December 1969

Final Report

DEVELOPMENT OF AGRICULTURE AND AGRO-INDUSTRY IN ETHIOPIA

Strategy and Programs

Prepared for:

THE TECHNICAL AGENCY
IMPERIAL ETHIOPIAN GOVERNMENT

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Strategy and Programs

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Prepared for:

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IMPERIAL ETHIOPIAN GOVERNMENT

SRI Project 6350

TRANSPORTATION FACILITIES, PROVINCIAL DIVISIONS, AND KEY TOWNS OF ETHIOPIA

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PREFACE

This Final Report summarizes the work completed by Stanford Research Institute for the Technical Agency of the Imperial Ethiopian Government (IEG) under Contract No. 663-72, signed in December 1966. The United States Agency for International Development assisted this contract through an agreement with the IEG authorized under PIO/T No. 663-70012. Throughout the duration of the study, a great many people have been involved; a wide range of subjects has been studied, and various plans have been prepared, all within the realm of agricultural development and the development of industries that directly relate to agriculture in Ethiopia.

The total effort in the Ethiopian project represented a sizable effort by the IEG, AID, and SRI. The IEG furnished a large number of counterparts, as well as office space and other facilities. SRI furnished over 240 man-months of the time of its professional staff, with the majority of that time spent in Ethiopia. In addition to the resident staff, nineteen SRI short-term experts were brought to Ethiopia to work on specific problems, and spent periods of time varying from a few weeks to several months.

The general objective of the Agro-Industrial Sector Study, as outlined in the contract, was to plan for a structural shift toward income-producing activities in agriculture and related industrial sectors. In preparing plans for expanding agriculturally related activities, a broad economic analysis of the agricultural sector was to be conducted, and at least six potential agro-industrial projects were to be selected for intensive review and analysis. For these selected projects, a plan for implementation was to be prepared.

While the scope of the study was determined in part by the Phase I Report, there were other limitations on what could be done. Given budget limitations and the desire for quick results, it was never intended that any of the studies would be able to utilize time-consuming or money-consuming techniques such as extensive field trials, experimental plots for crop production, well-drilling, national censuses, and the like. The studies had to rely on data that already existed or could be gathered quickly without large expenditures of money or manpower.

Throughout the study there was to be a review and evaluation of current plans and projects of the IEG; the findings of these studies were to be used in the preparation of a Final Report that was to include a plan of action for the IEG to consider.

Scope and Method of Study

The first phase of the work under this contract was the preparation of a plan of work, to be completed 90 days after the beginning of the overseas portion of the work. This report presented a preliminary strategy and indicated some of the areas of work on which the later parts of the survey would concentrate.

The preliminary strategy emphasized: (1) meeting the food demands of a growing population, (2) generating a domestic surplus, (3) increasing the supply of foreign exchange through increased exports, and (4) expanding industrial activity. In the plan of work, entitled "Development of Agriculture and Agro-Industry in Ethiopia," (also known as the Phase I Report), the focus of attention for the entire study was presented; attention was to be given to projects and studies that (1) yielded early returns, (2) that used scarce resources efficiently, (3) that used under-utilized resources wherever possible, (4) that were not hampered by land tenure or health problems, and (5) that fulfilled the IEG's overall objectives.

The report proposed that the most significant developments might come from one or more of the following:

1. Encouraging private foreign investment in agriculture
2. Developing and improving institutional arrangements that would support agricultural development
3. Increasing irrigated lands for agricultural production
4. Expanding and improving livestock and animal products
5. Expanding agricultural industries
6. Increasing mechanization and improving agricultural technology
7. Encouraging better land-use practices
8. Increasing technical and financial participation and assistance by multi-national or single-nation agencies.

The broad scope of the study and the staged phasing, where successive study phases depended for their direction on the findings of the previous stage, are believed to be a new departure for the Technical Agency, compared with the types of specialized feasibility studies previously supported. For AID, too, several new departures are believed to be evident in this project as compared with other AID projects. The use of systems analysis to study agriculture in different areas in the country is one example. Another is the broad latitude given the SRI team to develop its own integrated approach to feasible development projects, yet have them all related to an overall agricultural and agro-industrial development plan also worked out by the SRI team.

Three members of the resident staff in Addis Abeba, who arrived from the United States in late February 1967, worked on the preparation of the first 90-day report. They included Dr. Clarence J. Miller, Agricultural Economist and Project Leader; Dr. Willis W. Shaner,

Development Economist and Deputy Project Leader; and Mr. William L. K. Schwarz, Industrial Economist. They were assisted by Ato Kifle-Mariam Zerom, Economist of the Ministry of Planning, who joined the SRI staff for the duration of the study, and by SRI Economists Dr. Robert C. Brown and Dr. William Bredo, Project Manager. In July 1967, two additional resident team members were added to the staff, Dr. Raymond E. Borton and Dr. Gerald E. Marousek, both Agricultural Economists.

In September, 1967 the first of the short-term experts arrived for research into the various studies being planned. The completed series is composed of 21 reports. In addition to the Phase I Report and the Final Report, there are four industry-wide studies, eight studies involving the costs and income from specific projects, and seven studies involving sectors that, if improved, would aid in the development of agriculture and agro-industry, including aiding the specific projects studied in depth. The industry-wide studies were planned so as to precede, and focus attention on, the possibilities that the specific project proposal present.* The plan of action follows naturally from the individual studies.

It was informally agreed among all parties concerned that a necessary part of the quick implementation required in the contract was to interest potential investors as soon as possible in implementable projects. Consequently, concerted efforts were made by the SRI team to bring this about. The persons assigned to deal with the implementation of private investment--in the IEG, in FAO, and in AID--were contacted often by the team so that they would be aware of the studies underway and the approximate dates when study results would be available. Officers of foreign

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* Brief summaries of the reports published on the project are given in Appendix A.

embassies, from countries involved in commercial and foreign aid programs to African countries and particularly to Ethiopia, were contacted to discuss the SRI program and studies in which they might have a potential interest. Investment and banking representatives from the United States and the World Bank were contacted periodically so that they might be kept informed of study progress. Many potential investors, primarily from the United States, who visited Ethiopia to determine whether they might have an interest in agro-industrial investment, were furnished with current information, involved in numerous discussions, and participated in field trips with the SRI team. In addition, all IEG banking and investment organizations, and a very large number of present private Ethiopian investors, were interviewed and discussions were held concerning present and possible future investments in agricultural and agro-industrial projects.

Research Reports

This Final Report is the summary volume of the research conducted under the contract. In addition to the Plan for Research (Phase I Report), the following publications have been completed. They are listed according to subject headings, which denote the general relationship of each study to the others.

Livestock

Dr. Gerald E. Marousek, Dr. Charles W. Vrooman, Mr. Louis I. Thompson, and Dr. Emer E. Broadbent, Development of the Ethiopian Livestock Industry (Report No. 7).

Dr. Harold C. Love, Dr. Charles W. Vrooman, and Mrs. Jean S. Smith, Analysis of the Operation of a Commercial Feedlot in Southern Ethiopia (Report No. 18).

Dr. Gerald E. Marousek and Mr. Charles A. Martin, Economic Feasibility of Dry-Salting Treatment of Cattle Hides from Malgue Wendo Abattoir and Local Slaughter (Report No. 5).

Grains and Pulses

Dr. Clarence J. Miller, Mr. Howard W. Ream, Dr. Frank V. Beck, and Ato Alemayehu Wodejeneh, Production of Grains and Pulses in Ethiopia (Report No. 10).

Dr. Alan R. Thodey, Marketing of Grains and Pulses in Ethiopia (Report No. 16).

Oilseeds

Dr. Wifredo DeRafols, Dr. Harris Benedict, and Dr. Raymond E. Borton, Development of the Ethiopian Oilseeds Industry (Report No. 8).

Dr. Raymond E. Borton, Dr. Wifredo DeRafols, and Dr. Willis W. Shaner, Solvent-Extraction of Ethiopian Oilcake (Report No. 12).

Dr. Raymond E. Borton, Dr. Wifredo DeRafols, and Dr. Willis W. Shaner, Development of Castor Seed Production and Processing in Ethiopia (Report No. 11).

Irrigation

Mr. Robert L. Nevin, Mr. Howard W. Ream, Ato John Asfaw, Mr. Neely H. Bostick, and Dr. Willis W. Shaner, Supplemental Irrigation Projects on the Desset River (Report No. 15).

Mr. Robert L. Nevin, Mr. Howard W. Ream, Ato John Asfaw, Mr. Neeley H. Bostick, and Dr. Willis W. Shaner, A Supplemental Irrigation Project in the Borkenna Valley (Report No. 17).

Manufactured Farm Inputs

Dr. Harris M. Benedict, Potential Agricultural Chemicals Demand in Ethiopia (Report No. 3).

Mr. S. A. Cogswell and Dr. Harris M. Benedict, Potential Fertilizer Demand in Ethiopia (Report No. 1).

Aids to Investors

Mr. William L. K. Schwarz, Ato Paulos Abraham, and Ato Kifle-Mariam Zerom, Industrial Investment Climate in Ethiopia (Report No. 2).

Ato Kifle-Mariam Zerom, The Resources and Economy of Ethiopia (Report No. 13).

Studies to Facilitate Development

Mr. William L. K. Schwarz, Ethiopia's Export Trade in Major Agricultural Commodities (Report No. 6).

Dr. Carl F. Miller, Mr. James D. Sartor, Mr. James L. Mackin, and Mr. Peter O. Strom, Systems Analysis Methods for Ethiopian Agriculture, Vol. I.

Mr. Harry J. Robinson and Ato Mammo Bahta, An Agricultural Credit Program for Ethiopia (Report No. 9).

