses, and vegetables.

2. Wolamo Agricultural Development Unit (WADU) was established in 1969 and is being funded with the assistance of the International Development Association (IDA) of the World Bank. The major crops in the area are maize, coffee, and cotton.

3. The Ada District Development project will be activated in 1972. The main crops of the area are wheat and teff. US/AID will assist in funding and implementing this project.

These three projects will be directed primarily toward the peasant farmers and development of institutions for their benefit.

4. The Humera Agricultural Development project is located in the northwest lowlands. This project was established in 1970 with funds extended by IDA of the World Bank. The major crops are sorghum, sesame, and cotton.

5. The Awash Valley Authority is concerned with a different type of development and is not a formal project. The Authority was developed in 1954 as a chartered agency charged with the task of developing the natural resources of the Valley. This includes conducting surveys, administration of water rights, control of water flow, and coordinating activities of ministries and public authorities in the valley area.

Both the northwest lowlands area and developments resulting from the Awash Valley Authority activities are immediately more nearly associated with commercial scale farming than with the subsistence farming sector.

E. Short-Term Contribution to Exports

It is unlikely that the CADU, WADU, or Ada projects will contribute significantly to agricultural exports in the next 3 to 5 years. It is possible that CADU can significantly contribute to minimizing imports of wheat and malting barley in the 5 to 10-year term.

The CADU project area is doing an excellent job in wheat production, and experimental work with barley is progressing. Land is available for increasing output of pulses and more particularly, haricot beans. If price incentives are suitable, this project area could be expected to:

1. Contribute modestly to export of pulses
2. Assist in reducing imports of wheat
3. Provide a beginning for reducing imports of malting barley

The objective of WADU is to make that project area self-sufficient in food and feed. Pulses can be grown but are not expected to reach export proportions due to local need for subsistence food.

Since the Ada project area is only beginning active operation in 1972, it is doubtful if this area will significantly change its pattern of production in the next 5 years.

The northwest lowlands project area at Setit Humera is expected to export oil crops (sesame), provide cotton for domestic use and provide sorghum for perennially deficit portions of Eritrea and Tigre Provinces. Thus, there is little, if any, opportunity for exports of cereals or pulses from this project area.

The Awash Valley Authority is creating conditions favorable for future exports of certain pulses. In the foreseeable future (next 5 years) the profitability of cotton is expected to limit introduction of other crops

not now grown in quantity. Beyond this time, significant changes may occur.

One must conclude that the existing development project areas are not likely to contribute significantly and directly to export of cereals and pulses in the near term. Indirectly, through advice to commercial farmers, some contributions may be made.

IX. AGRICULTURAL EXTENSION AND FARMER EDUCATION

A. Introduction

An Extension Service was established for Ethiopia in 1952. The pattern that evolved was influenced by Oklahoma State University and followed the triumvirate system (resident teaching, research, and extension) which has been a part of the Land Grant University system in the United States for more than 100 years. As the Oklahoma State University phased out in Ethiopia, financial problems, among other things, dictated that the "Land Grant System" be abandoned. After a second Ministry of Agriculture reorganization in 1969-70, the Extension Service became the Extension and Project Implementation Department (EPID) of the Ministry of Agriculture.

The 1970-71 Master Plan for the EPID indicates that two main thrusts will be made on behalf of the farmers of Ethiopia.

1. Encouragement of commercial farming to improve the foreign exchange position and availability of raw materials, and,

2. Development of peasant agriculture to raise the standard of living for the majority of Ethiopia's population.

In January 1972, little had been done to implement the first point, but appreciable activity was underway in support of the second.

B. Organization and Personnel of the Extension Department

In order to understand extension's potential and limitations, it is necessary to understand the structure of the present EPID in relation to the Ministry of Agriculture. A flow chart is shown in Figure A-1 of the Appendix.

Organization of the Ministry of Agriculture is now patterned, in part, after the recommendations of the 1970 Rockefeller Foundation team. Certain significant changes from the initial recommendations of the team have altered the administrative flow of authority. It appears possible that the several essentially autonomous "departments" and projects attached to the MOA will result in coordination problems in the future.

Communications with field locations are difficult and frequently slow. The field staff frequently lacks mobility due, in part, to type of transportation available, difficulty of keeping some types of transportation functioning, and to budget limitations.

The headquarters technical staff is not presently adequate to handle field staff training and supervision, and also to supply needed technical support. More personnel with greater specialization is anticipated in the near future.

Extension field supervisors, both in and out of the 9 Minimum Package areas, are college graduates. They range in field experience from a few months to several years of service. Those contacted appear unusually competent.

The extension field staff appear quite capable of handling their present assignments when their lack of technical supervision is considered. Additional technical in-service training and specialization would allow these men to handle anticipated needs of the peasant farmers.

Extension agents are usually "diploma" men from either the Jimma or Ambo institutes of agriculture. Assistant extension agents have a formal education of tenth to twelfth grade. They normally have at least 6 months of practical training at Bako or in the CADU project area. These men are usually assigned to their home area.

Trade Center foremen in the Minimum Package areas normally have no more than an eighth to tenth-grade eduaction plus 4 to 6 weeks of intensive in-service training. The men may become assistant agents as a promotion. The Trade Center organizers may have up to a twelfth-grade education plus in-service training with established extension agents.

1. Capability and In-Service Training

The technical staff responsible for much of the in-service training consists of two sections:

1. Agronomy. One senior agronomist recently recruited from the position as nominal head of the Debre Zeit research station. There are 4 agronomists (all Ethiopian); a cereal crop specialist; a legume and oilseed specialist; a soils man; and, a crop protection specialist. There are also two expatriate (FAO) fertilizer specialists and one agronomist attached to the SIDA group.

2. Marketing and Credit. This section consists of one senior economist and two economists, all Ethiopian.

These men may have suitable expertise for their present assignments, but it is too much to expect them to be fully qualified in their wide range of responsibilities.

Overall, the extension field staff must be considered quite capable. Alemaya graduates appear knowledgeable, resourceful, and confident. Observations on their administrative ability were too limited to justify

conclusions. Jimma and Ambo "diploma" men function as extension agents and may be promoted to assistant supervisors. The men are carefully screened before being admitted to the schools, and are given an excellent course of instruction and training by a dedicated staff. They are required to have both knowledge of and experience with all peasant farming operations. They receive more extension education training than most extension field workers in the United States. Their technical and interpretive knowledge may be limited, but their applied knowledge appears quite good. Most are capable and confident.

Special in-service training is provided at Bako for selected staff members. Two former extension agents conduct most of the training but receive valuable assistance from the research station staff at Bako. Other in-service training covering the same general course work is given at CADU. This group also gives extensive credit and cooperative background training. The staff of CADU project does much of the teaching.

General in-service training for field staff is varied and apparently well-done. The number of days varies from year to year, but no less than two weeks of total training in any year is provided. Technical agronomic training appears inadequate in light of the very heavy agronomic orientation of the present extension program. Headquarters staff specialists handle much of the regular in-service teaching.

2. Relations with the Commercial Farming Sector

The Master Plan of EPID for 1970-71 recognized the need for action directed to the commercial farmer to enhance agriculture's contribution to Ethiopia's balance of trade. Apparently, no educational activities have been initiated in this group's behalf, nor does there appear to be any probability that action will be taken in the near future. Commercial farmers can, on their own initiative, gain information from observation areas, demonstrations, Minimum Package programs, and directly from the research stations.

One must make the judgment that the divisions and departments of the Ministry of Agriculture and the essentially autonomous units are not staffed, funded, or directed to work with the commercial farmer. From the point of view of this study, EPID is contributing relatively little to this potentially important export segment of the farming sector.

3. Staff Adjustments Needed

Since agronomic efforts are underway to help the peasant farmer and cooperative organization efforts are also planned, these comments will be directed toward the commercial farmer, but not exclusively to him.

The Extension Division must add additional, highly qualified specialist staff who have direct and continuing contacts with the Institute of

Agricultural Research. At this time, a minimum addition to the staff should consist of:

1 Soil Survey Specialist
1 Soil Chemist and Fertilizer Specialist
1 Agronomist for sorghum and maize
1 Agronomist for pulses, especially beans
1 Entomologist for economic crop plants
1 Plant Pathologist for economic crop plants
1 Agricultural Climatology Specialist
1 Farm Organization Economist (crops oriented)

These men must be trained to the M. S. level, be fully supplied with "tools of their trade", be completely mobile and be required to work as a team, using a complete problem-solving approach. These positions are essentially over and above the existing staff structure.

These specialists would have the responsibility of technically training the field extension staff, advising with commercial farmers on their problems, bringing research needs to the attention of IAR, and assisting in or originating applied interpretations of research.

There is no reason why this staff, in cooperation with the Institute for Agricultural Research should not conduct simple, but needed, agronomic research at locations away from the experiment stations. They should also be given the responsibility, in cooperation with the field extension agents, of interpreting experiment station research for the commercial farmers.

Ethiopia has a good basic extension staff, but questions must be raised as to whether the "demonstration" programs are the most logical base on which to build a long-range educational effort for the farm sector. Other questions must be raised about the effect of the essentially autonomous special project areas on the long-range extension educational efforts. A final question for the longer term is that of extension not being involved with family living, nutrition, and youth activities.

C. Status of Applied Agronomic Research

The following is a summary of the situation in January, 1972, relating to the status of research on various cultural practices for selected crops under consideration by the Experience, Incorporated study team.

	CROPS							
	Maize	Sorghum	Barley	Haricot Beans	Chick Peas	Horse Beans	Lentils	Other Pulses
Improved Varieties [4]	1	2	2	2	3	3	3	3
Fertilizer Use	2	2	2	2	3	2	3	3
Plant Spacing	1	2	-	2	3	2	3	3
Plant Density	2	2	1	1	2	2	2	2
Seeding Methods	2	2	2	2	3	2	3	3
Climatic Limitations	2	2	1	2	2	3	3	3
Weed Control	1	2	2	2	3	2	2	3
Disease Control	3	3	2	3	3	3	3	3
Insect Control	3	3	3	3	3	3	3	3
Time of Planting	1	2	2	2	2	2	2	3

1. Ready for extension dissemination with judgment.
2. Ready for demonstrations to check local adaptation.
3. Research inadequate, not ready for dissemination.
4. Several of the indicated "practices" including improved maize varieties are given the specific ratings for each crop with the understanding that associated known desirable practices will be imposed simultaneously with the specific practice under consideration. A rating of (1) does not suggest that additional research work is not needed.

1. Research and Research Needs for Pulses

Until recently, agronomic research activities on pulse crops in Ethiopia were practically non-existent and even today are at a very low level.

The Awasa Research Station, under the technical leadership of the French Institute Recherches Agriculture Tropicale (IRAT), has done the most research on haricot beans. Trials have been carried out with varieties, sowing dates, fertilizer application, weed control, etc. A uniform trial of haricot beans, including 5 varieties, 2 planting dates, and 2 plant population levels was grown at 7 locations in 1971.

Other research stations, notably at Bako, Jimma, Melka Werer, Nazaret, Tendaho, and Kalumsa (CADU), have, from time to time, carried out miscellaneous trials with varieties, fertilizers, etc.

Haricot beans have also been included in the Minimum Package fertilizer demonstration tests at various locations. These trials should indicate additional areas suitable for haricot bean production as well as stimulate farmers' interest in this crop.

Recently the FAO horticulturist, as chairman of the National Cash Crop Improvement Committee in Nazaret, has been given the task of co-ordinating research work on haricot beans.

Although at present haricot bean production in Ethiopia has encountere only minor problems of diseases and insects, it may be expected that as production increases and intensifies, such problems will undoubtedly increas

Research on other pulse crops has, thus far, consisted mainly of a few isolated, noncoordinated trials at different stations with several varieties and fertilizers. Chick peas, horse beans, lentils, and field peas are mainly produced by the subsistence, peasant farming sector with probably age-old production practices. Little research information is available on which to base recommendations for varieties, sowing dates, fertilizer applications, disease and insect control, or any other practices to improve yields and quality.

It is essential that well-coordinated research programs be developed for all pulse crops, including varietal improvement, agronomic practices, and disease and insect control. Trials should be carried out in major production areas of the crops concerned.

Certain inputs are needed to remove existing obstacles to increased production. These obstacles can be largely eliminated through research, education, and limited production incentives. Removing these obstacles will require attention to the following inputs:

1. Improved, adapted varieties made available to and used by producers;

2. Improved cultural practices for more satisfactory seed beds and more suitable stands;

3. Attainment of acceptable levels of weed control to minimize competition and allow most efficient use of moisture and plant nutrients;

4. Use of at least minimum levels of fertilizer as needed to supplement soil supplied nutrients;

5. Reduction of disease and insect problems through use of tolerant varieties, appropriate cropping patterns, improved cultural practices, and supplemental chemicals when necessary;

6. Assistance with harvesting, storage, and marketing techniques made available so that losses of grain produced are held to a minimum and the producer receives a fair price for his crop.

2. Suggested Research Priorities

1. A thorough screening program for maize, sorghum, barley and pulses should be instituted immediately and the materials planted for observation at all locations where there is an economic production potential. Three years should provide a suitable primary screening period. The surviving material should provide an effective germplasm and variety pool for future rapid gains.

2. Simple, effective machinery must be developed for seed bed preparation, planting, and handling of products.

3. Interplanting of crops must be studied at all locations where weather is suitable.

4. A soil testing laboratory, with provision for appropriate field research, must be established, funded, and staffed to minimize errors in fertilizer use.

5. Weed control measures, cultural and chemical, must be studied and evaluated for different types of farming operations and for different crops.

6. Information must be gathered to determine, for Ethiopia, the most effective method of procuring and maintaining improved seed supplies for all principal commercial crops. Production and marketing facilities should be established and placed in operation as soon as desirable materials become available. It is believed that different seed production facilities and marketing methods may be required to meet the needs of various groups of farmers.