Mr. Phillip L. Adams and Mr. Benjamin V. Andrews, Improvement of Ethiopian Ports (Report No. 4).

Dr. Raymond E. Borton, Ato Mammo Bahta, Woizerit Almaz Wondimu, and Ato John Asfaw, A Development Program for the Ada District, Based on a Socio-Economic Survey (Report No. 14).

As noted, Appendix A gives a brief description of each report. Together, the reports indicate the wide scope of agro-industry in Ethiopia. Reasons for the selection of the chosen studies and projects are discussed in the project selection section of this Final Report, immediately following a suggested strategy to be used in developing agriculture and agro-industry, and in meeting selected national goals. These sections make up Part One of this report. Part Two uses materials from many of the separate reports, together with other summary material and certain new material, to form a

plan of action for developing agriculture and agro-industry in Ethiopia. Part Three presents alternative considerations for project implementation. However, it will be noted that the discussion throughout the report is carried on at what might be termed three levels. There is first the broad strategy level, which is emphasized in Part One but is implicit in the remaining chapters. Then there is the program level, which is broad in scope but has details of phasing and budgets. Finally, there is the project level, which has the details of content and implementation needed for a careful consideration of a narrow sphere of activity. Projects make up programs which are used to implement strategy. Strategy sets guidelines for program selection and emphasis; in a general way, strategy also determines project emphasis and implementation methodology.

Draft Report and Oral Summary

In April, 1969, a draft final report was prepared and copies were sent to Ethiopia for review. In May, Dr. Bredo and Dr. Miller visited Ethiopia to present an oral summary of the key conclusions of the SRI studies to officials of the IEG and USAID/E. During a series of working sessions, ideas were exchanged and the basis was laid for modifications and revisions of the original draft. Officials of AID/W were visited in June, and ideas in the draft report were also discussed with them.

Acknowledgments

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In its two-year study of the development of agriculture and agro-industry in Ethiopia, the SRI team received valuable assistance from hundreds of individuals and dozens of organizations. We regret that we

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Livestock and Meat Board

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Economic Commission for Africa

Development Bank of Ethiopia

Ethiopian Investment Corporation

Ministry of Commerce and Industry

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H. E. Ato Belay Abay, Chairman

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Ato Negash Ghebre-Mariam, Assistant Minister, Ministry of National Community Development and Social Affairs

Ato Teshome Workie, Assistant Minister, Ministry of Public Works (Department of Water Resources).

A NOTE ON PLACE-NAMES

The names of Ethiopian cities, towns, provinces, rivers, mountains, and regional areas--transliterated from Amharic into English--appear in a great variety of spellings. In this report, with few exceptions, we have followed the spellings presented by the IEG to the U.N. Regional Cartographic Conference for Africa, held in Nairobi, Kenya, in July 1963.

Part One

A Strategy for Agricultural and Agro-Industrial Development

Part One

A Strategy for Agricultural and Agro-Industrial Development

For the near future, economic development in Ethiopia is tied to the Third Five-Year Plan, which covers the period from 1969 through 1973. The quotation below, from the Major Goals chapter of the Plan, provides a good framework in which to discuss the SRI view of national goals and the requisite strategy needed to reach those goals.

> All modern development plans stress the attainment of adequate rates of growth, expressed in terms of the expansion of the gross domestic product. . . The Third Five Year Plan of Ethiopia establishes an annual target for the expansion of the gross domestic product of six percent. . . Attainment of the over-all goal necessarily involves highly variable targets of expansion among the different sectors of economic activity.
>
> The foundation for the Ethiopian economy is and must long remain agriculture. But the development of agriculture. . . involves also stress on a concurrent development of industrialization. In the Ethiopian context this means especially the development of those lines of industry most closely related to agriculture and normally subsumed under the heading of agro-industry. The real and sustained development of Ethiopia is, in any event, unthinkable without sound progress in the expansion of agricultural output. The Third Plan affirms this goal by setting a growth rate of nearly 3% annually for total agricultural production. This is well above the rate achieved in recent years. . . Commercial agriculture will therefore have to grow by no less than 5.7% yearly.

This quotation emphasizes the importance of agriculture and agro-industry,* and especially of commercial agriculture, in the Ethiopian economy and in the hopes expressed in the Plan for growth during the next five years.

Future progress in the development of agriculture and agro-industry in Ethiopia depends on formulating a long-term strategy that makes the best use of available resources, with the object of accomplishing well-defined and agreed-upon goals. The selection of problems to be tackled and the concentration of efforts are central elements in the design of a development strategy, since Ethiopia faces a great many problems in developing its agriculture and agro-industry, and it is obvious that development projects can only be carried out on a phased basis. The pitfall of dissipating scarce financial and manpower resources on too many projects in too many widely scattered places without adequate impact must be guarded against.

The discussion of strategy development in the following pages is presented in three parts. First, the broad overall goals of a development strategy are considered; second, the elements in the design of a development strategy are discussed; and third, criteria for project selection are examined.

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* Agro-industry is defined to mean any step in processing, manufacturing, and distribution that has linkages to agricultural production or agricultural products. While backward or forward integration into farming or into industry is accepted by this definition, no particular level or form of integration is assumed necessary.

I GOALS OF NATIONAL DEVELOPMENT STRATEGY

Near-term future progress in the economic development of Ethiopia will depend on expanding the output of the agricultural sector. As long as the industrial base remains small, the country will necessarily have to rely on the output of agriculture and agro-industries for its exports and its foreign exchange earnings, its source of investment base, and for providing the food and fiber requirements of an expanding and increasingly urbanized population.

A. Expanding the Supply of Food Staples Relative to Demand

The foundations for future growth of the Ethiopian economy will be laid during the next 15 years. Consequently, the need for a program to increase the supply of grains and pulses available to the marketing system is urgent. At present, the growth in the domestic demand for grains and pulses is outpacing the growth in available supplies. Recent food shortages, the post-World War II decline in grain exports, the occurrence of large grain imports in 1958-60 and 1965-67, and the upward trend in domestic grain prices all attest to this fact. Further, Ethiopia is basically an agricultural economy and relies almost totally on the agricultural sector to earn its foreign exchange. Therefore, the need for food imports must be avoided wherever possible and the growth and diversification of exported agricultural products and markets must be fostered.

Ethiopia's market-dependent population is at present growing in excess of 3.5 percent per year and is projected to be 6.8 million by 1980, or 65 percent greater than it was in 1966. This means that the

estimated 1966 demand for grains of about 0.6 million metric tons will have increased to at least 1.0 million tons by 1980. However, the actual growth in demand is likely to be much higher, because per capita demand will increase as a result of higher per capita incomes. Higher incomes will also result in a shift in grain consumption from teff to the other grains, especially wheat.

The change in Ethiopia's supply position in grains is shown by her export-import balance, which amounted to net grain exports of 37,000 tons in the 1948-52 period; this had deteriorated to a net import position of 20,000 tons in 1962-66.

For the immediate future, the likelihood of Ethiopia returning to its former position as a grain exporter is slight. In fact, unless a very major and concerted effort is made to increase supplies, Ethiopia will become even more dependent on grain imports to meet its domestic needs. Not only would Ethiopia's grain production have to increase dramatically before it could export grains again, but its grain prices would have to decline substantially for it to compete successfully in the world market. However, consumers are price sensitive and lower grain prices would mean that even more grains would be consumed domestically.

The situation for pulses is more favorable, but no less urgent. Pulse exports have more than doubled over the past 20 years; however, domestic demand is probably growing even faster than the demand for grains as a group. A major and concerted effort will be needed to increase pulse supplies just to maintain the present level of exports. The need for pulse exports to continue growing and so contribute to Ethiopia's foreign exchange earnings is readily apparent.

B. Increasing Foreign Exchange Earnings

Increased exports of agricultural products will be needed to provide the bulk of foreign exchange earnings over the next 15 years. This means, also, that increased production of import substitutes will be needed to ease the country's foreign exchange position. Payment for the importation of capital goods for economic development will be dependent on the export of agricultural products for some years, until industry products can be exported in substantial amounts beyond present levels.

Debt charges on loans for economic development obtained from abroad must be repaid in foreign exchange, for the most part, and will place an increasing burden on the repayment capacity and financial integrity of the economy.

C. Expanding Investment Funds

Ethiopian agriculture is an important source of investment funds for development purposes. In addition to foreign exchange earnings, domestic investment funds for development will also have to come mainly from savings and taxes derived from the agricultural sector. Increased productivity--and expanding income from agriculture--is therefore essential if a domestic savings surplus is to be generated. Local investment in land development and the expansion of processing facilities, as well as money for education and health programs, will all be dependent on agricultural production for some time.

D. Building Foundations for Future Growth

Any development strategy must provide for building the infrastructure necessary for future development growth at the same time as development takes place and as funds become available. Selection of regions

for emphasis and of an infrastructure with multiple uses--with stress on transportation and communications--will all be part of reaching basic development goals.

Future economic growth will also depend on solving special problems--such as those of land tenure--in a way that will avoid disrupting production; incentives to producers to increase their marketable surplus and expand investment in agriculture and nonagricultural sectors crucial to development must also be provided.

Foundations for future growth may also be built through control of human and animal diseases. The malarial and rinderpest eradication campaigns are examples of such control. The provision of improved credit facilities is essential. Development of viable agricultural cooperative societies for marketing, procurement of farm supplies, and for farm credit may also prove extremely useful. Education of the skilled and professional manpower required for development will be of crucial importance.

II DESIGN OF A STRATEGY FOR DEVELOPMENT

Design of an effective development strategy requires a careful definition of the overall development goals; these guidelines must then be applied to each proposal for development and throughout the process of project selection and planning. For Ethiopian agriculture, the points of emphasis outlined below are recommended for establishing the priorities of a long-range plan for increasing agricultural production.