X. OVERALL FEASIBILITY OF EXPANDING EXPORTS OF PULSES

Pulses are not a new export item for Ethiopia; they have been traded in volume for over 20 years. As a group, the pulses now rank along with oilseeds as the next most important earners of foreign exchange, after coffee, hides and skins. During the 1960's exports of pulses have ranged from 55,100 to 80,200 metric tons but in 1970 shipments dropped to 51,100 metric tons. There is some evidence that the movement has again turned upward. Among the individual pulse crops, the greatest strength has been reported in exports of haricot beans, although horse beans and lentils have continued to be major income earners. Chick peas and field peas are of lesser importance in Ethiopia's export trade. Haricot beans are relatively less important in the domestic consumption pattern than are the other pulse crops. Other crops such as lentils, horse beans and peas, produced almost entirely on subsistence farms, have continued to account for the bulk of the export income from pulse exports

A. Market Situation

On the basis of official IEG statistics, it is estimated that less than 15 percent of the total production of pulses is currently exported. Domestic requirements for pulses are expected to increase at about 3 percent per annum overall during the 1970's, with the principal local demand centering on horse beans, lentils, and chick peas. Output has not been growing at that rate, indicating a worsening supply/demand situation in-country and perhaps less incentive to export. By 1980, domestic requirements for pulses may be in the range of 800,000 to 900,000 tons (gross) which is one-third or more above the total output reported in 1970. This would be exclusive of exports.

Export markets for Ethiopian pulses are highly differentiated. Haricot beans are shipped primarily to European countries such as Germany, Netherlands, France, United Kingdom, and Belgium. The nearby areas, such as Saudi Arabia, Lebanon, and South Yeman, along with Japan, have been major buyers of horse beans. Ceylon has been the largest single buyer of lentils. Mauritius, United Kingdom, and Egypt have occasionally been significant markets for lentils. In chick pea exports, Ceylon has been dominant; but recently the quantity sold there has been declining. Field peas are exported in small amounts, mostly to neighboring countries and to Italy.

It is generally expected that the world demand for pulses will expand more rapidly than the output and this should create a strong price situation that would be advantageous to Ethiopian producers and exporters. World demand during the 1970's is projected (by FAO) to advance from 35 million tons to 47 million tons.

Ethiopian pulses have suffered from price discrimination in some markets, particularly those in Europe, based mostly on either inferior quality or nonuniformity. Steps are now being taken to establish and

enforce standards that should materially improve the market acceptance of the Ethiopian products. Little or no organized effort is currently devoted to promoting pulse exports.

B. Production Situation

Since 1967, the production of pulses in Ethiopia has been reported near the 600,000-ton level, with the crops produced by subsistence farmers accounting for over 80 percent of the total. In terms of growth, the rate of increase has been generally low, with an average of 2 percent annually since 1961. During the past two years, however, there has been some evidence of an improvement in growth rate. Only the haricot beans, which are mostly grown for export, are currently produced primarily as a cash crop by the larger, commercial-type farmers. Very limited progress has been made in research on pulse production and little extension time has been devoted to these crops. Aside from the haricot beans, pulses are grown largely by the small, subsistence farmers who sell the small quantities that may be surplus to family needs.

On the basis of the reconnaissance survey conducted by the consultant team, together with the expert opinion of other technicians familiar with the local situation, it appears that Ethiopia has the basic resources necessary for substantially increasing its production of pulses. What is needed to accomplish this is immediate attention to improved varieties and seed and other technological factors, including cultural practices, fertilizer use, mechanization, etc. A substantial strengthening of the extension effort on pulses will also be required.

It appears likely that, initially, the haricot bean may have the best prospects for a rapid increase in production for the export market. Some assurance of a stable, equitable price, plus availability of services such as credit, storage, transportation, etc., will likely induce commercial farmers to grow haricot beans. There is also some opportunity to add to the supply of other pulses, especially horse beans, lentils, and peas, by increasing the per-unit production of the subsistence sector. But a greater impact on the export supply in the short run is likely to come from the larger farms. This is already evident in the production of haricots.

To some extent, the production of pulses in Ethiopia is affected by price competition from the cereals. Pulse prices are related closely to the export levels, while prices on cereals are now import-oriented. In these circumstances, cereals are more competitive than would normally be the case.

C. Outlook for Exports of Pulses

In the Third Five-Year Plan of the IEG (TFYP), exports of pulses were targeted to increase by 9 percent annually, with a goal of over 97,000 tons in 1973. Progress to date indicates that this goal is not likely to be achieved. The greatest shortage in tonnage is occurring in chick peas and horse beans; while haricot beans and lentils are more nearly on schedule. Pulse exports declined to about 51,000 tons in 1970, primarily because of a drastic loss in sales of chick peas to Ceylon, horse beans to Japan and Jordan, and lentils to nearby countries and the United Kingdom. A much better showing is being made by the haricot beans that are shipped primarily to European markets.

Given the availability of the necessary inputs and services, along with some assurance that prices will be stable and equitable, it appears that pulse production in Ethiopia can be increased substantially. It is anticipated that the subsistence sector will supply its own consumption requirements and continue to provide some surplus of peas, horse beans, and lentils for export. Medium and large commercial farms are expected to produce most of the haricot beans, the great bulk of which are exported. Present price incentives among competing crops are such that haricot beans are an especially attractive crop among the pulses currently produced in Ethiopia.

In view of the probable tightening in the world supply/demand position of pulses during the 1970's, it is likely that Ethiopia will be able to increase substantially its pulse exports to the traditional outlets and possible new markets as well. An annual growth rate of 3 percent or more will be needed to provide pulses for domestic consumption. To provide an exportable surplus of 150-200,000 tons by 1980, production must approach 1 million tons (gross) by the end of the decade. This would imply an annual growth rate of about 5.5 percent. In the TFYP, the goal was a 3.6-percent growth rate for pulses. Although formidable, the higher rate is not beyond accomplishment. Given the right combination of improved practices, inputs and related services, and reasonable price incentives, it is highly probable that Ethiopian farmers may be able to reach and sustain pulse production of the magnitude indicated. On the marketing side, the more apparent needs are greater handling efficiency and lower margins in-country, much more stringent quality control on exports, and a more aggressive export promotion program, including a favorable institutional climate for conducting external trade. Government policies, particularly those affecting prices, must be aimed at encouraging exports by removing existing obstacles and not creating new barriers to such trade.

Exports of pulses from Ethiopia could easily be doubled or trebled by 1980, providing a well-organized effort is developed with this objective constantly in view. In the beginning, the haricot beans probably have the greatest growth potential, but other pulses, both traditional and new in Ethiopia, must not be overlooked. At present, much more is known about the markets for haricots and this fact alone points up the need for research on both production and marketing of other pulses.

REPORT I

APPENDIX A

TABLES AND FIGURES

TABLE A-1. PRODUCTION OF CEREALS AND PULSES IN ETHIOPIA, 1960/70

	1953 1960/1	1954 1961/2	1955 1962/3	1956 1963/4	1957 1964/5[a]	1958 1965/6	1959 1966/7	1960 1967/8	1961 1968/9	1962 1969/70
CEREALS:					(1,000 Tons)					
Barley	748.0	760.0	774.0	785.0	1,347.9	1,371.7	1,398.9	1,430.0	1,462.6	1,495.6
Maize	678.0	682.0	695.0	720.0	788.4	812.1	826.6	853.0	880.4	909.0
Sorghum	1,064.0	1,081.0	1,100.0	1,132.0	867.7	887.0	922.1	988.6	1,007.3	1,036.8
Teff	1,793.0	1,824.0	1,859.0	1,915.0	1,255.5	1,267.0	1,285.5	1,304.3	1,323.3	1,342.6
Wheat	255.0	260.0	266.0	282.0	692.9	721.7	738.9	760.0	782.0	808.0
TOTAL	4,538.0	4,607.0	4,694.0	4,834.0	4,952.4	5,059.5	5,172.0	5,335.9	5,455.6	5,592.0
PULSES:										
Chick Peas	160.0	162.2	164.7	169.5	168.4	172.0	173.9	176.7	180.5	185.3
Field Peas	110.0	111.5	113.2	116.0	114.9	117.8	119.6	121.6	123.9	126.4
Haricot Beans	60.0	60.7	61.5	62.5	63.2	64.8	66.4	68.2	70.1	72.3
Horse Beans	100.0	101.4	103.0	105.7	128.8	116.4	120.9	125.9	131.5	137.8
Lentils	90.0	91.4	92.8	95.0	95.4	99.1	99.8	101.2	103.4	106.5
TOTAL	520.0	527.2	535.2	548.7	570.7	570.1	580.6	593.6	609.4	628.3

a/ Beginning in 1964/5 (E.C. 1957) a revised base was used in estimating production of certain cereals.

SOURCE: Statistical Abstracts, Central Statistical Office, IEG.

TABLE A-2. AREA OF CEREALS AND PULSES IN ETHIOPIA, 1960/70

	1953 1960/1	1954 1961/2	1955 1962/3	1956 1963/4	1957 1964/5[a]	1958 1965/6	1959 1966/7	1960 1967/8	1961 1968/9	1962 1969/70
					(1,000 Hectares)					
CEREALS:										
Barley	935.0	950.0	967.5	960.5	1,643.8	1,652.6	1,672.8	1,693.2	1,713.9	1,734.8
Maize	744.0	757.7	772.2	776.0	800.4	812.1	820.2	828.4	837.7	847.1
Sorghum	1,329.0	1,351.2	1,375.0	1,384.0	1,071.2	1,081.7	1,129.5	1,174.0	1,188.6	1,203.2
Teff	3,260.0	3,316.0	3,380.0	3,384.0	2,110.0	2,111.6	2,132.7	2,154.0	2,175.5	2,197.3
Wheat	364.0	371.4	330.0	390.1	962.3	988.6	1,008.4	1,028.6	1,049.2	1,070.3
TOTAL	6,632.0	6,746.3	6,874.7	6,894.6	6,587.7	6,646.6	6,763.6	6,878.2	6,964.9	7,052.7
PULSES:										
Chick Peas	266.0	270.3	274.5	275.0	276.0	277.4	280.5	285.3	289.9	294.2
Field Peas	122.0	123.9	125.7	126.6	127.7	128.1	130.0	131.8	133.5	135.0
Haricot Beans	86.0	86.7	87.8	88.0	89.0	90.0	91.0	91.9	92.8	93.7
Horse Beans	110.0	112.7	114.4	115.3	124.0	126.5	131.4	136.0	140.2	144.0
Lentils	150.0	152.3	154.6	157.1	159.0	162.5	166.3	169.6	172.3	174.4
TOTAL	734.0	745.9	757.0	762.0	775.7	784.5	799.2	814.6	828.7	841.3

a/ Beginning in 1964/5 (E.C. 1957) a revised base was used in estimating production of certain cereals.

SOURCE: Statistical Abstracts, Central Statistical Office, IEG.

TABLE A-3. YIELD OF CEREALS AND PULSES IN ETHIOPIA, 1960/70

	1953 1960/1	1954 1961/2	1955 1962/3	1956 1963/4	1957 1964/5	1958 1965/6	1959 1966/7	1960 1967/8	1961 1968/9	1962 1969/70
	(Quintals per Hectare)									
CEREALS:										
Barley	8.0	8.1	8.2	8.3	8.2	8.3	8.4	8.5	8.5	8.6
Maize	9.0	9.2	9.2	9.4	9.8	10.0	10.1	10.3	10.5	10.7
Sorghum	8.0	8.1	8.1	8.2	8.1	8.2	8.3	8.4	8.5	8.6
Teff	5.5	5.6	5.6	5.7	5.9	6.0	6.0	6.6	6.1	6.1
Wheat	7.0	7.1	7.1	7.3	7.2	7.3	7.3	7.4	7.5	7.6
PULSES:										
Chick Peas	6.0	6.1	6.1	6.2	6.1	6.2	6.2	6.2	6.2	6.3
Field Peas	9.0	9.0	9.0	9.2	9.0	9.2	9.2	9.2	9.3	9.4
Haricot Beans	7.0	7.0	7.1	7.2	7.1	7.2	7.3	7.4	7.6	7.7
Horse Beans	9.0	9.0	9.1	9.2	9.1	9.2	9.2	9.3	9.4	9.6
Lentils	6.0	6.0	6.0	6.0	6.0	6.1	6.0	5.9	6.0	6.1

SOURCE: Statistical Abstracts, Central Statistical Office, IEG.

TABLE A-4. QUANTITY OF PULSES EXPORTED FROM ETHIOPIA, 1965/70

	1965	1966	1967	1968	1969	1970
	(1,000 Metric Tons)					
PULSES:						
Chick Peas	9.5	10.9	10.7	13.9	8.0	2.2
Field Peas[a/]	2.3	1.5	0.9	1.0	2.0	0.4
Haricot Beans	19.7	19.5	17.9	19.3	16.7	17.1
Horse Beans	17.8	22.4	24.7	18.5	27.4	15.6
Lentils	5.8	14.9	15.0	22.0	24.5	15.8
TOTAL	55.1	69.2	69.2	74.7	78.6	51.1

a/ Includes "dried" peas and "mixed" peas classifications.

SOURCE: Annual External Trade Statistics, IEG, Ministry of Finance, Addis Ababa

TABLE A-5. AVERAGE UNIT VALUE OF PULSES EXPORTED FROM ETHIOPIA, 1965/70

	1965	1966	1967	1968	1969	1970
			Eth.$ per Metric Ton)			
PULSES:						
Chick Peas	231	288	267	219	234	235
Field Peas	217	267	243	264	249	257
Haricot Beans	352	360	350	357	304	396
Horse Beans	189	252	208	196	192	225
Lentils	253	364	345	342	379	312

SOURCE: Annual External Trade Statistics, IEG, Ministry of Finance, Addis Ababa.

NOTE: Exports are valued fob at the IEG customs border station except on shipments via the Franco-Ethiopian Railway, goods are valued at the Ethiopian customs station of clearance.

TABLE A-6. EXPORTS OF GRAINS AND PULSES FROM ETHIOPIA, 1942/70

Year	Whole Grains[a/]	Flour	Pulses[b/]	Total
		(Metric Tons)		
1942	NA	NA	NA	13,000
1943	NA	NA	NA	33,000
1944	NA	NA	NA	45,000
1945	67,000	14,500	100	81,600
1946	120,000	14,700	600	135,300
1947	147.000	6,200	600	153,800
1948	53,400	4,400	37,000	94,800
1949	32,300	4,400	22,600	59,300
1950	19,700	1,000	33,200	53,900
1951	50,500	650	34,400	85,550
1952	30,800	2,200	64,000	97,000
1953	30,400	2,200	68,700	101,300
1954	18,900	100	60,500	79,500
1955	14,300	100	55,400	69,800
1956	6,300	100	43,100	49,500
1957	5,200	600	54,800	60,600
1958	2,300	-	33,300	35,600
1959	500	-	46,400	46,900
1960	1,500	-	66,600	68,100
1961	2,500	c/	80,200	82,700
1962	3,600	100	69,000	72,700
1963	5,800	400	69,800	76,000
1964	2,300	500	68,000	70,800
1965	4,300	900	55,100	60,300
1966	100	c/	69,200	69,300
1967	3,800	c/	69,200	73,000
1968	1,400	c/	74,700	76,100
1969	3,900	c/	78,600	82,500
1970	3,000	600	51,100	54,700

a/ Average composition 1948-61: 40% sorghum, 25% maize, 25% wheat, 10% other. After 1961 sorghum became increasingly dominant.

b/ Average composition 1948-61: 36% horse beans, 33% lentils, 13% haricot beans, 13% chick peas, 5% other. After 1961, haricot beans gained rapidly in relative position.

c/ Less than 50 mt.

SOURCE: Central Statistical Office, IEG, and Annual External Trade Statistics, IEG, Ministry of Finance, Addis Ababa.

TABLE A-7. QUANTITIES AND DESTINATION OF EXPORTS OF CHICK PEAS FROM ETHIOPIA, 1966/70

DESTINATION	1966	1967	1968	1969	1970
		(Metric Tons)			
EUROPE:					
Netherlands	-	50	-	-	-
Belgium	-	100	-	-	-
United Kingdom	5	2	-	-	-
Italy	102	-	-	-	-
MIDEAST AND AFRICA:					
Mauritius	141	173	50	17	53
Kenya	654	173	-	18	-
Lebanon	21	50	-	-	-
Affars and Issas	60	-	25	-	-
South Yemen	427	445	126	109	80
Yemen	-	-	10	-	-
Jordan	-	-	-	520	-
Saudi Arabia	225	179	199	209	124
Sudan	21	-	-	-	-
Tanzania	114	-	-	-	-
ASIA:					
Japan	-	-	700	-	-
Singapore	717	693	388	90	149
Ceylon	8,429	8,827	12,365	7,017	1,742
OTHERS:					
U.S.A.	33	32	-	-	-
TOTAL	10,949	10,724	13,863	7,980	2,148

SOURCE: Annual External Trade Statistics, IEG, Addis Ababa

TABLE A-8. QUANTITIES AND DESTINATION OF EXPORTS OF FIELD PEAS FROM ETHIOPIA, 1966/70

DESTINATION	1966	1967	1968	1969	1970
		(Metric Tons)			
EUROPE:					
Belgium	-	100	-	-	-
Italy	870	420	210	336	112
United Kingdom	-	50	-	-	-
West Germany	162	-	-	233	15
Netherlands	173	100	-	2	-
MIDEAST AND AFRICA:					
Mauritius	-	12	80	-	-
Affars and Issas	1	-	1	-	20
South Yemen	183	172	214	220	160
Saudi Arabia	-	-	-	10	-
Israel	-	-	-	-	50
Kenya	-	-	1	-	-
Lebanon	50	-	-	-	-
ASIA:					
Japan	-	-	-	969	79
Ceylon	-	-	240	218	-
TOTAL	1,439	854	746	1,988	436

SOURCE: Annual External Trade Statistics, IEG, Addis Ababa.

TABLE A-9. QUANTITIES AND DESTINATION OF EXPORTS OF HARICOT BEANS FROM ETHIOPIA, 1966/70

DESTINATION	1966	1967	1968	1969	1970
	(Metric Tons)				
EUROPE:					
Belgium	1,389	675	910	610	1,329
West Germany	8,927	10,009	10,111	9,116	10,971
France	2,359	1,534	2,841	2,223	1,961
Italy	97	94	100	319	110
United Kingdom	1,955	1,931	1,797	1,613	304
Yugoslavia	140	-	95	62	-
Greece	-	-	30	-	-
Netherlands	1,365	980	665	588	1,560
Spain	170	-	-	-	-
MIDEAST AND AFRICA:					
Egypt	-	260	-	-	-
Sudan	-	30	-	-	-
Affars and Issas	1,085	135	305	302	413
Lebanon	50	705	-	-	-
Israel	289	483	148	239	51
Yemen	1	-	230	51	-
South Yemen	433	458	543	384	306
Jordan	-	-	60	-	120
Saudi Arabia	-	100	10	352	9
Kuwait	-	-	40	30	-
Kenya	65	-	-	31	-
Mauritius	-	-	-	8	-
Iraq	48	-	-	-	-
ASIA:					
Japan	469	360	110	432	-
China (M)	250	-	-	-	-
Singapore	50	-	-	-	-
Ceylon	10	-	22	-	-
Malaysia	5	100	673	300	-
OTHERS:					
U.S.A.	-	25	150	-	-
New Zealand	300	-	469	-	-
Australia	16	5	20	10	-
TOTAL	19,473	17,884	19,329	16,671	17,134

SOURCE: Annual External Trade Statistics, IEG, Addis Ababa.

TABLE A-10. QUANTITIES AND DESTINATION OF EXPORTS OF HORSE BEANS FROM ETHIOPIA, 1966/70

DESTINATION	1966	1967	1968	1969	1970
	(Metric Tons)				
EUROPE:					
Netherlands	1,165	22	100	-	-
France	-	50	-	202	40
Italy	640	825	152	152	-
West Germany	225	-	160	-	214
United Kingdom	386	-	25	75	-
Belgium	-	-	-	105	-
Greece	180	-	-	-	-
MIDEAST AND AFRICA:					
Egypt	1,450	1,107	-	-	-
Sudan	-	40	60	-	1
Affars and Issas	472	470	200	837	760
Gibraltar and Malta	50	50	-	-	-
Kuwait	130	263	20	-	-
Lebanon	2,444	2,281	677	735	948
Israel	278	962	1,038	308	320
Jordan	1,820	5,438	5,511	2,988	575
Yemen	2	28	150	148	6
South Yemen	1,700	2,290	678	1,831	987
Kenya	-	-	-	3	-
Saudi Arabia	5,196	4,291	5,889	6,011	6,261
ASIA:					
Japan	6,254	6,541	3,770	13,392	4,979
Pakistan	-	73	-	-	-
Ceylon	13	-	13	601	500
OTHERS:					
U.S.A.	23	18	27	32	50
UNSPECIFIED:	10	-	-	-	-
TOTAL	22,438	24,749	18,470	27,420	15,641

SOURCE: Annual External Trade Statistics, IEG, Addis Ababa.

TABLE A-11. QUANTITIES AND DESTINATION OF EXPORTS OF LENTILS FROM ETHIOPIA, 1966/70

DESTINATION	1966	1967	1968	1969	1970
	(Metric Tons)				
EUROPE:					
France	340	519	25	-	-
Italy	-	9	-	-	-
United Kingdom	1,834	4,532	1,494	3,457	984
Switzerland	-	500	-	-	-
Netherlands	49	-	50	24	-
Yugoslavia	-	-	-	100	-
Belgium	-	-	-	-	5
Greece	99	-	-	-	-
MIDEAST AND AFRICA:					
Egypt	1,687	2,000	1,990	3,489	-
Sudan	3,386	1,565	1,670	3,924	485
Mauritius	1,216	1,212	-	1,475	1,502
Kenya	-	66	5	5	5
Affars and Issas	-	1	21	3	2
Lebanon	400	198	-	-	-
Israel	730	781	248	59	-
Reunion	-	-	25	-	-
Mauritius	-	-	1,870	-	-
Somalia	-	-	8	325	-
Saudi Arabia	743	504	260	1,258	252
Yemen	-	-	10	2	-
South Yemen	25	68	-	37	-
ASIA:					
Japan	20	-	720	-	-
Singapore	90	-	-	-	44
Ceylon	4,287	3,076	13,693	10,246	12,472
OTHERS:					
U.S.A.	30	-	-	130	-
TOTAL	14,936	15,031	22,089	24,534	15,751

SOURCE: Annual External Trade Statistics, IEG, Addis Ababa.

TABLE A-12. MONTHLY FARM PRICES OF GRAINS AND PULSES IN THE DEBRE ZEIT AREA OF ETHIOPIA

October, 1969 - September, 1970

	Maize	Barley	Sorghum	Chick Peas	Horse Beans	Lentils	Field Peas
	(Eth.$ per Quintal)						
October	16.25	16.75	-	16.75	11.50	27.50	16.25
November	14.33	16.00	15.00	16.00	14.25	30.33	15.50
December	15.00	19.00	-	17.00	14.50	24.50	19.00
January	15.50	20.00	-	22.00	15.16	24.50	21.33
February	16.00	18.33	17.00	18.00	16.00	27.00	24.00
March	19.37	19.00	25.00	20.50	18.50	31.00	25.50
April	20.50	20.00	-	20.00	18.00	30.50	24.50
May	22.00	23.66	-	22.00	21.00	31.00	25.66
June	22.00	23.66	24.50	26.00	23.00	32.00	27.50
July	27.66	26.00	29.00	28.00	27.00	31.66	31.50
August	28.00	27.00	31.50	34.00	30.00	28.00	38.00
September	29.20	29.70	34.20	33.50	33.00	39.00	39.00

NOTE: Prices not available on white haricot beans.

SOURCE: Institute of Agricultural Research, Debre Zeit.

TABLE A-13. ESTIMATED COSTS AND RETURNS FOR CERTAIN CROPS IN ETHIOPIA[a/]

Commodity	Assumed Yield per Ha. Quintals	Costs per Ha.	Gross Return per Ha.[b/]	Net Return per Ha.
		(Eth.$)		
Teff	9.1	184	319	135
Wheat	9.3	156	287	131
Maize	16.8	157	356	199
Barley	9.0	118	202	84
Sorghum	8.6	126	246	120
Chick Peas	8.0	122	227	105
Broad Beans	9.6	119	217	98
Lentils	6.4	118	189	71
Haricot Beans	10.0	260	363	123

a/ Computation based mostly on estimates of yield and costs in reports on Ada and Shashamene Projects and on surveys of Ethiopian farms by Stanford Research Institute.

b/ Prices used were 1970 average for Addis Ababa reported by the Ethiopian Grain Corporation.

NOTE: This analysis is intended only to show the relative returns from cereals and pulses in certain conditions; it does not represent on-farm returns, nor are the yields and costs other than indicative for comparative purposes.

TABLE A-14. ANNUAL WHOLESALE PRICES OF PULSES IN SELECTED MARKETS, 1965/70

	1965	1966	1967	1968	1969	1970
			(Eth. $ per Quintal)			
LENTILS						
Addis Ababa	24.42	28.56	30.47	30.47	26.63	29.46
Debre Marcos	-	-	-	28.05	25.77	27.09
Bahar Dar	-	18.00	-	-	-	-
Gondar	-	-	28.34	28.74	27.63	29.30
Asmara	-	-	31.86	33.63	30.94	27.67
Dese	-	27.60	27.68	30.53	26.18	27.48
Dire Dawa	-	-	33.09	36.12	30.70	29.37
Nazaret	-	29.08	31.07	30.17	27.88	26.65
PEAS						
Addis Ababa	24.34	19.31	19.05	17.32	16.44	26.26
Debre Marcos	-	17.42	16.86	20.03	18.11	29.34
Bahar Dar	-	17.35	16.23	15.84	16.99	22.93
Gondar	-	-	16.86	13.68	27.64	20.80
Asmara	-	-	17.66	16.95	19.02	22.21
Dese	-	16.58	14.58	14.64	14.49	22.34
Dire Dawa	-	-	19.91	20.12	17.04	21.90
Nazaret	-	17.89	15.82	17.36	15.23	24.63
HORSE BEANS						
Addis Ababa	18.51	16.06	13.74	13.34	14.06	22.64
Debre Marcos	-	-	12.26	15.10	12.50	24.18
Bahar Dar	-	16.01	13.68	13.77	14.72	21.62
Gondar	-	-	16.89	15.17	16.38	22.06
Asmara	-	-	19.23	17.41	18.83	24.92
Dese	-	15.91	13.57	13.13	13.45	21.02
Dire Dawa	-	-	18.33	17.98	17.15	28.25
Nazaret	-	15.36	13.91	12.17	11.72	19.23
CHICK PEAS						
Addis Ababa	19.40	17.97	17.03	17.81	18.21	28.38
Debre Marcos	-	-	-	17.00	-	24.50
Bahar Dar	-	-	-	16.50	-	-
Gondar	-	-	17.26	17.57	16.86	23.32
Asmara	-	-	22.91	22.00	19.82	26.41
Dese	-	15.22	16.23	16.77	18.16	24.54
Dire Dawa	-	-	18.77	19.82	21.17	32.78
Nazaret	-	16.94	17.23	18.56	-	21.43
HARICOT BEANS						
Addis Ababa	23.08	22.63	18.53	19.29	27.59	36.25
Debre Marcos	-	-	-	-	-	-
Bahar Dar	-	-	-	-	-	-
Gondar	-	-	-	-	-	-
Asmara	-	-	-	-	-	-
Dese	-	11.00	13.49	14.25	-	-
Dire Dawa	-	-	21.67	18.91	27.34	31.50
Nazaret	-	24.49	19.22	20.18	27.22	38.47