A. Efficient Use of Funds and Manpower

Since both development funds and qualified manpower are scarce, it is believed extremely important to concentrate development efforts and to use effectively the limited technically qualified people and the limited domestic and foreign exchange funds available. Although the immensity of the task makes it seem that everything must be done at once for everyone, decisions should be made with the view of using adequate concentrations of manpower and money in areas of the most immediate and highest potential.

B. Expanding of "Market Oriented" Agriculture for Greatest Impact*

There would appear to be little doubt that immediate term gains in agricultural exports and increased food and fiber supplies will come most

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* The term "market-oriented" is used to indicate that a broader coverage is meant than the usual "commercial," large-scale plantations. Location, size of farm, and the nature of the tenancy pattern may be most important factors in determining whether an area is market oriented; in some areas, under suitable conditions, relatively small farms may prove surprisingly responsive to market incentives.

effectively through the encouragement of land development in areas where land is available for medium-scale and large-scale commercial farm enterprises. Such land may be undeveloped at present, or some may now be farmed by traditional methods. Agricultural development projects that generate returns at an early date, with relatively short gestation periods, should be selected. Supplemental groundwater irrigation and more intensive dry farming should provide effective opportunities for expanding near-term output; in addition, many processing industries--possibly integrated with production--can also generate early returns. Attention should focus on projects in areas that are relatively accessible* and that require a minimum of additional infrastructure and public services.

Whenever possible, major reliance for project implementation should be placed on private entrepreneurial initiative and direct commercial investment. Large-scale commercial enterprises can be encouraged through provision of agricultural credit, technical help, and possibly incentives. Private investment of funds from outside Ethiopia in enterprises that integrate agricultural production, marketing, and processing should be sought. Public sector actions--whether involving new laws and regulations, infrastructural investments, or incentives--should be designed to supplement and encourage private activities.

C. Concentration of Efforts

Efforts should be concentrated in areas of the highest potential to obtain the greatest results in the development of peasant agriculture. Areas that have the potential for producing surpluses for the market,

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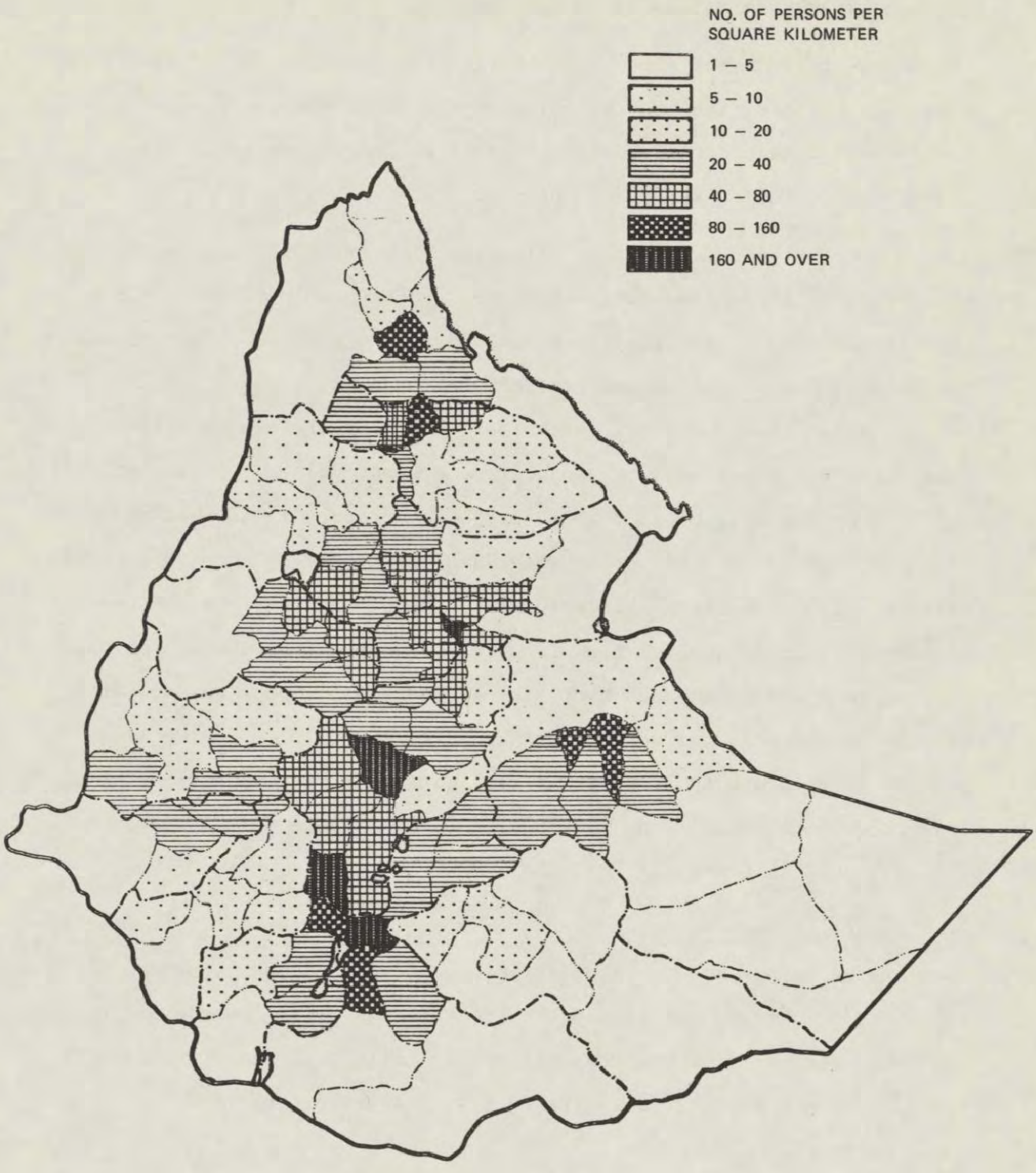
* Manpower, as well as market accessibility, is partially related to population density, shown in Figure 1.



SOURCE: Department of Municipalities, Ministry of Interior, May 1967.

FIGURE 1 POPULATION DENSITY

that are located near existing roads, and that have suitable land to add to cultivation should be emphasized.

Areas that do not have these characteristics must wait for development, or programs might be initiated to encourage people to move out of these areas into other agricultural areas or into industry or other activities as they develop in Ethiopia.

Concentration of effort is warranted also on increasing the output of a relatively few commodities that are produced in quantity, that have important economic linkages to other industries, and for which there is substantial current knowledge of technical production coefficients, as well as established markets. Attention should, therefore, be given to upgrading the output of such products as grains, pulses, livestock, oilseeds, and specialty crops through projects designed to augment the value added through production, processing, and marketing. Also of high priority are projects that provide inputs needed in agriculture. There are undoubtedly other opportunities in which private entrepreneurs can make profitable investments. However, the foregoing are important not only because of the scale of output, but because they offer opportunities for prototype projects feasible of replication in various parts of the country as local conditions warrant, and over time as markets and production potentials increase.

Export expansion--both of present exports and of potential exports--needs to be emphasized for short-term impact when commodity projects are selected for development emphasis. Products that lend themselves to meeting world market needs and that can be partially or wholly processed in Ethiopia should receive concentrated effort wherever possible.

D. Package Programs

In government programs to develop agriculture over past years, much dissatisfaction has been expressed at times because the investment of much money and manpower appears to have resulted in very little obvious development activity. In the search for better alternatives, the concept of the "package" development program was adopted. The key element of the program is the concept of a package of inputs applied to a limited geographic area within the nation. The inputs should include all the factors deemed critical for development in the area, and in sufficient quantities to eliminate any constraint to production. Of critical importance are fertilizer, irrigation, improved seeds, pesticides, adequate credit, mechanization, and a strong extension program to encourage adoption of increased farm inputs and improved cultural practices. A research program adapted to the area, and the necessary infrastructure--roads, health and education, credit and marketing programs--should be added as needed according to determined priorities.

Package programs must be adapted to the needs of each area. Such a program is appropriate for a significant group of farmers in an area where the possibility of an important impact exists; it is in contrast to a nation-wide program that would require massive resources to accomplish anything of value. At present, resources of technical manpower and inputs are not available on the massive scale that would be required to extend package projects all over the nation. Progress in the organization of farmers in the area into cooperative farm supply, procurement, and marketing organizations should be considered a plus factor in such a program.

Development of transportation and marketing facilities for the selected areas must be part of the development activity. The extension of improved roads into production areas should increase production

through the use of more easily available inputs; better prices to producers should provide an incentive to greater production. Increased education and contact with the outside urbanized world will bring in new ideas and encourage population mobility. Health facilities will be more available to local people through better roads. Areas for road building can be selected with all these considerations in mind. Areas with high production potential should be given priority.

Carefully chosen crop research programs must be undertaken to promote agricultural development. The local testing of new seeds, fertilizers, and chemicals is particularly important in Ethiopia where extreme variability of conditions exists within short distances. Funds for development of research and local testing facilities need to be given priority where possible. These activities can lead to greater gains in the future.

E. Making Supplies and Services Available

Supplies and equipment for raising production on small and medium-sized farms are not at present available. Not only must farmers learn about the benefits of improved seeds, fertilizers, chemicals, and equipment, but they must be able to obtain them in small quantities near their point of use. Improvement of private distribution of farm supplies should be encouraged as much as possible by the government.

Local people need water for their own use and their livestock. In many parts of the country this is crucial to human and animal health. Nearby water supplies would alleviate much effort put into carrying water and into driving herds and flocks long distances to water. As a felt need of the local people, a better supply of water is often the number one request. In some areas there are also possibilities of using water for irrigation on a limited scale. Water resource studies on groundwater, including well drilling tests, and on small stream damming possibilities should be conducted extensively.