SOURCE: Ethiopian Grain Corporation

TABLE A-15. RELATIVE POSITION OF PULSE IMPORTS FROM ETHIOPIA IN RELATION TO TOTAL IMPORTS IN CERTAIN MARKETS

	1967			1968			1969		
	Total Imports	from Ethiopia	Proportion Ethiopian	Total Imports	from Ethiopia	Proportion Ethiopian	Total Imports	from Ethiopia	Proportion Ethiopian
	Metric Tons		Percent	Metric Tons		Percent	Metric Tons		Percent
EUROPE									
Belgium	42,390	875	2.1	42,080	910	2.2	38,740	715	1.8
France	98,050	2,103	2.1	108,580	2,866	2.6	110,220	2,425	2.2
Italy	108,400	1,348	1.2	170,020	463	0.3	167,400	807	0.5
Netherlands	204,070	1,152	0.6	258,880	815	0.3	408,240	614	0.2
United Kingdom	152,500	6,515	4.3	157,750	3,316	2.1	157,750	5,145	3.3
West Germany	113,850	10,009	8.8	128,140	10,271	8.0	135,260	9,349	6.9
MIDEAST & AFRICA									
Israel	10,440	2,226	21.3	7,530	1,434	19.0	7,000	606	8.7
Jordan	6,100	5,438	89.1	8,440	5,571	66.0	5,580	3,508	62.9
Kenya	22,150	239	1.1	10,280	6	0.1	7,880	57	0.7
Lebanon	65,150	3,234	5.0	34,510	677	2.0	30,200	735	2.4
Mauritius	5,080	1,397	27.5	5,520	130	2.4	4,530	1,500	33.1
Saudi Arabia	7,480 [a/]	4,974	66.5	10,790	6,358	58.9	12,650	7,840	62.0
South Yemen	3,160 [a/]	3,433	100.0	3,800	1,561	41.1	4,230	2,581	61.0
Sudan	4,330	1,635	37.8	2,590	1,730	66.8	6,140	3,924	63.9
UAR	18,840	3,367	17.9	23,690	1,990	8.4	19,030	3,489	18,3
ASIA									
Ceylon	71,000	11,903	16.8	61,900	26,333	42.5	60,000 [b/]	18,082	30.1
Japan	220,660	6,901	3.1	151,660	5,300	3.5	220,170	14,793	6.7
Malaysia	27,210	100	0.4	29,000	673	2.3	29,620	300	1.0
Singapore	18,640	693	3.7	19,930	388	1.9	18,920	90	0.5
WORLD TOTAL	1,723,910	69,200	4.0	1,761,300	74,700	4.2	2,029,400	78,600	3.9

a/ Apparently quantities reexported are omitted.

b/ Estimated imports - quantities not reported by FAO.

SOURCE: FAO Trade Yearbook 1970, Rome, and IEG Annual External Trade Statistics, Addia Ababa.

TABLE A-16. AVERAGE DECLARED VALUE OF PULSES EXPORTED FROM ETHIOPIA TO CERTAIN MARKETS

	1970			1969		
	Quantity mt	Value Eth.$1,000	Per mt Eth.$	Quantity mt	Value Eth.$1,000	Per mt Eth.$
LENTILS:						
Mauritius	1,502	462	307	1,474	592	402
Sudan	485	264	544	3,924	2,136	544
U.K.	984	288	293	3,457	1,098	318
Ceylon	12,472	3,770	302	10,246	3,019	295
Saudi Arabia	252	109	432	1,258	589	468
DRIED AND MIXED PEAS:						
Italy	112	23	205	336	81	241
Israel	50	13	260	-	-	-
Japan	79	18	227	970	179	185
South Yemen	160	49	306	220	65	295
Ceylon	-	-	-	218	47	216
West Germany	15	3	200	233	120	515
HORSE BEANS:						
Affars and Issas	760	166	218	837	161	192
West Germany	214	68	318	-	-	-
Ceylon	500	145	290	501	114	190
Israel	320	76	238	303	64	208
Japan	4,979	985	198	13,392	2,454	183
Jordan	575	128	223	2,988	454	152
Lebanon	948	200	211	735	150	204
Saudi Arabia	6,261	1,412	225	6,011	1,303	217
South Yemen	987	215	218	1,831	374	204
HARICOT BEANS:						
U.K.	304	127	418	1,613	613	380
Belgium	1,329	446	336	610	182	298
France	1,961	835	426	2,223	652	293
West Germany	10,971	4,305	392	9,116	2,752	302
Netherlands	1,560	587	376	588	162	275
South Yemen	306	128	418	384	141	367
CHICK PEAS:						
Ceylon	1,742	389	223	7,017	1,653	235
Saudi Arabia	124	30	242	209	53	254
Singapore	149	50	335	90	28	311
South Yemen	80	21	262	109	27	248
Mauritius	53	14	264	17	5	294
Jordan	-	-	-	520	95	183

SOURCE: IEG Annual External Trade Statistics, Addis Ababa.

TABLE A-17. ESTIMATED MARKETING COSTS FOR HARICOT BEANS FROM FARMGATE TO FOB PORT, ETHIOPIA

	Minimum	Typical	Maximum
		(Eth. $/mt)	
MARKETING COSTS FROM SHASHEMENE			
Village Buyer - (total margin) (includes 1.50 sacking and loading)	2.50	5.00	10.00
Sacks	15.00	16.00	17.00
Local Transport to Wholesaler	1.50	1.50	1.50
Truck Broker	0.00	0.50	1.00
Loading Truck	1.00	1.00	1.50
Transport to Addis Ababa	20.00	25.00	30.00
Unloading and Weighing	1.00	1.50	1.50
Machine Cleaning	5.00	5.00	6.00
Added Hand Cleaning and Picking	10.00	12.50	15.00
Storage, 4 to 8 months @ 10¢ q/month	4.00	6.00	8.00
Wholesaler or Exporter Margin (profit or loss)	60.00	74.00	91.50
Via Truck to Assab:			
Truck Broker	0.00	0.50	1.00
Loading	1.00	1.00	1.00
Transport to Assab	15.00	25.00	50.00
	16.00	26.50	52.00
Via Rail to Djibouti:			
Load Truck to Railway	1.00	1.00	1.00
Truck to Railway (truck $25, with trailer $50)	2.27	2.27	2.50
Load Railway Car	1.00	1.00	1.00
Transport to Djibouti	16.00	20.00	25.00
	19.27	24.27	29.50
Fumigation at Port	2.00	2.00	2.00
Transaction Tax @5 ($500 value)	10.00	10.00	10.00
Ethiopian Grain Board	4.00	4.00	4.00
	16.00	16.00	16.00
Assab Forwarding Agent (total charge) (includes unloading truck, $1; storage and loading, $1; transport to dock, $1; unloading, $1; loading ship, $2.40; miscellaneous and profit)	11.00	11.00	11.50
Djibouti Forwarding Agent (total charge) 800-1,300 FD, (87.34 FD = Eth. $1) (includes unloading car, 115 FD; storage and transport to dock, 180 FD; loading ship, 210 FD; total Eth. $5.78; also miscellaneous and profit)	9.16	12.00	14.88
TOTAL Cost Via Assab	103.00	127.50	171.00
TOTAL Cost Via Djibouti	104.43	126.27	151.88
MARKETING COSTS FROM DIRE DAWA			
Village Buyer Margin, Sacks, Local Transport, Unloading and Weighing, Cleaning and Storage	39.00	47.50	59.00
Via Rail to Djibouti:			
Loading Truck, Transport to Railway and Load Car	4.27	4.27	4.50
Transport to Djibouti	22.30	22.30	23.00
Port Costs at Djibouti	25.16	28.00	30.88
TOTAL	90.73	102.07	117.38

TABLE A-17. ESTIMATED MARKETING COSTS FOR HARICOT BEANS FROM FARMGATE TO FOB PORT, ETHIOPIA... continued

	Minimum	Typical	Maximum
		(Eth. $/mt)	
MARKETING COSTS FROM NAZARET			
Village Buyer Margin, etc.	39.00	47.50	59.00
Via Truck to Assab:			
Truck Broker and Loading	1.00	1.50	2.00
Transport to Assab	20.00	32.50	60.00
Via Rail to Djibouti:			
Local Transport and Loading	4.27	4.27	4.50
Transport to Djibouti	16.00	20.00	25.00
Port Costs at Assab	27.00	27.00	27.00
Port Costs at Djibouti	25.16	28.00	30.88
TOTAL Cost Via Assab	87.00	108.50	148.00
TOTAL Cost Via Djibouti	84.43	99.77	119.38
MARKETING COSTS FROM AWASH			
Village Buyer Margin, etc.	39.00	47.50	59.00
Via Truck to Assab:			
Truck Broker and Loading	1.00	1.50	2.00
Transport to Assab [a/]	10.00	20.00	35.00
Via Rail to Djibouti:			
Local Transport and Loading	4.27	4.27	4.50
Transport to Djibouti	32.35	32.35	33.05
Port Costs at Assab	27.00	27.00	27.00
Port Costs at Djibouti	25.16	28.00	30.88
TOTAL Cost Via Assab	77.00	96.00	123.00
TOTAL Cost Via Djibouti	100.78	112.12	127.43
MARKETING COSTS FROM DESE			
Village Buyer Margin, etc.	39.00	47.50	59.00
Via Truck to Assab:			
Truck Broker and Loading	1.00	1.50	2.00
Transport to Assab	12.50	20.00	25.00
Port Costs at Assab	27.00	27.00	27.00
TOTAL	79.50	96.00	113.00

a/ Estimated cost over new highway.

NOTES: For distances from these points, truck rates are about 20¢ per mt/kilometer; and for pack animals, computed cost may be 5 times this figure, though often not considered a cost where farmer owns the animals. The truck rates are actual rates except from Awash, but an estimated reduction of approximately 30% is expected from those points affected by the new highway to Assab. Railway rates at the lowest level would be expected to be reduced to meet truck competition as has been done before. Any such reductions would increase the presently calculated farmgate prices. If beans delivered by farmers have an excess of 3% foreign matter, there would be a proportional reduction in farmgate prices.

SOURCES:

1. Transport Administration Department
2. Private truckers
3. NATRACO
4. Franco-Ethiopian Railway

TABLE A-18. ESTIMATED CIF, FOB, AND FARMGATE VALUES OF HARICOT BEANS

Location	Marketing Costs			Values		
	Minimum	Typical	Maximum	Minimum	Typical	Maximum
				(Eth.$/mt)		
CIF Price Rotterdam [a/]				600.00	600.00	600.00
Ocean Freight (Via Suez) $43.25 [b/] Ins. and Commission $18.00	61.25	61.25	61.25			
Net fob Assab/Djibouti				538.75	538.75	538.75
FROM SHASHEMENE						
Via Truck to Assab	103.00	127.50	171.00	367.75	411.25	435.75
Farmgate Price Via Rail to Djibouti	104.43	126.27	151.88	386.87	412.48	434.32
FROM DIRE DAWA						
Via Rail to Djibouti	90.73	102.07	117.38			
Farmgate Price				421.37	436.68	448.02
FROM NAZARET						
Via Truck to Assab	87.00	108.50	148.00	390.75	430.25	451.75
Farmgate Price Via Rail to Djibouti	84.43	99.77	119.38	419.37	438.98	454.32
Farmgate Price						
FROM AWASH						
Via Truck to Assab	77.00	96.00	123.00	415.75	442.75	461.75
Farmgate Price Via Rail to Djibouti	100.78	112.12	127.43	411.32	426.63	437.97
Farmgate Price						
FROM DESE						
Via Truck to Assab	79.50	96.00	113.00	425.75	442.75	459.25
Farmgate Price						

a/ All calculations are based on an estimated price of $600 (U. S. $240) as a more normal price than the present (January 1972) price of $700 (U. S. $280) which is unusually high due to shortage of haricot beans. Farmgate value is for clean beans.

b/ The rate via the Cape is Eth. $62.00 per mt.

SOURCE: See Table A-17 for details of marketing costs. Farmgate prices are calculated by subtracting marketing costs from assumed price cif Rotterdam and fob Assab/Djibouti.

TABLE A-19. ANTICIPATED HECTARAGES OF BEANS TO BE FERTILIZED--AWASA, NAZARET & DESE AREAS[a/]

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
With Project	11,000	15,000	20,000	27,000	33,000	39,000	46,000	55,000	61,000	65,000
Without Project	8,600	9,300	10,700	13,100	15,000	16,300	17,500	19,500	21,000	21,000
Difference	2,400	5,700	9,300	13,900	18,000	22,500	28,500	35,500	40,000	44,000
Percentage of Hectares to be Fertilized	5	10	15	20	25	30	30	30	30	30
Hectares to be Fertilized	120	570	1,395	2,780	4,500	6,750	8,550	10,600	12,000	13,200
Quintals of Fertilizer Required	90	426	1,047	2,085	3,375	5,067	6,411	7,986	9,000	9,900
Eth. $ Cost	3,420	16,190	39,780	79,230	128,250	192,546	243,618	303,468	342,000	376,200

[a/] No fertilizer is scheduled for beans in the Awash or Dire Dawa-Jijiga areas.

TABLE A-20. HARICOT-TYPE BEAN SEED NEEDS--SELECTED AREAS--IN METRIC TONS BY YEARS

PRODUCTION AREAS	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Awasa	300	360	420	540	660	780	960	1,200	1,300	1,500
Awash Valley	60	120	180	300	420	540	720	960	1,200	1,320
Dese	70	210	350	560	700	840	980	1,190	1,330	1,400
Dire Dawa - Jijiga	490	560	630	742	882	980	1,120	1,190	1,190	1,260
Nazaret - South	350	420	560	700	840	980	1,120	1,260	1,330	1,400
TOTAL	1,270	1,670	2,140	2,842	3,502	4,120	4,900	5,800	6,370	6,880
Increased Needs due to Project	158	479	791	1,305	1,768	2,195	2,795	3,456	3,845	4,290

TABLE A-21. HECTARES NEEDED FOR HARICOT BEAN SEED PRODUCTION BY YEARS

PRODUCTION AREAS	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Awasa	300	330	380	450	440	490	510	600	630	680
Awash Valley	60	110	150	220	250	280	340	420	500	530
Dese	100	260	440	620	640	700	750	850	950	940
Dire Dawa - Jijiga	810	930	900	1,060	1,260	1,250	1,250	1,320	1,190	1,260
Nazaret - South	350	380	470	540	560	630	660	700	670	700
TOTAL	1,520	2,010	2,340	2,890	3,150	3,350	3,510	3,890	3,910	4,110
Portion of Total Needed for Seed	8.0%	8.0%	7.3%	7.0%	6.0%	5.4%	5.0%	4.4%	4.0%	4.0%

TABLE A-22. INITIAL UNIT COST ESTIMATES OF PLAIN AND CONVERTIBLE WAREHOUSE STORAGE PER SQUARE METER FLOOR AREA

	Item	Unit Cost Eth. $/m^2
1-	Plain warehouse concrete floor, 10 cm, with average foundation wall and steel reinforcing	15
2-	Convertible floor, 15 cm, with sub-floor alley and ducts (see Figure A-2)	30
3-	Steel columns and roof --- purlins and metal roofing for common gable-type roof, 7.6m wall height, 15 to 31 m width -- no wall covering -- average	25
	a. plus metal covered sidewalls with rolling doors -- average	32
	b. plus all walls metal covered -- average	35

TABLE A-23. TYPICAL FOB PRICES OF GRAIN AND BEAN HANDLING, CLEANING, AND PROCESSING EQUIPMENT

Item	Prices Eth. $
1- Elevators, augers, conveyors, bag trucks, etc.	
Two-wheel bag truck	150
Four-wheel bag truck	250
4" auger - 3m long -- 10 to 15 ton/hr	100
4" auger - 5m long -- 10 to 15 ton/hr	125
6" auger - 5m long -- 20 to 30 ton/hr	220
6" auger - 6.5m long -- 20 to 30 ton/hr	280
15m (50') height - 6" x 4" cup-belt elevator leg 30 ton/hr	3,900
15m (50') height - 9" x 5" cup-belt elevator leg 70 ton/hr	5,300
9" auger U-trough conveyor--per 100' length	3,400
Portable belt conveyor for bags--26' long	3,000
Canvas belt conveyor for picking beans	2,000
2- Scales and baggers	
Portable platform scales	600
Truck, trailer scales -- 25 ton capacity 34' x 10' platform	10,000
Automatic bagging scales -- 100 kg capacity	1,800
Portable bag closer	700
Integrated bag weigher, filler, conveyor and sewer	5,300
3-Seed cleaners-graders	
2 to 5 q/hr (hand power)	250
25 to 30 q/hr	2,000
35 to 50 q/hr	9,000
Scalper 300 q/hr	3,500
Vacuum gravity separator table 20 to 25 q/hr	9,000
Stoner 20 q/hr	2,600
4- Grading equipment	
Electric moisture tester	1,000
Gram Scales	100
Sampling probes -- sack, load, deep bin	200
Set official docking sieves	100
Weight/volume tester	200
5- Holding bins with discharge auger (hopper-bottom bulk bins on stilts)	
6' x 10' total height -- 3 tons	700
9' x 24' total height --20 tons	1,800
6- Bulk weighing and dumping	
Dump pit and grate	2,000
Overhead truck, trailer hoist	2,500
7- Scale house, office and laboratory 6m x 10m at Eth.$100/$m^2$	6,000

TABLE A-24. ESTIMATED TOTAL COSTS FOR BUILDING AND EQUIPPING PROCESSING, STORAGE AND SERVICE CENTERS

Size-tons	Item	Cost (Eth. $)
3,000		
	Sack warehouse--30m x 32m x 7.6m (provides 240m^2 floor working area) 960m^2 at Eth. $50	48,000
	Portable platform scales	600
	2-two-wheel bag trucks	300
	2-four-wheel bag trucks	500
	6" auger, 5m long, with motor	300
	6' x 10' height, hopper-bin with discharge auger	700
	Seed cleaner-grader -- 25 q/hr	2,000
	Portable, bag, belt conveyor	3,000
	Canvas belt conveyor for picking beans	2,000
	Automatic bagging scales -- 100 kg capacity	1,800
	Portable bag closer	700
	Total	59,900
	Per ton storage capacity	20
5,000		
	Above 30 x 32 warehouse and equipment	59,900
	Plus:-	
	First 4 bents of convertible warehouse (see plan in Figure A-2) -- provides 150 m^2 additional working area-- 630m^2 at Eth. $65	41,000
	Dump pit	2,000
	50'--6" x 4" cup-belt elevator leg with 5 hp motor	4,200
	9' x 24' height, hopper-bin with discharge auger	1,800
	Total	108,900
	Per ton storage capacity	22
8,000		
	All of above	108,900
	Plus: -	
	Four more bents of convertible warehouse (35 m^2 more working area) 756 M^2 at Eth. $65	49,100
	Seed cleaner-grader -- 50 q/hr	12,000
	Picking belt conveyor	2,000
	Integrated bag weighter, filler, conveyor, sewer	5,300
	Portable, bag, belt conveyor	3,000
	Total	180,300
	Per ton storage capacity	22.50
11,000		
	All of above	180,300
	Plus:--	
	4 more bents (12 total) -- 45m^2 more working area -- 756 m^2 at Eth. $65	49,100
	61m (200') lower U-trough conveyor	6,800
	Vacuum gravity separator table	9,000
	Stoner	2,600
	Total	247,800
	Per ton storage capacity	22.50

TABLE A-24. ESTIMATED TOTAL COSTS FOR BUILDING AND EQUIPPING PROCESSING, STORAGE AND SERVICE CENTERS . . . continued

Size-tons	Item	Cost Eth. $
14,000		
	All of above	247,800
	Plus: --	
	4 more bents (16 total) 40 m^2 more working area -- 756 m^2 at Eth. $65	49,100
	25 ton truck, trailer scales	10,000
	Scale house, office and laboratory	6,000
	Basic grading equipment	1,600
	Total	314,500
	Per ton storage capacity	22.50
20,000		
	All of above -- (entire 30 x 32 warehouse to be available for sack storage -- 4,000 tons)	314,500
	Plus: -	
	7 more bents (23 total--see maximum unit layout in plan, Figure A-2--1200m^2 at Eth. $65	78,000
	61m (200') lower U-trough conveyor	6,800
	Total	399,300
	Per ton storage capacity	20
26,000		
	All of above	399,300
	Plus:--	
	Conversion of maximum layout to bulk storage-- See plan:--	
	20- 11m x 7.3m (36' x 24') round steel bins (walls only) 3520 kg steel/bin at Eth. $2.00/kg	140,800
	10-11m x 12m (36' x 40') round bins 9,320 kg/bin at Eth. $2.00	186,400
	10% for erection	32,700
	50' -9" x 5" cup-belt elevator leg with 7-1/2 hp motor	5,700
	122m (400') upper U-trough conveyor	13,600
	Overhead truck, trailer hoist	2,500
	Down spouting, connections, velocity breaks	3,600
	10 sets movable sub-floor and sweep auger units with motors	7,600
	Scalper 30 ton/hr	3,500
	5- 3hp aeration fans	3,650
	Total	799,350
	Per ton storage capacity	31
	If bulk bins were installed initially with only columns and common roof over all bins (no walls on columns) estimated cost would be:--	
	Metal roof and concrete floor--4100 m^2 at Eth. $55	225,500
	Round steel bins (walls only)	360,000
	30m x 32m warehouse	48,000
	Scale house, office and one complete set of above equipment	112,000
	Total	745,500
	Per ton storage capacity	29

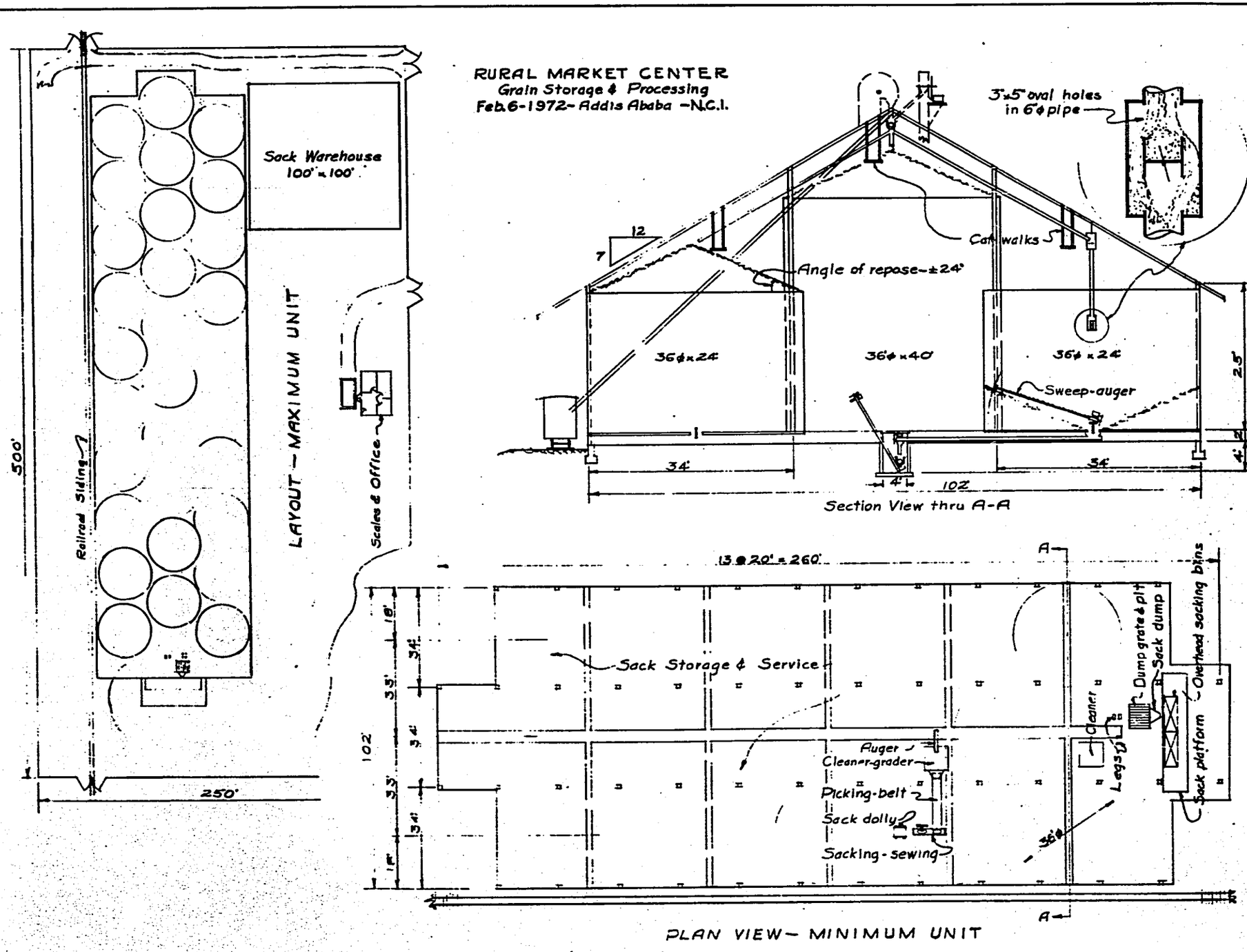

RURAL MARKET CENTER
Grain Storage & Processing
Feb. 6-1972- Addis Ababa -N.C.I.
Sack Warehouse
100' x 100'
LAYOUT - MAXIMUM UNIT
Railroad Siding
Scales & Office
500'
250'
3"x5" oval holes in 6"ϕ pipe
Cat walks
12
7
Angle of repose-±24°
36ϕx24'
36ϕx40'
36ϕx24'
Sweep-auger
25'
4'
34'
4'
102'
Section View thru A-A
13@20'=260'
A
Sack Storage & Service
Dump grate & pit
Sack dump
Overhead sacking bins
Sack platform
Cleaner
Auger
Cleaner-grader
Picking-belt
Sack dolly
Sacking-sewing
Legs
36ϕ
102'
18'
34'
33'
34'
33'
34'
1'
PLAN VIEW- MINIMUM UNIT

FIGURE A-2.

TABLE A-25. CAPACITIES AND COSTS OF CYLINDRICAL, CORRUGATED STEEL GRAIN BINS WITH CONICAL ROOF & CONCRETE FLOOR

Standard US Bin Sizes		Capacity		Weight		Cost		
Diam.	Ht.			Wall[c]	Wall & Roof[d]	Steel[e]	Concrete[f]	Total
(ft)		(bu)[a]	(mt)[b]	(lbs)		(Eth. $/mt)		
18	16	3,710	99	1,780	2,880	29.60	3.23	33
21	16	4,860	130	2,170	3,600	27.60	3.24	31
24	16	6,760	181	2,660	4,370	23.00	2.95	26
27	16	8,680	232	3,330	6,440	23.80	2.84	27
36	16	16,069	430	4,450	9,470	22.80	2.60	25
18	24	5,389	144	3,400	4,570	30.40	2.25	33
21	24	7,413	198	4,020	5,640	25.40	2.13	28
24	24	9,766	261	4,600	6,510	24.00	2.04	26
27	24	12,550	336	5,810	9,150	22.00	1.97	24
36	24	22,868	612	7,750	13,410	19.85	1.83	22
42	24	42,000	1,120	11,260	24,300	21.40	1.68	23
24	32[g]	12,788	342	7,770	10,650	28.40	1.56	30
27	32	16,400	439	9,020	13,490	30.90	1.50	32
36	32	29,666	793	13,840	21,080	26.20	1.41	28
24	40	15,810	423	11,020	13,570	28.20	1.26	29
27	40	20,200	540	12,960	16,990	31.20	1.22	32
36	40	36,463	975	20,560	27,260	26.60	1.15	28
48	40	66,289	1,770	31,240	41,030	21.20	1.08	22

a/ Maximum capacity - utilizing space under roof with grain heaped to angle of repose, plus a 5% pack factor.

b/ Based on 37.4 bu/mt, or a grain density of 58.8 lb/bu, which is 0.757 mt/cubic meter.

c/ Weight of wall only - each ring of proper gauge steel for structure stability.