Various community development activities now being stressed in centers organized through the Ministry of Industrial Community Development and Social Affairs are laudable and need to be extended in combination with other agricultural work wherever possible. Self-help organizations can build educational facilities, improve feeder roads, and sponsor health education, while other coordinated activities are bringing increased crop and livestock productivity, better transportation and communications, and related improvements. The maintenance of new water facilities needs to be done with local help. In some cases, local groups can become the instrument for improved credit facilities, for the distribution of supplies, and for the storage and marketing of local products.

The availability of desirable consumer goods may also have an impact on the monetization of the subsistence economy. This will be greatly assisted by the construction of roads into the market towns throughout the country and also through the encouragement of retail shops to serve small communities. Government policies that increase the costs of such items of wide consumer demand as sugar, small transistor radios, umbrellas, and cotton yardgoods will need to be reconsidered if the welfare of rural people is to become a paramount objective.

F. Encouraging Investment

Technical aid is needed by many possible investors in Ethiopian agriculture. Among local landowners who at present hold substantial areas of land there is a marked scarcity of ability to operate agricultural enterprises effectively. These landowners are busy with commercial or governmental work in Addis Abeba or Asmera and have little time to devote to their lands, and thus they follow the usual custom of having it farmed by tenants. Some are turning to the dealers of farm machinery

and other agricultural suppliers for advice on how to get larger operations started. Others have looked both for management and financial help and have not been able to find either available. A service (either private or governmental or both) that would provide management and financial help to landowners who would like to enter into commercial agricultural operations would be extremely helpful.

Land development leases are presently being given to private parties by the Government at the national and local level, but without the benefit of really stable titles to the lands. Both Ethiopian and foreign investors frequently need advice on where farm lands are available and for what purpose. It appears that there is a need to speed up the work of the Ministry of Land Reform and Administration to establish reliable lists of available lands with clear legal titles. This would provide needed assistance and encouragement to investment in bringing agricultural land into production as quickly as possible.

Improvements such as those cited above contribute to reducing risk and uncertainty. This applies especially to better land leasing arrangements, improved marketing facilities, and credit and technical assistance provided through various agencies, both private and governmental. Stable government policies designed to promote agricultural development will assist in creating the kind of climate in which entrepreneurs want to invest.

Actual promotion of investment in agricultural development in Ethiopia will require a variety of IEG efforts. At the present time the Ministry of Agriculture is sometimes helpful to prospective investors, but little actual promotional activity has taken place. The Ministries of Agriculture and Commerce and Industry should be able to help local investors, and the Ethiopian Embassies abroad should be able to assist

foreign entrepreneurs who show an interest in investment in Ethiopia. Much remains to be done in this regard.

G. Building Institutions, Programs, and Public Services

The future development of Ethiopia's economy will be greatly facilitated by enlarging the infrastructure. Important criteria in selecting infrastructure development projects are the possibility of multi-purpose utilization and their value in removing particular bottlenecks holding back development of certain areas or activities. Provision of transportation facilities will usually occupy a first order position, crucial to the development of production, marketing, education, and health, as well as other institutional development.

Although some commercial agricultural enterprises will provide some of their own marketing and storage facilities, others may not have the necessary resources. This may be particularly true of local Ethiopian businessmen who are venturing into agriculture for the first time. Sales and service outlets in towns near the areas of production will be crucial to the survival of these entrepreneurs. These outlets will offer services such as the following: gasoline and spare parts, cleaning and preparing products for export or local sale, and supplies such as seed, fertilizers, chemicals, tools, or even advice on how to proceed. Storage under bonded warehousing will be particularly useful to medium and large producers of grains, pulses, and oilseeds, both for local sale and for export.

A basic strategy for commercial agriculture and agro-industry is the design and structuring of public institutions, policies, and services that assist in the formulation and implementation of the individual projects. In general, this component consists of actions by the IEG to improve the investment climate and create the necessary incentives to expand production. The important factor to consider in this connection is that

these actions be directly related to output of key commodities in high priority producing areas, and be designed to provide an environment that is conducive to execution of the projects. Examples of such actions include:

1. Systematic inventories of material and human resources in the most promising development regions.

2. Provision for adequate marketing and storage services for major commodities in important producing areas.

3. Construction and maintenance of an adequate infrastructure, including schools and health facilities.

4. Concentration of research activities along lines that lead to near-term increases in output of the most important products.

5. Establishing credit facilities that can provide adequate financing with suitable terms of agriculture and agro-industrial commercial enterprises.

6. Creating incentives to private investors through regulations relating to taxation, repatriation of earnings, and other measures.

H. Recognition of Agriculture as a Base for National Development

Industry is not yet sufficiently developed to be an important substitute for imported products nor a source of exports. Domestic mineral resources are not known to be in large quantities nor of good quality, and none have a ready international market that could be a foreign exchange source. The principal natural resource that remains, then, is agriculture, including forestry and fishing, upon which the development of the economy rests. As implied earlier, the monetization of a large segment of agriculture must be assumed in a development program.

I. Extension of Agro-Industries as the Base for Industrialization

With agricultural products as the principal resource on which to base development, the manufacture of certain farm inputs and the processing of agricultural end-products appear to be natural first steps toward industrial expansion. Processing gives additional value to products destined for export, and makes use of the local resources of management, labor, and construction materials. Local manufacturing industries, as they develop, must train management and skilled labor, which then provides a base on which further industry may be developed. Furthermore, as the original agro-industries expand, they provide the demand for "intermediate goods"--i.e., factory supplies that may be provided by other domestic manufacturing plants when the demand has become large enough.

The creation of modern commercial farms stimulates the development of industries that process farm products and that manufacture and distribute farm supplies. Modern processing industries require adequate amounts of raw materials, of suitable quality, with dependable deliveries. It is much easier to obtain these products from medium and large farm operators than from small subsistence peasant farms. Large and medium sized commercial farms also provide adequate outlets for supplies of farm inputs. The linkages, therefore, caused by expansion of commercial agriculture can have important impacts on the development of related industries.

Linkage of products to local industries and needs are illustrated by wheat and cotton production, which probably should be of the types that local industries will process and sell only within Ethiopia. Livestock production can be linked with feed production and processing, as well as meat processing, for local and export consumption. Other linkages to be considered are: processing of vegetable oils that produce

livestock feeds as a by-product, and that also have uses for further processing for products such as margarines and soap, or the processing of hides and skins to produce leather for shoes and other leather products. Agro-industries such as these have linkages to other industries, and thereby stimulate the economy, to a degree that other industries do not.

III PROJECT SELECTION

A. Bases for Selection

It was decided at an early stage that the SRI studies should place major emphasis on economic growth; consequently, the potential contribution of a project toward this goal became the principal criterion in selection. Factors considered in project selection were: the initial impact and the ultimate impact of each type of project; the rapidity with which a project could be initiated and could attain the status of an on-going enterprise returning a positive net income; the possibility for earning foreign exchange; and the feasibility of encouraging producers to increase their production for the market.

Emphasis was placed on projects that would generate returns at an early date. Rapid implementation for immediate impact was to be encouraged wherever possible. Many large-scale irrigation, reclamation, and settlement schemes produce returns only in the very long run and have long non-productive gestation development periods. However, selected large-scale projects such as the Awash Valley project, where much of the preliminary investigative and pre-investment work has been completed, offer important opportunities for increased production of cash crops and livestock and should be given ample encouragement to use what has already been developed.

Placing priority on projects that demand less initial infrastructure will also bring quicker impact for the money expended. Areas for concentrated development of crops for export need to be near shipping facilities and existing transportation facilities. Where possible, processing facilities should be available to reduce export bulk.

Projects for domestic food grains development may be located in areas farther from the export facilities. Roads that open up areas for export crop production might be given priority.

With rising population, food supplies will have to grow at an increasing rate to feed the additional increments of population and to feed the population better as urbanization expands and people become aware of more and better foods and are able to buy them. Hence, a balance between production for domestic and export sales must be achieved. One cannot be developed to the exclusion of the other.

Projects with obvious multiplication possibilities should be emphasized. The IEG should seek to build this feature into most agricultural development projects. Exclusive rights to the sales of certain products, projects that do not train local people who might carry on similar activities in the future, projects in which the market for the product is so limited that more could not be produced and sold--all of these should be avoided in favor of those that will inspire duplication, that include facilities for training, and that will aid in the development of the immediate area.

There is a need for the IEG to continue the identification and development of specific agricultural and agro-industrial impact projects that are financially rewarding to investors and that make a maximum possible contribution to added value of output and increased foreign exchange. The SRI Agro-Industrial Sector Study has begun this process with its resource analyses and feasibility studies of several areas and industries related to agriculture. This activity must be carried forward by the IEG with a continual survey and review of ideas and proposals.

B. Agro-Industries

The importance of agro-industries in the Ethiopian economy is illustrated by their relative proportion of all manufacturing enterprises--approximately 85 percent when measured either by employment, or in gross value of production.* The major groups of agro-industry include food, beverages, tobacco, textiles, leather, and lumber. The market for these products is primarily domestic, with the exception of meat, which has had an export market for some years.

Agro-industrial enterprises may be grouped into two categories: (1) farm-input manufacturing, such as the production of fertilizer or of agricultural chemicals, and (2) farm product processing, such as the processing of cattle, wheat, sesame, etc. Considering the types of processing plants referred to in the second category, past experience in Ethiopia appears to indicate that there is little difficulty in getting new plants built when the need arises. At present, over-capacity is evident in certain lines of agro-industry, at least with present methods of management and planning.† The over-capacity exists relative to the limited supplies available for processing. Therefore, the main thrust of SRI's studies has been to emphasize the absolute necessity of integrating processing and marketing with the production of raw materials.‡ Such integration may be achieved in different degrees through various

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* See Report No. 13, The Resources and Economy of Ethiopia.