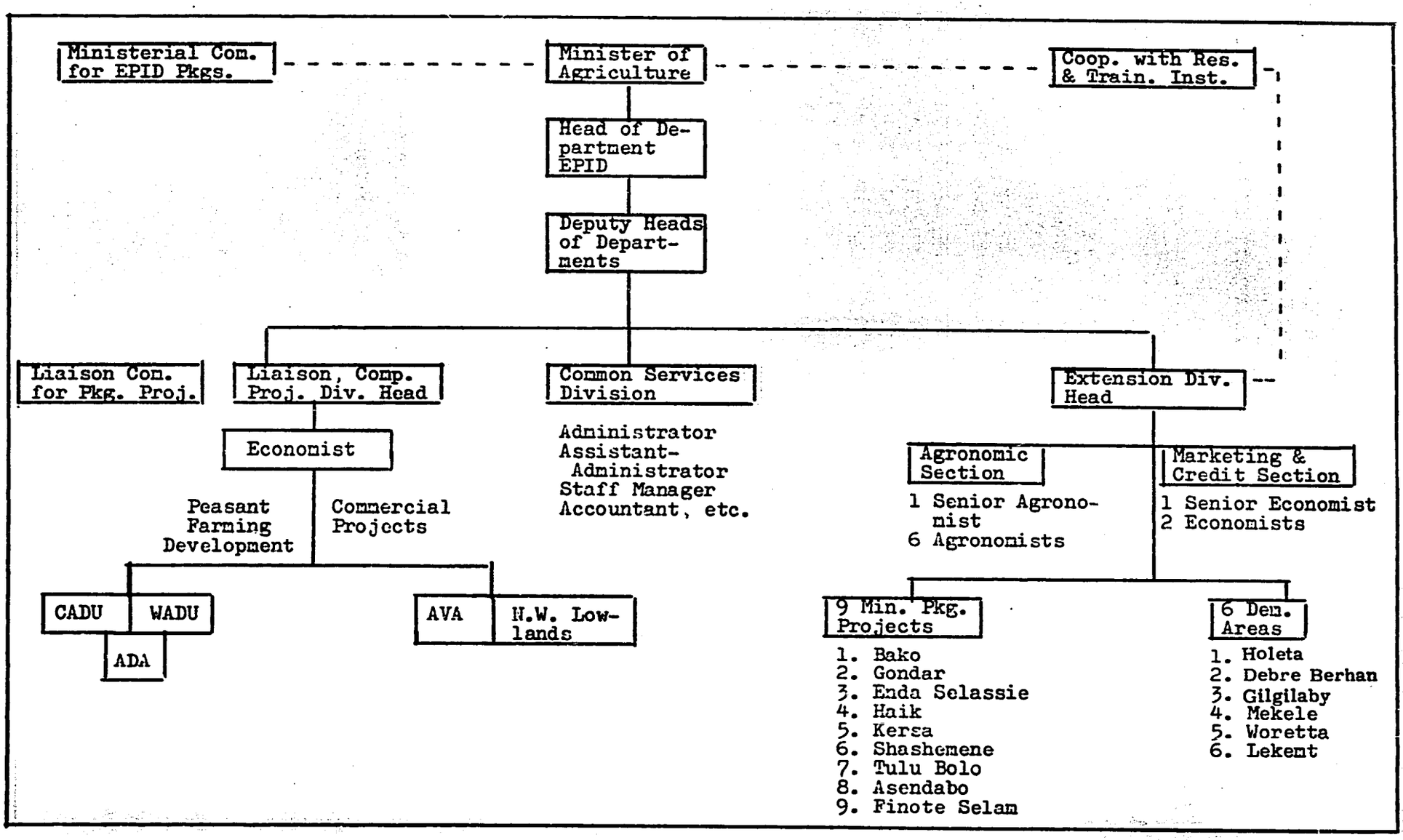
d/ Approximate shipping weight of wall and roof sheets, and structural members.

e/ Typical, suggested US fob retail price, multiplied by 2.50 (to convert to Eth. $) for steel wall and roof only - no floor or equipment.

f/ Based on estimated cost of concrete floor and steel reinforced foundation ring, with PVC vapor barrier in floor, to be Eth. $80 per cubic meter of concrete.

g/ All bin walls higher than 24 feet are provided with Z-bar or channel, vertical stiffeners - one per foot of diameter.

FIGURE A-1. ORGANIZATION OF EXTENSION AND PROJECT IMPLEMENTATION DEPARTMENT (1971)



APPENDIX B

Part 1 -- OUTLOOK FOR EXPORTS OF ETHIOPIAN PULSES TO CERTAIN FAR EAST MARKETS *

Part 2 -- OUTLOOK FOR EXPORTS OF ETHIOPIAN PULSES TO CERTAIN NEAR EAST MARKETS *

* Based on findings resulting from first hand surveys conducted in Asia (Japan, Hongkong, Taiwan, Malaysia, Singapore and Thailand) and the Middle East (South Yemen, Saudi Arabia, Egypt and Israel) during February and March, 1972.

APPENDIX B

Part 1

OUTLOOK FOR EXPORTS OF ETHIOPIAN PULSES TO CERTAIN FAR EAST MARKETS

A. Background

Asia, particularly the subcontinent, is the major pulse-consuming area of the world. The countries of this region are producing most of the pulses that they consume in such large quantities. The volume of imports is not so great as might be indicated by consumption data. Nevertheless, certain countries such as Ceylon and Japan do import sizable quantities of beans, peas and lentils. It has been estimated by the FAO that total demand for pulses in Asia and the Far East will increase over 40 percent during the 1970's (from 17 to 24 million tons). Japan is the largest importer of pulses in the region, although Ceylon, Singapore, Malaysia, Hongkong and Taiwan are also buyers of considerable quantities of these products. Both Japan and Ceylon have been importing pulses from Ethiopia, but other Asian markets have not yet been exploited in any volume so far as Ethiopian products are concerned. Tables A-7 through A-11 of Appendix A provide detail on the exports of pulses from Ethiopia to the Far East and other markets.

B. Market Survey

To add to the completeness and content of the pulse production project for Ethiopia, it was the consensus among those concerned with preparation of the project proposal that surveys of certain existing and prospective export markets should be conducted. These surveys were to provide data that would supplement the considerable knowledge already available on the European demand. Regional coverage of surveys included the Near East as well as the Far East. In Appendix B, Part I, the areas covered and evaluated include Singapore-Malaysia, Hongkong, Taiwan and Japan. Thailand, one of the principal suppliers of pulses to these markets, was also visited. The Near East situation is reported in Part II of Appendix B. The Asian markets were visited in February and March, 1972. Information was obtained mostly through interviews with public officials and dealers, supplemented by the substantial amount of published data available in each of the markets surveyed.

C. General Market Situation

Imports of pulses by the five markets surveyed have varied from 225,000 tons to about 320,000 tons during the 1964-70 period. As can be seen from Appendix Table B-1, there has been a marked high-low variation in the annual volume, resulting primarily from fluctuations in Japan's imports. The overall trend in imports has been slightly upward, with the four markets, other than Japan, showing a less marked fluctuation from year to year.

Products included in these import data are those listed in the SITC category 054.2, which is described as "beans, peas, lentils and other leguminous vegetables, dried". Although the general classification is used in all of the areas surveyed, there are marked differences in the subcategories, and this complicates the problem of identification and comparison. For this reason, an effort was made to obtain scientific names whenever possible. Samples of the various products used in volume were gathered, particularly where the commodity is not currently among the pulses produced in Ethiopia.

In the Far East, it is immediately obvious that most of the pulses imported are not the types traditionally produced in Ethiopia; prominent among these imports are the small beans of various colors such as red, green, white, yellow, and black and a larger bean known as the "Black Matpe". At present, these particular beans are obtained largely from Mainland China, Burma and Thailand. Horse beans and dried peas are used in some volume, and in Japan there are substantial imports of other types, such as haricot beans, lima beans and large red beans. Whether Ethiopia is in position to produce competitively the types of beans now peculiar to the Orient is not known, but the posibility should be investigated. Horse beans from Ethiopia have been shipped to Japan despite the competition of the same product from nearby China.

TABLE B-1. IMPORTS OF PULSES BY CERTAIN FAR EAST MARKETS, 1964-1970

Year	Singapore	Malaysia	Hongkong	Taiwan	Japan	Total
	metric tons					
1964	18,460	26,870	31,770	10,780	137,830	224,710
1965	18,930	27,180	51,150	17,520	205,580	320,360
1966	22,290	29,310	31,430	31,640	179,390	294,060
1967	18,640	27,210	24,840	22,130	220,660	313,480
1968	19,930	29,000	20,180	20,250	151,660	241,020
1969	18,920	29,620	26,330	24,220	220,170	319,260
1970	19,250	29,480	18,570	28,900	190,310	286,510

SOURCE: FAO-1970 Trade Yearbook, Vol. 24, and various reports on foreign trade published by the countries involved.

To assist in evaluation of Ethiopia's prospects for producing and exporting certain of the items that are significant among the pulses imported by Far East markets, the following is a description of terminology used to describe these products. Unfortunately, the terminology is not precisely uniform from place to place, but there is sufficient similarity to provide an approximate guide.

TABLE B-2. DESCRIPTIVE TERMINOLOGY FOR CERTAIN PULSES USED IN THE FAR EAST.

Description	Other Common Names	Scientific Name(s)
Small Red Beans	Azuki	Phaseolus angularis
Small Green Beans	Mung	Phaseolus hirtus, Phaseolus aurens Roxb (green seeded)
Small Yellow Beans	Golden	Phaseolus aureus Roxb (yellow seeded)
Small Black Beans		Phaseolus aurens Roxb (black seeded)
Pegin Beans	Red, Pigin, Kidney	Phaseolus calcaratus (red)
Broad Beans	Horse	Vicia faba
French Beans	Navy, Haricot, Lima, etc.	Phaseolus vulgaris, Ph. lunatuo and Ph. coccineus
Black Beans	Black Matpe	Vigna sinensis Savi (black seeded)
Peas	Green, Field, White, Winter	Pisum sativum

It is of interest to note that all of these pulses are used directly for human consumption; many of the beans are important ingredients in cakes, soups, desserts and sauces. Peas are used similarly to a lesser extent, with a considerable quantity being processed into the canned form. Certain pulses have highly specialized uses such as growing bean sprouts, most frequently from the small black beans. Throughout the area included in this survey, there was a surprising lack of knowledge that Ethiopia is an exporter of pulses and that the Empire might be a potential source of supply for the Far Eastern markets. It is obvious that if Ethiopia is to exploit

these markets, it will be necessary to initiate and maintain an aggressive marketing program on pulses; also, penetration will be furthered if the types of pulses particularly preferred by these markets can be made available.

1. Singapore-Malaysia

As an outlet for pulses, Singapore and Malaysia may logically be considered as one market. Not only are the types of pulses consumed similar, but the trade in these commodities is also comingled between the two political entities. Considerable quantities of beans, peas and lentils are reexported from Singapore to Malaysia. Imports of pulses by this market area have ranged consistently from 45,000 to 50,000 tons per year since 1964. While not a major buyer in the relative sense, the area is sufficiently important to justify serious investigation as a potential market for pulses that are now being or may in the future be produced in Ethiopia.

By classification, value and source, the imports of pulses reported by Singapore and Malaysia in 1970 were:

	Quantity (mt)	Average Value (cif)[1/] (Eth. $ per mt)	Major Suppliers
1. Singapore			
Dried Beans	5,186	450	China, Thailand
Edible Dried Peas	8,235	390	Thailand, India
Chick Peas	2,623	500	India, Morocco
Lentils	3,203	550	Burma, India
2. West Malaysia			
Dried Beans	15,129	365	Thailand, China, Burma
Edible Dried Peas	4,643	378	Thailand, India, New Zealand
Chick Peas	3,341	415	Morocco, India, Burma
Lentils	6,370	484	India, Burma, Thailand

There are no trade barriers or restrictions that would hamper the movement of Ethiopian pulses into this market area. These commodities are duty-free in Singapore, and in Malaysia the duty is M$ 10 per metric ton (Eth.$8.33) plus an ad valorem tax of 4 percent. Throughout the area the pulses most in evidence in the markets are the small beans in green, yellow and black colors. Except for the black bean, the major uses of these beans are for making porridge or desserts and for the liquid resulting from boiling. The black beans are the major source of sprouts used in Oriental cooking. Some of the yellow beans are prepared with meat dishes. In any event, these beans are not now among the pulses produced in Ethiopia.

1/ Throughout this report on Far Eastern markets, a factor of Eth. $60 can be used as an approximation in reducing the cif value to the equivalent price fob port in Ethiopia (per mt).

It appears that the Indian population of Singapore and Malaysia is the principal user of the chick peas and lentils. A number of the dealers who sell these items are Indian and may prefer to obtain their supplies from India even though pulses from that source seem to be higher in price. Another group of dealers are Chinese and several have close connections with exporters in Bangkok, which may account in part for the importance of Thailand as a source of imports. Without exception, the traders interviewed had no knowledge of Ethiopia as a source of pulses. But they expressed interest in the possibility of exploring this potential new supplier. It should be noted that Morocco is one of the more important sources of chick peas, although Thailand, China and Burma dominate the overall trade in pulses. Ethiopia's exports to this market have been limited to small quantities of chick peas, haricot beans and lentils, and this trade has been sporadic.

2. Hongkong

Imports of beans and peas in Hongkong totaled 18,570 tons in 1970; this was a 25 percent decline from the previous year. Pulse imports reported by the Crown Colony vary considerably from year to year but generally total about 20,000 to 25,000 tons. Beans as a general category make up over 90 percent of the imports, with dry peas accounting for the balance. In Hongkong, the types of pulses imported are about the same as in the Singapore-Malaysia area; i.e., the small beans (red, green, yellow and black) dominate the market. Only limited amounts of chick peas, horse beans, lentils and peas are used in the Colony.

Mainland China and Thailand have been the major sources of supply for beans, although Indonesia began providing a fairly significant amount in 1971. The entry of Indonesia into this market appears to have been at Thailand's expense. The USA, China and Thailand have provided the bulk of the dry peas imported by Hongkong. Included among other suppliers who export small quantities of pulses to this market are, Mozambique, South Africa, Australia, India, New Zealand and Singapore. In 1970, the imports of beans averaged about Eth. $415 per ton cif in value and peas were somewhat higher at Eth. $450 per ton. Among the principal suppliers, Thailand appears to receive a higher price for beans than is reported for China and Indonesia. Peas from the USA were substantially higher in price than the imports from China and Thailand. These marked variations in value must reflect differences in type of produce and/or quality.

Hongkong has an absolute minimum of restrictions on imports of all commodities, particularly foods including pulses. There are no taxes on beans and peas and no import license is required. What was said above concerning the lack of knowledge of Ethiopia as a potential source of pulses applies equally to Hongkong. Aside from the fact that the Empire does not

now produce the types of pulses in greatest demand in this market, there is the further problem of penetrating a new area in which competition is keen. If quality and price are attractive, however, new sources of supply would certainly be considered by Hongkong's importers.

3. Taiwan

Beans and peas other than soybeans imported by the Republic of China (Taiwan) totaled about 30,000 tons in 1970; this represented an increase of 20 percent over 1969. By type and value, the principal items among the 1970 imports were:

	Quantity	Average Value (cif)
	(mt)	(Eth. $/mt)
Green Beans	17,938	325
Broad Beans	1,287	305
Peas	5,880	325
Black Beans	1,533	275
Kidney Beans	1,105	310

The principal sources of supply for pulses (beans and peas) imported by Taiwan are, Thailand (especially small green beans), Iraq, USA, and Indonesia. The USA is an important source of dry peas, which are used, in part, for canning. Small red beans are produced in quantity in Taiwan, and some of these beans have been exported to Japan where they are known as Azuki beans. Other beans are also produced locally, but imports are needed to supplement the domestic output. Most beans are not as profitable as other crops for Taiwan farmers and some, such as horse beans and field peas, do not grow well in this climate. The outlook is for continued imports of pulses by this market.

Pulse imports, along with imports in general, must be approved by the ROC government, but the regulations apply equally to all sources of supply. Recently, the duty on dry beans and peas has been 20 percent ad valorem. Here again, if Ethiopia is to enter the market, it will be necessary to provide the types of pulses used in the Far East and to compete on price and quality. Also, it will be necessary to inform Taiwan's importers that Ethiopia is an exporter of pulses and a potential source of supply.

4. Japan

Among the present and prospective outlets for pulses in the Far East, Japan is unquestionably the best prospect as far as exports from Ethiopia

are concerned. Not only is Japan a very large consumer of such products, but it is also heavily on the plus side in trade with the Empire. In 1970, the imports of pulses totaled over 190,000 tons and in 1971 the volume was more than 220,000 tons.

The following distribution among products was reported for 1970:

	Quantity (mt)	Average Value (cif) (Eth.$/mt)
Small Red Beans (Azuki)	18,106	805
Broad Beans	22,056	360
Peas	35,916	320
Green Beans	36,770	425
French Beans	51,706	380
Pegin Beans	11,264	355
Misc. Pulses	14,495	415

Historically, Japan has produced most of the pulses consumed in the country, but, during the current year, it is anticipated that imports will outstrip local production for the first time. The Azuki, or small red bean, is a staple in the Japanese diet. It is a basic ingredient in preparing "An", which is a sweet paste-like product used primarily in pastries. Dried peas are also used in this manner, although most of the green and yellow peas are made into canned products. It is estimated that about three quarters of the peas imported are the brownish "winter" peas that are mixed with Azuki beans for making "An". Among the markets for pulses in the Far East, Japan is not only the largest but also the most diverse in types of beans and peas imported. Along with Azuki beans and dried peas, sizable quantities of kidney-type, broad, small green, medium black and haricot-type beans are purchased abroad.

Imports of pulses are controlled by the Japanese government under a quota system. Quotas are in terms of money, and the amount allocated for this purpose has been increasing steadily of late; in the 1970-71 marketing year, the quotas were a record US $31.4 million. These quotas are apportioned among Azuki, kidney-type and broad beans, and dried peas. The importers then receive their share of the quotas on the basis of their past participation in the trade. It is a very rigid system in which a new dealer would likely find it difficult to obtain an import permit. There is said to be strong pressure from pulse exporting countries to obtain a liberalization of this quota system, but local producers and some government people favor its continuation. Pulses are currently subject to a 10-percent ad valorem duty, except that Mung and Black Matpe beans are exempt.

Ethiopia has been shipping a considerable quantity of horse beans to Japan, but China continues to be the major source of supply for this commodity and Morocco is another competitor. It should be noted that the value of horse beans imported from Ethiopia is considerably below the average for similar beans from China and Morocco. It is not known whether this difference is due to lower quality in the Ethiopian product or whether Ethiopia made a less advantageous sale. Among the other pulses, the major sources of Japanese imports are:

Small Red Beans	China, Taiwan, Korea
Peas	USA, New Zealand, Netherlands, Australia
Green Beans	Thailand, Burma
French Beans	USA, Burma, Argentina, Madagascar, South Africa
Pegin Beans	Burma, China, Thailand

It is apparent that competition among present and prospective suppliers of pulses to Japan is severe. Furthermore, it is reported that in some cases pulses destined for Japan are sold through London agents. In light of Japan's current advantage in the balance of trade with Ethiopia, it would seem reasonable for the IEG to assist in negotiating increased sales of pulses to Japan, perhaps at better prices, providing quality is competitive. To achieve an improved position in this very important market, Ethiopia must move much more aggressively than in the past. Both the kinds and the quality of pulses offered for export to Japan will need to be in line with the requirements of that market.

D. Summary and Outlook - Far East

In present circumstances and assuming continuation of the existing pulse production pattern in Ethiopia, there are only limited opportunities for significant expansion of exports to the Far East. This observation would be altered substantially (1) if those pulses preferred in the Orient that are not now produced in Ethiopia were to become available for export, and (2) if the Empire improved quality and staged an aggressive promotion of pulse exports to the Far East. At the moment, there is a small market for chick peas, field peas and lentils in Singapore, Malaysia and Hongkong. Horse beans are another item that is imported on only a limited scale by all areas; the expeption being Japan, which buys much larger quantities. Japan and, to a much lesser extent, Taiwan are now the only real outlets for haricot-type beans. Peas, however, are purchased in all areas and may offer considerable promise as another commodity that could be exported to the Far East immediately.

In all of the markets surveyed, there is an active demand for pulses that are new to Ethiopia. Among these products, the small beans of various colors, along with the larger-size black, white and red beans, are the most important imports. Whether these beans can be produced competitively in Ethiopia is an unknown factor that deserves early attention.

With the assistance of the IEG through the Grain Board, the Grain Corporation, the Chamber of Commerce and even the Ministry of Foreign Affairs, Ethiopian exporters may be able to increase sales of presently available pulses in Far Eastern markets. At present, too many prospective importers know nothing about the Ethiopian products or even that they are available. Immediate steps need to be taken to initiate research designed to determine the practicability of growing the new types of pulses mentioned frequently in this report.

It is perhaps not necessary to stress, again, the need for quality control in the products exported. This action alone would assist considerably in the effort to improve the returns from Ethiopia's pulse exports. There appears to be an unusually large variation in the average price reportedly paid by importing countries for a number of pulses that are obtained from various sources. In this comparison, Ethiopia too often lags behind other suppliers. To some extent at least, this disparity may result from poor bargaining by Ethiopian exporters or lack of knowledge of the true market situation. It is recognized, of course, that time of sale, quality and other factors are also involved in price determination.

APPENDIX B

Part 2

OUTLOOK FOR EXPORTS OF ETHIOPIAN PULSES TO CERTAIN NEAR EAST MARKETS

A. Introduction

It has been noted elsewhere in this report that Ethiopia is a major supplier of pulses imported by several nearby countries in the Near East, particularly those accessible to the Red Sea. These markets are outlets for the types of pulses other than the white haricot beans emphasized in the proposed pulse production project. Both the proximity of the Near East markets to Ethiopia and the fact that their requirements are sufficiently diverse to encourage production of several types of pulses would indicate this as an area where Ethiopia should give major attention to its marketing efforts.

To obtain information on the current situation on pulse imports and prospects in the short-term future, a survey was conducted by representatives of Experience, Incorporated and the IEG Ministry of Agriculture who visited four countries in the Near East. Data relating to the marketing of pulses in each area was obtained from dealers, government officials and published reports. In the section that follows, the market potential for Ethiopian pulses is reviewed for South Yemen, Saudi Arabia, the UAR, and Israel. In contrast to the Far East, it should be noted that the markets discussed in this part of the survey report (Appendix B) have been outlets for Ethiopian pulses over a considerable period of time; the objective now is not entry but, rather, expansion.

1. The People's Democratic Republic of Yemen (South Yemen)

a. General Background. Many factors have contributed to the diminishing importance of Aden, the capital of the People's Democratic Republic of Yemen, as a transit port in international trade. In the past, some types of Ethiopian pulses were shipped to Aden, where they were reexported to other destinations. The statistics show these transactions as exports to South Yemen, and, consequently, it appears that exports of Ethiopian pulses, particularly horse beans, have decreased considerably. However, it is reasonable to assume that these quantities, which statistically appear lost, may now be purchased direct by the consuming countries without using Aden as an intermediary.

Since the Republic's independence in November, 1967, the ruling government has nationalized many industries. Also, imports of many manufactured goods and a considerable part of imports of foodstuffs have been nationalized. However, imports of pulses are still left in the hands of private enterprises, but, legally, the government has the right to nationalize this trade also. Local importers contacted felt that this has not been done, due to the small importance of this business to overall trade. Whether the government will also nationalize pulse imports cannot be predicted at this stage.

It is said that the advancing nationalization policy has caused the departure of many thousands of expatriates from the country, particularly Asians and North Yemenists, reducing its population to slightly over one million. This has led to a decreased pulse consumption and it will take some time until it will be offset again by population growth.

b. Pulse Market Situation. Imports of pulses into the People's Democratic Republic of Yemen are shown in Table A-15 of Appendix A. As in other countries in the Red Sea area, horse beans are by far the most popular type of pulse consumed throughout Yemen; the Ethiopian quality is well-liked, particularly the smaller beans. In this item, Ethiopia does not appear to have any competition, as no other countries are said to supply South Yemen with horse beans; for this reason alone, sales are likely to increase again, but the rate is likely to be slow.

In contrast, Ethiopia has practically no share in the imports of lentils, which are supplied mainly by India and Syria. It must be noted that the consumption of lentils, after the departure of a large part of the Asian population, has decreased to only a few hundred tons per year. Local consumers require whole lentils with the husks (skins) removed, which gives the lentils a red/orange color. Judging by size and taste, Ethiopian whole lentils that have been dehulled would be suitable for this market. However, importers contacted indicated that in trial shipments of Ethiopian lentils, it was found that the dehulling was done in such a way that many grains were broken into small fragments, and the appearance of the lentils was consequently inferior to competing varieties (particularly Indian lentils). Local importers felt that, with an improved dehulling technique, Ethiopia would be able to compete more effectively against Indian lentils, which are usually considerably more expensive.

South Yemen imports several hundred tons of white haricot beans yearly. Ethiopia seems to have the biggest share of this market, however, Kenya was said to be emerging as a serious competitor. It appears that quality requirements on white beans are low, and that more importance is attached to the price. One importer complained that he had just negotiated a purchase of Ethiopian white beans, but the transaction was not approved

by the Ethiopian National Bank, due to the fact that the price negotiated was below the minimum price required by the Bank. It should be borne in mind that, in the case of South Yemen, quality requirements for beans tend to be low. Consequently, one cannot reasonably apply the same minimum prices to better-quality beans, as required, for example, in European markets.

Field peas are imported only in limited quanitites, and no increase in Ethiopian exports can be expected in these items since consumption is very small. Ethiopian chick peas are used largely for animal feeding purposes, and the decreasing sales figures are said to be due to the fact that feeders have cut down on chick peas in the feed mixtures.

Import duties on all pulses are 5 percent on the cif value. There are no quotas or limits on the quantities that may be imported; however, dealers often find it difficult to obtain foreign exchange from the National Bank for their imports of pulses. This situation might become more severe, due to Yemen's deteriorating economic situation; but, in view of the nature of pulses (which are cheap staple foods), imports will likely remain a necessity.

2. Saudi Arabia

a. Pulse Market Situation. Saudi Arabia's rapid development owes its origin to a steady growth in oil income. Agricultural land is limited, but its development has proceeded rapidly through increased irrigation. This has brought about increases in cultivated land. Nevertheless, a large part of the foodstuffs must still be imported. As Appendix Table A-15 indiates, Ethiopia has been supplying about 60 percent of the total pulses imported by Saudi Arabia. These imports consist largely of horse beans that are widely consumed as a staple food by the population of about seven million.