† For example, egg and beef plants in northern Ethiopia must close down or operate at partial capacity when supplies are not available or are inadequate.

‡ This statement should not be interpreted to imply, however, that any project for which feasibility is studied need be an "integrated" project, in which several steps in production or processing are combined. The particular project to be studied must be chosen and defined by the researcher, with no limits being set aside from the general requirements discussed in the text above.

devices--corporate operation of farm or ranch land where the necessary production takes place; closely supervised contracts with local farmers to maintain supplies; an extensive and aggressive procurement organization that will assemble supplies from many different production areas, and maintain them in holding or storage locations until needed by the plant. The location of new plants may be near important supply areas rather than near urban centers if it is justified on an economic and technical basis, as is sometimes the case.

C. The Third Five-Year Plan

Although the SRI studies were initiated--and, in some cases, completed--before the release of the Third Five-Year Plan, the emphasis in the projects selected is consistent with the objectives for agriculture stated in the Plan. Key statements in the Plan* are quoted below, together with references to SRI studies.

"The rapid development of commercial agriculture is the only way to get the relatively quick increase needed in agricultural exports." (p. 13)	This has been the goal in all SRI studies. Some discussions particularly relevant to the objective can be found in Reports 1, 3, 7, 8, 9, 10, 15, 17, and 18.
"The second line of attack will concentrate on opening up, settlement, and cultivation of new lands in various parts of Ethiopia..." (p. 14)	New areas in the Middle Awash and in the Teseney/Om Hager area of the Northwest are studied in the SRI report on Systems Analysis.

* References are to a review draft. Some modifications can be expected in the Plan as it will finally be published. All pages noted are from Chapter XIII.

"The traditional area of peasant subsistence farming...will yield only slowly to efforts made to modernize it..." (p. 15)	While emphasis was not on peasant farming per se, studies that will prove useful when attacking this problem include Reports 9 and 14.
"At the moment, the most promising approach to the successful development of strategically selected areas is that known as the 'package program.'" (p. 16)	An example of this type of program is given in Report No. 14; Report No. 10 lists other suggested areas where a program could be initiated.
"Policy for crop production is designed to meet the three major objectives of increased exports, greater substitution for imports and coverage of urban food supply requirements." (p. 18)	Grains, pulses, and oilseeds were studied. Reports 8, 10, 11, 15, 16, and 17 are relevant.
"The need is recognized for a carefully conceived livestock and livestock products development policy geared to the realities of the situation..." (p. 19)	Reports 5, 7, and 18 are applicable.
"Appropriate technical measures can greatly increase productivity..." (p. 20)	Reports with pertinent discussions include: 1, 3, 7, 8, 10, 11, 14, 15, 16, 17, 18, and the Final Report.

D. Areas of Work and Projects Selected

The discussion below covers important areas of work and projects finally selected for in-depth study by the SRI team. Many other areas of work and projects were considered by the team, but eliminated from further consideration at this time, either because they were of less importance within the framework of project selection discussed above, or because they were being studied by other teams.

1. Livestock and Animal Products

Livestock was unanimously considered--by SRI, USAID, and IEG experts--as the most important sector of agriculture that could be studied. During the project one resident SRI staff member and five short-term experts were assigned by SRI to work on various aspects of this field. One general background study and two feasibility studies were completed. One of the latter was a study of hide processing--hides being the most important Ethiopian export after coffee. The second study was of a feedlot project, since a major problem appeared to be the stability and volume of the cattle supply.

2. Cereal Grains and Pulses

The study of grains and pulses is also extremely important, not only because a high proportion of farmers produce one or more of these crops, but because they are the source of the bulk of the food for domestic consumption. The possibility for quick implementation of schemes to expand production efficiently and reach the export market with increased volumes must also be considered within reach. Three studies were completed: a general background study of grain and pulse production; a background study on grain and pulse marketing; and the feasibility of an area "package" study, in which the area depends entirely on grain and pulse production for its economic rationale.

3. Oilseeds

The study of oilseeds was difficult to encompass, because of the large number of relatively minor crops that are included, and because of the lack of quantitative data available. The favorable world market for several of the crops was one positive consideration; on the other

hand, the almost complete lack of experimental production information was a limitation. Three studies were completed: a general background study on production, marketing, and export of oilseeds and two feasibility studies--one on a solvent extraction plant for oilcake, and the other on a processing plant for castorseed. The solvent plant depends for its economic justification on the world market demand for higher quality and more uniform oilcake; the castorseed operation, which would require expanded commercial production of castorseed, depends on a strong world market for castor oil in future years.

4. Cotton

Cotton and its substitutes are of major interest in Ethiopia. Other natural fibers are either in good domestic supply or cannot compete with present imports. In any case, plant fibers other than cotton must be considered as minor commodities.

Cotton fibers and textiles require a sizable amount of foreign exchange for imports. Strategies to relieve this situation might be based either on producing more domestic cotton and textiles, or to export more products to earn the foreign exchange. Emphasis in the SRI studies has been on the latter strategy, but the former should also receive support in sound future planning.

Indicated present and planned increases in both cotton production and in textile manufacturing were sufficiently positive that it appeared that the cotton industry was able to handle all immediate economic pressures. Furthermore, uncertainties about future plans for certain major development schemes (such as those for the Awash Valley, which has much land apparently suitable for cotton production) appeared to suggest that research on expansion of cotton production would be better delayed for a time until these uncertainties are clarified. Consequently, while

only a moderate amount of work on cotton has been completed in the SRI studies, this should not detract from the importance of carrying out further studies in the future.

Studies undertaken by SRI in which cotton or cotton products are involved include the following:

1. In Reports 1 and 3, the use of fertilizers and chemicals on the cotton crop is discussed, and future hectares of plantings are projected.

2. Report No. 8 includes cottonseed production, marketing, and export in the study of oilseeds.

3. Report No. 15 considers cotton production as one of the important crops in rotation programs. The Systems Analysis Methods report considers cotton production in two of the three areas in which detailed studies were made.

Other current studies of interest include:

1. Italconsult, Melka Sadi-Amibara Proposed Irrigation Project, Awash Valley Authority, Rome, December 1968.

2. P. F. Van der Goot, Report on the Cotton Industry in Ethiopia, Awash Valley Authority, Addis Abeba, December 1967.

3. J. Mahar et al., Analysis of the Economic Suitability of Increasing the Tariff on Outer Garments. This is an SRI study to be released in 1969. The study involves an in-depth analysis of cotton and other fiber products, the volume of imported clothing, employment in a garment factory, and linked activities (cotton production and ginning, for example).*

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* Conducted by a separate SRI team assisting the Ethiopian Ministry of Defense.

5. Tools and Machinery

The importation of hand tools and agricultural machinery is already sizable, and the demand for these products should increase rapidly as agriculture becomes more commercially oriented. Therefore, the setting up of import-substituting manufacture of these products was considered by the SRI team. Such a study was not undertaken because, at approximately the same time, several developments occurred that filled this gap.

1. Two firms are known to be involved in machinery assembly or manufacturing. One is importing boxed and partially knocked-down farm machinery, which is assembled in Ethiopia. The other has established a factory, as a result of a feasibility study sponsored by the Technical Agency, and plans to produce hand tools, with agricultural tools to be produced later if they are found to be feasible.

2. The Chilalo Agricultural Development Unit (sponsored by the Government of Sweden and the IEG) has plans for testing the use and adaptation of local or introduced tools and implements in peasant farming, and for making studies of possibilities for importing suitable implements in large amounts, or manufacturing agricultural tools and implements in Ethiopia.

3. A Michigan State University team, sponsored by USAID and working in the Institute for Agricultural Research, has for the past 18 months been studying agricultural mechanization in Ethiopia and two other African countries. Five diverse areas in Ethiopia have been studied at different levels of mechanization. Proposals for Ethiopia resulting from these studies will include the establishment of an agricultural power and land use research and development center, and the implementation of selected mechanization programs.

6. Fruits and Vegetables

This group comprises a large variety of individual products. Each product bulks rather small in trade, and all added together make up a very modest domestic market. The possibility of exporting sizable quantities on a high-profit basis was the rationale for selecting a study in this field. In addition, the Desset Valley supplementary irrigation project had the proper location for vegetable production and was favorable to exportation. While production and location factors were excellent, further study unfortunately revealed that the planned export medium (air freight to winter markets in Europe) was not available in sufficient quantity to justify immediate development of the project based on these commodities. The possibility of exports to Europe by air freight in the winter season should be studied again in the near future, when air cargo capacity may have expanded sufficiently. In addition, the possibility of future reopening of the Suez Canal is also a consideration favoring a positive outlook for winter exports by sea to Europe.

7. Supplementary Irrigation

A number of studies of large-scale irrigation problems--large streams, large dams, large irrigable land areas--have been made over the years in Ethiopia. These include studies of the Awash Valley (now being implemented) and the Blue Nile Valley. An urgent need was felt also for a study of comparatively small supplementary irrigation systems--adaptable to one or a few farms, low in cost to install and low in upkeep, in some cases only being used on a supplemental basis in the production process (when rains fail or are not sufficient). This type of irrigation has been found to be rapidly expandable in other countries, partly because individual farmers are often able and willing to pay for such a system from their increased crop production; therefore, the major burden of cost does not fall on the government.

Two feasibility studies were completed for projects of this type--one in the Desset River Valley and one in the Borkenna River Valley.

8. Chemicals and Fertilizer

While the present utilization and importation of these products are rather modest in scale, it is obvious that, as commercial farming increases, the demand for these products will increase at an increasing rate. As a first step in developing a domestic industry to handle these products, a fertilizer feasibility study was completed that recommends beginning with two plants to engage in the physical blending of imported concentrates.

9. Port Development

To the extent that an agricultural development program for Ethiopia depends on greatly expanded exports and perhaps increased imports, the efficiency of port operations is of vital concern. Therefore, a study of needed improvements of the ports serving Ethiopia was made, including calculations of cost and associated cash savings.

10. Agricultural Credit

The need for credit in agriculture and agro-industry was voiced by every group interviewed by the SRI team. A study was therefore made of credit requirements in the agricultural and agro-industrial sectors of the economy, and a credit program was proposed by SRI for implementation.

11. Systems Analysis Studies

A comparative analysis was conducted of three agricultural areas of the country. The three areas selected for study by the Inter-Ministerial Committee were located in the Middle Awash Valley, near

Debre Zeyt/Nazret, and in the Teseney/Om Hager area. A study was made in each area, using system analysis methods, and alternative development schemes for the areas were evaluated.

12. Studies in Depth

Figure 2 indicates the locations of the studies in depth that were completed by SRI. All of these studies resulted in development projects being recommended. Only one--Borkenna--needs further study before action to implement could commence.

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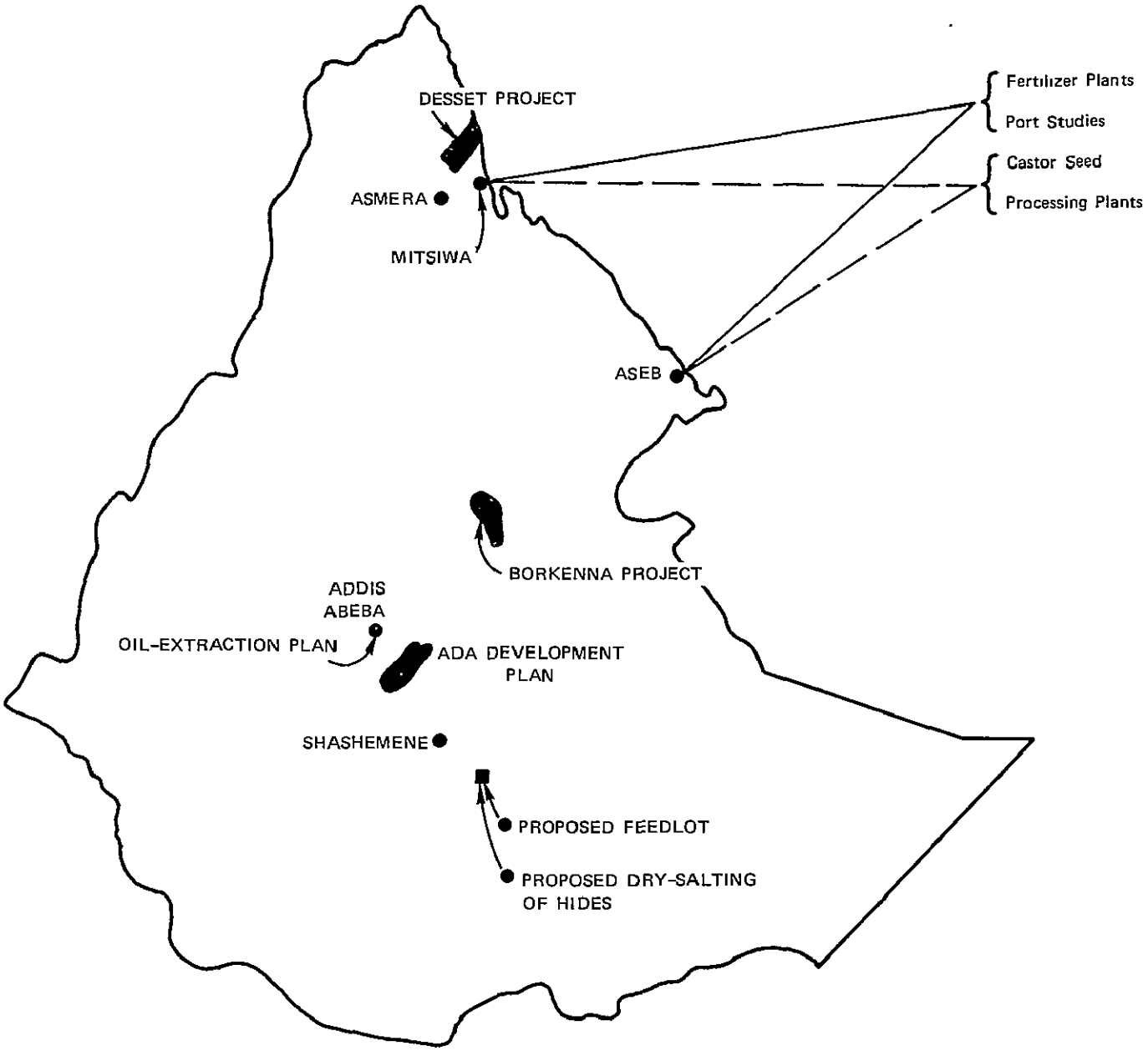

FIGURE 2 LOCATION OF STUDIES IN DEPTH

Part Two

A Plan of Action

Part Two

A Plan of Action

Part Two is composed of eight programs constituting a plan of action for the development of agriculture and agro-industry in Ethiopia. These programs can be briefly designated as follows:

- Farm Inputs
- Agricultural "Packages"
- Supplemental Irrigation
- Agricultural Credit
- Product Processing
- Marketing and Exports
- Improvement of Technology
- Manpower Resources.

Although the research and study of the eight programs was undertaken within the framework of a fifteen year Plan of Action, the details presented here are primarily concentrated on the first five years of the period. The longer range program necessarily tends to be more general and has fewer details, both because there is less definitive data with which to work out specific plans, and because future political and business decisions that may strongly influence program priorities and emphases are less predictable.

The projects studied in depth by the SRI team form a part of the various programs, although some of SRI's more general studies provided background information that has helped shape other programs. While the SRI team has been well aware of other projects for agriculture being carried

out by national and international groups with IEG cooperation in Ethiopia--and this knowledge has influenced the thinking of the SRI team in many cases--such projects have not in general been made a part of the eight programs detailed in the following sections. The existence of these other projects is not considered a limitation of the programs proposed here, since--under the Third Five-Year Plan--there is room for all present and most proposed projects for agriculture in Ethiopia, if studies have shown them to be feasible. Furthermore, there is little conflict or overlapping between present projects and those proposed by SRI. Once adequate resources are located by the IEG to implement one or more projects under a program, the principal problem is to activate the projects with as little time wasted as possible, since Ethiopia can ill afford to lose time in its struggle to develop its agriculture and agro-industry quickly but soundly.

PROGRAM I. FARM INPUTS FOR AGRICULTURAL PRODUCTION

In improving the development of agriculture, no factor is more necessary than the group of items collectively labelled here as "farm inputs." These are those major items, the majority of which are purchased, that are needed by the farmer to use, along with his own labor and capital and land, to increase his production and improve his farming efficiency. The major items usually considered as belonging in this category include irrigation, improved seed, credit, fertilizer, chemicals, machinery, and feed.

In initiating and maintaining a program to furnish inputs that the farmer may buy, stress needs to be placed on the necessity of adequate local availability of the input materials at the time when it is desired by the farmer. No program will succeed if proper distribution and local storage of the input factor, for purchase by the farmer when needed, is not arranged adequately. One of the present complaints about certain inputs--which farmers in some areas are convinced would be profitable to use--is that there is no way to obtain these inputs in the quantities and at the times when they are needed.

The inputs considered in this section include (1) farm machinery, (2) livestock feed and forage, (3) fertilizer, (4) farm chemicals, (5) improved field crop seeds, and (6) improved farm management. Irrigation and agricultural credit are discussed in Program III (p. 89) and Program IV (p. 111).

A. Farm Machinery

Owing to the efforts of various groups--e.g., the Michigan State University team and continuing work by the Chilalo Agricultural Development Unit (CADU)--it may be assumed that there will be a continuity of thinking and efforts toward the improvement of farm machinery adapted to different levels of sophistication for farming tasks in different regions of Ethiopia. While most of this machinery may well be imported, it can be expected that in time much will be manufactured domestically. The package crop production program discussed in Program II (p. 57) assumes that there will be an active program of machine manufacture and adaptation that will continue throughout the next fifteen-year period.

B. Feed

1. Livestock Forage

In general, there is a livestock feed shortage in Ethiopia for the current livestock population as it is presently distributed.* In consequence, sub-maintenance rations give many animals little resistance to disease and parasites. This is particularly true of oxen used for farm work. Many sheep also show evidence of malnutrition.

Overgrazing of grasslands is evident everywhere in Ethiopia, particularly in the highland areas having more than 600 millimeters of rainfall and around ponds and watering places in regions of lesser rainfall. The poor condition of pastures is often aggravated by the extremely close grazing of sheep and goats. These animals, added to a large cattle population, result in overstocking in many areas where there is continued decline in the quantity and quality of forages.

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* See Report No. 7, Development of the Ethiopian Livestock Industry.

In sedentary and semi-nomadic agricultural areas the pasture land is being fully utilized or overused. Certain areas are also presently underused because of water scarcity, resulting from low total rainfall and high rates of runoff. To the extent that underdeveloped pasture areas tend to be in higher rainfall regions at lower altitudes, livestock is directly competitive with crops for the use of the land. Unless based on rotation pasturage, livestock production probably will not be able to compete in the long run with crops. While there are areas where foliage is available but not usable because of dry weather or disease, the possibilities of large quantities of additional feed from pasture being made available during the next few years are limited. Where groundwater is available, drilling of wells may be a flexible and economical method of obtaining water.