Ethiopian horse beans are well-liked for their quality, and exports to Saudi Arabia have increased regularly over the past several years. It seems unlikely that exports of this item can be increased much beyond the rate of population growth, since horse beans are widely used and the market seems exploited to its limits. Ethiopia has had little competition in this commodity and has been supplying almost all imports of horse beans to Saudi Arabia. Egypt is also a large producer in the Red Sea area. While Egypt at one time exported substantial quantities, production during recent years has left little surplus for export, and this situation is expected to continue. Ethiopia is thus likely to keep the position as the major supplier of horse beans to Saudi Arabia in the years to come. It was noted that one of the importers contacted had bought canned horse beans from an Asmara cannery, and, although sales figures are still negligible, they are said to be increasing. Being a convenience food, canned horse beans are likely to find a more ready acceptance in the years to come.

Imports of lentils into Saudi Arabia presently range from 1,000 to about 2,000 tons per year. Roughly speaking, Ethiopia supplies about 20 to 30 percent of these imports. Lentils are mostly consumed as splits, and India is said to be the largest supplier, with a share of about 40 to 50 percent of the market; the remainder is purchased from Turkey and Syria. Indian lentils are said to be excellent in quality and cooking features. Furthermore, the splitting of the Indian lentils is done in such a fashion that the lentils are split exactly in half and not in smaller fragments, with the whole part of the husk removed. Although Ethiopian lentils are similar to the Indian variety, the appearance of the former has not given entire satisfaction, due to the way the splitting and dehulling is done. In addition, importers contacted criticized the high content of foreign matter. Average wholesale prices for Indian lentils in Saudi Arabia are about 20 to 30 percent higher than for Ethiopian lentils; thus, an effort to improve the splitting and dehulling techniques employed in Ethiopia would seem likely to pay off.

Imports of chick peas into Saudi Arabia range between 1,500 tons and 3,000 tons per year, and they are received mainly from Morocco, Turkey, Syria and Sudan. These countries produce the quality required in this market, namely chick peas of a whitish color and of a diameter of up to 8 or 9 millimeters. Ethiopia grows smaller chick peas , which are consumed in Saudi Arabia to a very limited extent only. An effort should be made to ascertain whether Ethiopia can grow a type similar to those produced in the countries mentioned, as whitish chick peas of the caliber indicated have a good market in many countries.

Beans imported by Saudi Arabia are the longish, white-type known as Cannellini or Lingots; white beans of small and medium size do not find acceptance. Yearly imports range upward to 1,000 tons, and Ethiopia should be able to participate in this business by increasing production of the longish, white beans which are already grown in the Empire on a limited scale.

There are no import duties imposed on imports of pulses into Saudi Arabia, nor are there any quotas in force. Imports are being handled entirely by private enterprises.

3. United Arab Republic (Egypt)

a. General Background. Practically all imports of pulses by the UAR are purchased on tender. The trade is nationalized , but there is an element of competition among the five large national trading companies. Whenever a tender is being offered, each company endeavors to find the cheapest source of supply. Offers are submitted to the Ministry of Supply, where the final decision on each purchase is made.

The worsening of the balance of payments, accentuated by the closure of the Suez Canal and the subsequent shortage of foreign exchange, has forced the UAR to give preference to those supplier countries where bilateral or other trade agreements exist. Imports of Ethiopian pulses to the UAR require payment in hard currency, and this is considered to be the principal reason why Ethiopia's share of this market has remained limited. According to the Ministry of Supply, pulses are imported from Ethiopia only when they cannot be purchased from countries where special clearing arrangements exist. Furthermore, political considerations appear to take precedence over economic considerations in determining sources of imports.

b. Pulse Market Situation. Horse beans are by far the most widely consumed pulse in the UAR, which was formerly an exporter of this commodity. However, in recent years, local production has not always been sufficient to cover local demand, which is said to be about 100,000 tons per year. Consequently, imports became necessary and supplies were purchased from Algeria, Morocco and China. Prior to 1968, limited quantities of horse beans were also bought from Ethiopia; but after the closure of the Suez Canal, transportation of Ethiopian pulses to the UAR is said to have become difficult.

The yearly consumption of lentils is estimated at 20,000 to 25,000 tons. Local production is small, and each year some 15,000 to 20,000 tons must be imported, the bulk being supplied by Syria and the remainder by Turkey, India and Ethiopia. Consumers prefer splits and also, but to a lesser degree, whole, dehulled lentils. Ethiopian lentils are said to be preferred over the quality received from Syria, but they are usually more expensive. Consequently, they are purchased only when Syria is unable to furnish the required quantities.

Consumption of white beans is about 10,000 tons per year. In this item, the UAR is normally self-sufficient, but when imports become necessary, purchases are made from the Sudan. There is a trade agreement between these two countries, and this makes it difficult for the IEG to compete, although the Ethiopian medium-sized white beans would be suitable for this market.

There is said to be no consumption of chick peas, and the small quantity of field peas used here is grown in the UAR.

4. Israel

a. Pulse Market Situation. Yearly imports of pulses into Israel are approximately as follows: 4,000 to 5,000 tons of white beans, 3,000 tons of chick peas, 300 to 400 tons of horse beans and 500 to 800 tons of lentils. Ethiopia's share in this market has been limited, and this is mainly due to

the fact that Israel requires types of pulses that are not grown in Ethiopia. This applies particularly to white beans and chick peas, which account for the bulk of pulse imports to Israel.

The white beans purchased by Israel are mostly a medium size, with a width of at least 7 millimeters. These beans have been supplied by the United States (Great Northern type) and by Bulgaria and Roumania. One of the importers contacted did make a trial shipment of medium-sized Ethiopian white beans but found them too small to substitute for the Bulgarian beans or the Great Northerns. In addition to the medium-sized beans, a few hundred tons of small white beans are imported yearly for the canning factories. Ethiopia, who formerly supplied the largest share of these beans, has been losing ground to Kenya, where the so-called Mexican 142 is produced. These beans are of a more uniform size than the Ethiopian smalls, and importers contacted said that this advantage has caused the shift to the Mexican 142. One of the importers contacted has bought Ethiopian Cannellini beans and found the quality to be excellent. In his opinion, this should develop into a regular business, provided supplies in Ethiopia are available at competitive prices. As a matter of interest, Israel also buys this type of beans from Greece and Turkey.

As in Saudi Arabia, Israel consumes only the whitish chick peas with a diameter of 8 to 9 millimeters. The local chick pea crop is about 2,000 tons, and the imports are made mainly from Turkey and Greece. The type of chick peas grown in Ethiopia is not suitable for this market because it is too small and of a brownish color.

Yearly consumption of horse beans is limited to a few hundred tons. Imports in 1967 and 1968 were substantially above average, due to purchases of Ethiopian horse beans by the United Nations for relief purposes in the refugee camps. Exports of Ethiopian lentils to Israel have decreased considerably since 1967. This is said to be due to the fact that supplies can now be purchased at lower prices in the occupied territories; it was also mentioned that Syrian lentils are delivered to Israel, via Jordan. Another source of supply for lentils is Turkey. Syria, Jordan and Turkey have the advantage of being much closer to Israel, which results in lower transportation costs. As a matter of interest, lentils are consumed as dehulled wholes or as splits. However, the dehulling must be done in Israel by one of three mills, which means that only hulled, whole lentils may be imported.

The bulk of the green field peas consumed is grown locally. Occasional imports are purchased either in Hungary or Roumania. Ethiopian field peas cannot now compete in this market because of inferior quality.

B. Summary and Outlook - Near East

It can be expected that Ethiopia will be able to keep her present share in the South Yemen market. Substantial increases in sales of any of the pulses seem unlikely, perhaps with the exception of lentils. However, increased exports of lentils could only be accomplished by improving dehulling techniques; i.e., with a product that matches the quality of dehulled, red Indian lentils.

North Yemen was not included in the survey trip, but there is reason to believe that this country has an interesting potential for Ethiopian pulses. The statistics show that , thus far, exports of these commodities from Ethiopia to North Yemen have been very limited, but there seems no reason why North Yemen should not develop into a sizable outlet for Ethiopian pulses. An effort to explore export possiblities in this market should be undertaken either by the trade or through official channels.

Ethiopia's position as the leading supplier of pulses to Saudi Arabia could be strengthened by producing additional varieties of pulses consumed in this market. A serious effort should be made to study the feasibility of growing particularly the large-size chick peas of a whitish color similar to those grown in Morocco. In viewing the diversification of the production of white beans, the Cannellini, which is the longish, kidney-shaped type, should be grown in Fthiopia in larger quantities. Saudi Arabia is a potential buyer of Cannellini, as is Europe, where they are consumed in large quantities. With regard to Ethiopian lentils, gains could be made in Saudi Arabia through the introduction of a better dehulling and splitting technique.

Under the present circumstances, the prospects for increasing sales of Ethiopian pulses to the UAR seem limited. A bilateral, or less formal, trade agreement may stimulate business between the two countries, but this might not result in the additional foreign exchange earnings desired by the IEG. One way of supplying the UAR with larger quantities of Ethiopian pulses against payment of hard currency might be to negotiate transactions through third countries who are supporting the UAR financially. Russia is said to be supplying the UAR with Canadian wheat, which is purchased with hard currency; Ethiopia might be able to negotiate business on the same basis.

Growth of population in Israel, stimulated by the high immigration rate, is expected to be more than 5 percent per year, and imports of pulses are also expected to increase at least by this rate. On the basis of information received, there is little chance of increasing sales of Ethiopian

pulses to Israel unless Ethiopian pulse production is diversified, i.e. new types are grown. One of the importers contacted showed willingness to supply, at no charge, the seed stock for a yearly production of at least 1,000 tons of whitish chick peas, provided he is given the assurance that this type can be grown in Ethiopia. In addition to chick peas, Ethiopia should be in position to grow a medium-sized white bean comparable to the Bulgarian beans or the USA Great Northerns. This would open up new markets, not only in Israel but in many other countries as well.

APPENDIX C

PROSPECTS FOR MECHANIZATION IN PULSE PRODUCTION

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A. General

It is not known to what extent mechanization for the production of maize and haricot beans may be feasible for medium and large-scale operations. Direct funding for machinery is not included in the Pulse Development Project. However, after the second or third year of the program, when it is determined which mechanical inputs can most greatly expedite bean production, it is envisioned that loans from the revolving fund for production credit could become available for financing the purchase of certain machinery. If such loans were made only to bean producers and on a prorata basis, according to the percentage of hectarage planted to beans or agreed to be planted, these loans might prove to be positive incentives for more bean production. Some possibilities and problems of increased mechanization as viewed at this time are discussed.

There is general concensus that high yields over large areas are the result of three principal types of inputs:

1. Superior, high quality seed.
2. Intelligent use of fertilizers and agricultural chemicals.
3. Effective use of power and modern agricultural machinery.

There are large areas of Ethiopia well-suited to mechanization. Modern tractors and plows are already common in some areas of Ethiopia, but little use is being made of row-crop machinery for planting, cultivation, and harvesting. It appears that mechanization could be introduced where it could be used most efficiently through three major steps, taken one at a time.

1. Introduction of tractors and machinery for primary and secondary seedbed preparation. This has been done in some places by large scale farmers and through farmer cooperatives, where, by joint ownership and/or custom work, the annual use can be maximized. The disk plow is the type most commonly used, but as more fertilizer and previous crop residue require deeper incorporation into the soil, it appears that research will be needed to determine the advantages of the moldboard plow. Most effective methods of secondary seedbed preparation must also be determined (preparation for planting).

2. Introduction of variable space, multiple-row planters, and cultivators. Crops such as cotton, maize, sorghum, beans, millets, and sesame are best planted in rows. This provides for more efficient application of fertilizer, insecticides, herbicides, weed control by mechanical cultivation, and harvesting. Modern tool-bar planters and cultivators are now available,

which will plant seeds of all the above crops and at the best row-spacings for the different crops. Research must be conducted on different soil types and in different weather regions to determine the most efficient planter and cultivator units.

3. Introduction of the modern combine with both the grain table and row-crop head attachments, as well as other possible feeding attachments for special conditions for harvesting and threshing, is needed. This all-purpose machine, which has been greatly improved, is suitable for harvesting and/or threshing virtually all the dried grain crops now grown in Ethiopia. Special studies must be conducted to determine and/or develop needed modifications or special attachments for local crops and harvesting conditions.

B. Double-Cropping

Temperatures in Ethiopia are favorable for crop growth the year around. In certain areas, the annual rainfall pattern appears to be suitable for double-cropping (two successive crops each year) with certain crops.

To make possible or to take maximum advantage of double-cropping will require minimizing the time between the harvest of the first crop and the planting of the second. It is this critical time when adequate mechanization may mean the difference between success and failure of a double-cropping program. The first crop may require harvesting during damp or rainy weather, and it may need harvesting as soon as possible after maturity, when the grain moisture content would be too high for safe handling or storage and the weather for the ensuing 2 or 3 months would likely be too damp for adequate natural drying. Therefore, maximum mechanization of field work and mechanical drying facilities are considered requisite for the probable success of double-cropping.

Double-cropping, with beans or maize following cotton, is being practiced to a limited extent in the Awash Valley irrigated area. Maize following beans may be feasible where the small rains (March, April, May) are consistent.

A series of estimates has been prepared to indicate the physical and economic possibilities of a double-cropping system (maize and beans) on a 200-hectare farm unit. A summary of these estimates shows costs of the different operations for producing maize and beans in a double-crop system.

TABLE C-1. SUMMARY OF ESTIMATED COSTS FOR A FULLY-MECHANIZED 200-HECTARE FARM [a]

Item	Cost per Quintal	
	Eth. $	
	Maize	Beans
1. Total field tractor	0.78	2.35
2. Combine harvesting	0.40	1.20
3. All other field machinery	0.27	0.83
4. All hired labor (including 2 full-time men)	0.44	1.32
5. Storage and conditioning equipment	0.25	0.75
6. Drying, grading, marketing	0.31	0.94
TOTAL (power, equipment, labor)	2.45	7.39
Expressed in US ¢/bu	24.5	73.9

a/ Double-cropping with beans and maize. Assumed yields 20 q/ha for beans and 60 q/ha for maize. Costs are divided equally between the two crops grown on nonirrigated land.