The extremely high density of livestock found in many areas is undoubtedly based on the fact that a high proportion of the feed is obtained from crop residue or aftermath. In most cases, crop residue is fully utilized. Hay is usually produced only in very small quantities. Areas now under cultivation are needed primarily to produce food grains. Development of irrigation in some dry areas will result in the availability of some alfalfa hay in the future.

a. Improving Forage Supply

Over 50 percent of the cattle population is concentrated in the high rainfall areas of the country. Here the climatic and soil conditions are relatively favorable for introducing new forage species and improving both permanent and cropland aftermath pastures. Since practically no observations have been made in Ethiopia regarding the adaptability and productivity of introduced species of grasses and legumes, the first

step in a livestock forage program should be to establish small plots at representative locations in the various grassland zones.*

There may also be some possibility of providing more forage and extending the grazing period further into the dry season by seeding annual legumes at the time of planting of wheat or barley, in the zones where these crops are prevalent. Green chop, hay, or silage also takes various varieties of forage crops and can be produced when the pastures are seasonally deficient or when intensive feeding is to take place. Certain grasses and legumes for improved permanent pastures must also be considered. Where year-round green forage is desired, particularly on dairy farms, seeding of winter grains and annual legumes such as oats, rye, and winter barley are recommended.

b. Shift to Managed Pastures

As a second step, the changeover from the present, generally overgrazed pastures to well-managed pastures of improved grasses or legumes supplemented with better aftermath grazing and hay and silage is farther in the future. There must be a complete change in attitudes of Ethiopian farmers derived from an understanding of benefits before much progress in pasture improvement can be expected to take place. This will require a vigorous and effective program of education and extension to bring about a proper appreciation of the grassland potential and a desire on the part of the farmers to improve their livestock feed resources. They must be shown that it is more profitable to market cattle fed on good grass at two or three years of age rather than to feed them for five to eight years.

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* See Appendix A, Report No. 7, Development of the Ethiopian Livestock Industry.

c. Forage Research Program

A third step in the development of an effective forage program for Ethiopia is a stepped-up research program. Ethiopia does not now have the resources or trained personnel to carry out a large-scale basic research program in forage crops. However, it is essential that an applied research program be combined with extension demonstrations to solve some of the local problems and to provide the information needed for farmers and ranchers to begin improving their livestock feed supplies. It has been recommended that a minimum of three research workers would be needed for the initial stages of this program, with additional staff added as the program expands. It has also been recommended that a minimum of three extension forage specialists be provided to work in three zones. This would be an initial program; additional extension agents could be added as the program expands.

It must be realized that many of the suggestions in this crop forage program are not necessarily aimed at feed inputs that will be bought and sold. A certain part of the forage will be sold; however, in many cases the feed will be raised on the farm by the farmer, and utilized by his own livestock. In other cases, the farmer could buy hay and feed to use in the seasons when feed is short.

2. Feedlots

One way of supplementing the limited pasture feed resources of the country is to establish feedlots, as warranted by demand, to conduct intensive cattle feeding under close supervision. A feasibility study for a feedlot proposed as a prototype was completed under the SRI research program.* This feedlot could be located in several possible

* See Report No. 18, Analysis of the Operation of a Commercial Feedlot in Southern Ethiopia.

locations; one location might be in the Rift Valley near feed production and purchased feed sources. Such a location would have easy access to Addis Abeba and other large domestic meat markets, and at the same time would have railroad and road access to the ports for possible export.

Such a feedlot, given appropriate relationships between the price of cattle purchased, the price of feed, and the price of cattle sold might feed up to 29,000 cattle per year on a two-month basis for each head of cattle fed. On this basis, a great deal of additional meat in the form of additional weight per head of cattle fed through the feedlot would be made available to the market--domestic or export. While the feasibility study considers cattle from the southern livestock area as the primary target for such a feeding operation, it is possible that feedlots could be repeated in a limited number of other areas of the country, given appropriate feed and cattle price relationships. The favorability of such relationships would have to be decided on a situation-by-situation basis.

The extension of buying stations into the country, to provide a supply of cattle for the feedlot, is discussed in Program VI.

3. Grain Production

The possiblity of increased grain production for animal feeding should not be overlooked. At the present time, with almost all grain production going to domestic food consumption,* price levels for grains are such that it is usually not feasible to feed grains to livestock except in some of the by-product forms such as mill feed and brewer's grains. However, such conditions could be expected to change in the

* See Report No. 10, Production of Grains and Pulses in Ethiopia.

future. For instance, if programs can be developed that will increase the production of certain grains markedly, it is possible that domestic prices will drop to the point where it may be economically feasible to feed grain to animals in addition to the grass and other products they now consume. This is more likely to be true if grain prices dropped to the point where grain can be exported or used in industrial processing. Also, in time, livestock prices may rise to the point where it will be profitable for farmers and ranchers to feed higher priced products such as grain to livestock to increase their taste and marketability. Although difficult to anticipate, these price relations could change within the next few years if rapid advances in grain yields are achieved.

When presently unused lands are brought into production they could provide a substantial feed resource for livestock output. Many of the humid areas can also be made more productive by farm development programs using machinery. If increased production comes about on dry lands now planted predominantly with barley and sorghum, it will be either through additional irrigation and/or the use of mechanization on large acreages.

A mixture of cash crops and intensive livestock production could create a more stable agricultural economy for some of these highly productive areas. The limiting factors in rapid development of many of these areas are capital and skilled manpower. Both private and government investment need to be mobilized to effectively modernize and expand production from these lands.

C. Fertilizers

Although it is generally true, throughout the world, that increased fertilizer use offers the greatest single opportunity for large immediate improvement in farm production, this has not yet been conclusively demonstrated in Ethiopia. At present, there is little use of fertilizers in Ethiopia. In addition, there should be a sufficient number of additional

fertilizer tests made--under a variety of conditions, crops, and varying fertilizer applications--to show that the application of fertilizer will usually be economically justifiable.

In addition to the use of fertilizers, it seems probable that significant increases in agricultural production will depend on improvement of cultural practices, increased irrigation, and use of improved seed, pesticides, and farm machinery. SRI conducted a fertilizer* study which, among other things, projected fertilizer consumption during the next 15 years and considered how this demand was to be met. It was estimated that Ethiopia's consumption of fertilizer nutrients could increase from the present 3,500 metric tons per year to as much as 16,400 metric tons annually in 5 years, 41,500 metric tons in 10 years, and 86,800 metric tons in 15 years.

Under any circumstances, certain steps must be taken to provide the appropriate background for and incentives to growers if a program for expanding agricultural development through fertilizer use is to proceed effectively. An extensive research program must be undertaken to determine the response of various crops in the different regions of Ethiopia to the addition of fertilizer, and the results must be made known to growers both through demonstration plots and through a strong education service. For growers to be assured that their investment in plant food will be justified, a program of crop price supports combined with an aggressive buying program may be required. An initial program of government subsidization of the purchase of fertilizer by growers is one alternative that has been suggested for consideration. Finally, growers must be assisted in obtaining the credit necessary for fertilizer purchase.

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* Report No. 1, Potential Fertilizer Demand in Ethiopia.

D. Chemicals

Agricultural chemicals for the control of pests--such as weeds, insects, and fungal diseases--can, when used in conjunction with other improved cultural practices, generally increase the yield of crops.* In addition, the control of insects and diseases during storage and shipment of crops through the use of agricultural chemicals, although it does not increase crop production, can increase the ultimate supply by preserving more of the harvested crop.

The estimated total demand for agricultural chemicals, in metric tons, is as follows: after 5 years, 883 tons; after 10 years, 1,758 tons; after 15 years, 3,118 tons. Tonnage requirements are projected in terms of pure chemicals even though they may be applied in dilutions.

A program for increasing utilization of agricultural chemicals by growers has two important elements: (1) to convince growers that the use of chemicals will result in financial gains, and (2) to educate the grower in regard to their potential hazard to life and therefore how to use them safely.

The heaviest use of agricultural chemicals in Ethiopia, both present and potential, will occur where cotton, fruits, and vegetables, including potatoes, are grown. This would include Eritrea, Harer, and Shewa Provinces, the Awash Valley in Welo Province, and the Setit-Humera area in Begemdir Province. A large proportion of the grain, oilseed, and pulse crops are also produced in these same areas; hence, they represent the areas of greatest potential use of pesticides.

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* See Report No. 3, Potential Agricultural Chemicals Demand in Ethiopia.

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There appear to be three general approaches to implementing widespread use of agricultural chemicals. The first of such approaches will require increasing the extension staff of the Ministry of Agriculture, so that demonstration plots can be set up in growing areas among growers on a selective basis to show the benefits of applying the various pesticides. In addition, studies might be carried out showing benefits of fertilizers and pesticides combined. This approach places the full burden of the implementation program on the Ministry of Agriculture and the associated agricultural colleges, or experiment stations.

An important second approach is for the suppliers of agricultural chemicals to take a strong initiative in offering advice and instruction on the use of pesticides as a part of their sales program. This method of stimulating pesticide use has been very successful elsewhere. Actually, the agricultural chemical companies in Ethiopia are developing promotional plans to encourage growers of all sizes to use pesticides. This varies from distribution of small packets of pesticides for use in seed dressing to airplane application of pesticides for control of bollworms on cotton.

The development of such services by the agricultural chemical companies will mean that their salesmen will be out contacting the growers directly to encourage use of the pesticides. This has the further advantage that experiment station personnel can continue to improve methods of application and be relieved of the promotional phases of extension work, which is especially relevant with the current shortage of extension personnel.

A third, and perhaps the best, alternative approach is for the Ministry of Agriculture to carry out the experimental work and to establish demonstration plots but to draw heavily upon the agricultural chemical supply companies for assistance in a joint program. Industry

assistance would consist primarily in furnishing the chemicals needed for the demonstration plots and in arrangements for inspection of the plots on certain days. Following this, the agricultural chemical companies would continue to provide the services, advice, and their own promotional activities directly with farmers.

The application of pesticides requires good timing and can also be hazardous. This suggests another approach. Individual small companies could contract with growers at a specified sum per hectare for the treatment of various crops with proper pesticides. The success of such ventures necessarily depends on the knowledge and capabilities of the operators. This would open up opportunities for many small businesses. This approach removes from the grower or inexperienced individuals the necessity of handling or working with hazardous chemicals.

E. Improved Seed

An unpublished SRI study, summarized in Appendix B, recommends a project that is apparently feasible and that would provide improved field crop seed for farmer use. Improved seed is a key farm input that, at small cost, can often provide the basis for substantial increases in yields of specific field crops--such as has been shown in various countries of the world in connection with improved varieties of hybrid wheat, rice, grain sorghum, maize, and other crops. A seed certification program to guarantee the purity and viability of the seed, and a government program involving production of foundation seed for companies to use as their basic materials, are essential accompaniments to the project.

It is planned that private companies would produce the certified seed, under contract with Ethiopian farmers. The companies would carry the brunt of the sales-demonstration program to convince farmers of the value of using the improved seed, although the aid of the Agricultural

Extension Service would gladly be accepted when available. By the end of five years, 5,000 metric tons of seed would be produced and processed annually; by the end of 10 years, 16,000 tons would be produced. This program would be a vital part of the overall program to provide increased food for Ethiopia domestically as well as to provide more commodities for the commercial market.

F. Improved Farm Management

Better management of farms in Ethiopia would be concerned with such problems as: (1) the introduction of crops not grown extensively before in Ethiopia, (2) improved seedbed preparation, timely planting and cultivation, and proper spacing of plants, (3) better crop rotation and double cropping, (4) better harvesting methods, (5) lower cost per quintal of crop harvested, (6) better product quality, and (7) the practice of irrigation where feasible.

To obtain such improved farm management, a number of steps can be considered: (1) strengthening the Agricultural Extension program, including more test-demonstration activity, (2) initiating short courses for those farmers who are interested in a particular subject and can benefit, (3) considering the establishment of farm price incentives that would affect the market-oriented farmer directly, (4) allowing an increased number of foreign concessions, where improved methods of management would be used and local farmers could learn by demonstration, (5) assuring that the marketing system will provide purchasable farm inputs in the quantity needed, at the time and in the locations desired, and (6) assuring that the marketing system will buy increased farm output at reasonable prices, and will be able to store and transport the increased production without major difficulty.

G. A Five-Year Program

Following is a suggested partial program for expanding farm inputs for the first five years; detailed consideration of a longer period is not felt appropriate at this time. It will be noted that the program is incomplete, since suggestions are based primarily on observations and research undertaken by the SRI team; however, the program takes into account the work undertaken by other teams and agencies. Emphasis here is on getting the inputs ready for use; how they are used will be discussed in a later section.

The introduction of improved farm machinery, and tools for cultivation and harvesting, can be left to the groups now working in this field. Improved farm management training, it is suggested, should be concentrated in the package program areas discussed in Program II.

It must be realized by the reader that the phasing and dates suggested for the various segments of this program are in most cases set down as only one of a set of alternatives. Innumerable permutations are permissible. For instance, if the initiation of a project suggested for the first year does not in fact begin then, either because the government budget item is not available or because a private company is not ready to undertake the project, then it might well begin the second year instead. When changes of this nature are made in project phasing, care must be taken to see that any other projects that would need to precede or operate in parallel with the one changed are also altered so that they will be in operation at the proper time.

In the following listing, (G) identifies an action to be undertaken by the IEG; (P) identifies one that private enterprise will be interested in undertaking; and (B) identifies one that will probably require contributions from both sectors.

First Year

Seed

- The IEG should establish a section of Seed Certification and Testing in the Crop Production and Protection Department of the Ministry of Agriculture. (G)

- A certified seed company should prepare land and plant the first seed with which to begin its operations. (P)

Forage

- The Institute for Agricultural Research, Ministry of Agriculture, should employ the first forage specialist, to begin experimental plot work in the "Warm Foothills/ Moderate" Zone.* (G)

Feedlot

- The feedlot company should begin construction activities. (P)

Fertilizer

- The fertilizer company should construct the fertilizer blending plant at Aseb. (P)

Chemicals

- The Technical Agency should conduct a feasibility study on the establishment of an agricultural chemicals blending plant. (G)

- The IEG should take the initiative in establishing a joint program between the Ministry of Agriculture (Crop Production and Protection Department and Agricultural Extension Service) and companies interested in the sale of agricultural chemicals. The IEG might set up and operate demonstration plots

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* See Appendix A, Report 7, Development of the Ethiopian Livestock Industry, for discussion of this zone and other forage zones mentioned subsequently.

that would include experiments with application techniques; the chemical companies might furnish free raw materials for the demonstrations, and operate an aggressive sales and service program for farmers. (B)

Second Year

Seed

- The Institute for Agricultural Research, Ministry of Agriculture, should initiate a Breeder Seed experimental program, to test new varieties that are to be provided for the Foundation Seed program. (G)

- A National Seed Law should be enacted, covering quality standards for all commercial seed operations. (G)

- The Seed Certification and Testing section, Ministry of Agriculture, should begin field certification of seed produced as certified seed. (G)

- A certified seed company should begin complete operations. (P)

Feedlot

- The feedlot company should begin operation. (P)

Forage

- The Agricultural Extension Service, Ministry of Agriculture, should employ the first forage specialist, to supervise forage extension work in the "Warm Foothills/Moderate" Zone, and cooperate with the forage research worker stationed there. (G)

- The Institute for Agricultural Research should employ one forage specialist to begin experimental work in the "Cool Highland/Temperate/Relatively Frost-Free" Zone. (G)

Fertilizer

- The fertilizer company should construct a fertilizer blending plant at Mitsiwa, and begin operation of the plant at Aseb. (P)

Chemicals

- If the feasibility study conducted by the Technical Agency has shown the plant to be feasible, a chemicals company should construct an agricultural chemicals blending plant at a preferred location suggested by the feasibility study. (P)

Third Year

Seed

- The Institute for Agricultural Research should begin a program to provide Foundation Seed for seed production purposes by the certified seed company. (G)

Forage

- The Agricultural Extension Service should employ one forage specialist to supervise forage extension work in the "Cool Highland/Temperate/Relatively Frost-Free" Zone, and cooperate with the forage research worker stationed there. (G)

- The Institute for Agricultural Research should employ one forage specialist to begin experimental work in the "Highland/High Elevation/Cool" Zone. (G)

Fertilizer

- The fertilizer company should begin operation of its plant located at Mitsiwa. (P)

Chemicals

- The chemical company should begin operation of its agricultural chemicals plant, and expand the joint program for test demonstrations and sales promotion in cooperation with the IEG and private chemical companies. (P)

Feed Mixing

- The Technical Agency should conduct a feasibility study of a feed mixing plant that could produce mixed feeds for livestock and poultry.* (G)

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* See Report No. 7, Development of the Ethiopian Livestock Industry.

Fourth Year

Seed

- The Seed Certification and Testing section, Ministry of Agriculture, should construct a Central Seed Laboratory. (G)

Forage

- The Agricultural Extension Service should employ one forage specialist to supervise forage extension work in the "Highland/ High Elevation/Cool" Zone, and cooperate with the forage research worker stationed there. (G)

Fifth Year

Seed

- The Seed Certification and Testing section should begin operation of its Central Seed Laboratory. (G)

- The Institute for Agricultural Research should construct a processing plant to process the Foundation Seed that it will provide for the use of the certified seed company. (G)

Budget Recapitulation for Five Years

Capital Costs

To give the reader an approximation of the initial investment funds which will be involved in the program during the period in which the Third Five-Year Plan is operating, these costs have been cumulated for the five years and identified as government or private costs.

CAPITAL COSTS FOR FIVE YEAR PROGRAM
(Thousands of Ethiopian Dollars)

Government	Private
Eth$ 230	Eth$ 10,993

Recurrent Costs and Income

At any particular level of operation of the projects, there will be annual costs that are repeated year after year; the same is true of income from project operation. Over the five-year period covered here, the number of projects increases and the magnitude of operation of individual projects expands. The highest level of both recurrent costs and annual income for all projects in the program is present in the fifth year, since previous years do not represent the complete program. As the operating budgets, either planned or actual, for both government departments and private companies are calculated on an annual basis, it was felt that the recurrent costs and income for only one year--the fifth--should be presented here as being the most useful figures.

RECURRENT COSTS AND INCOME--FIFTH YEAR
(Thousands of Ethiopian Dollars)

Government		Private Company	
Costs	Income	Costs	Income
Eth$ 510	Eth$ 160	Eth$ 14,502	Eth$ 17,066

PROGRAM II. AGRICULTURAL "PACKAGE" PRODUCTION

Agricultural development is a complex process and it is difficult to achieve rapid success. There is growing awareness that an area development program combining multiple inputs rather than single-factor inputs is more likely to succeed. Sometimes for success a multidisciplinary approach is necessary. In the SRI Agro-Industrial Sector Study, a number of regions were examined for agricultural development potential;* three were chosen for the application of a systems analysis method--Debre Zeyt/Nazret, Setit-Humera, and the Middle Awash Valley. The results of this technical survey and the projections of possible alternatives and increases in production are available in SRI's report, Systems Analysis Methods for Ethiopian Agriculture, April 1968.

Of the studied areas, Debre Zeyt/Nazret exemplifies traditional Ethiopian highland agriculture, with its attendant problems of small holdings. Increasing agricultural production under these conditions requires careful consideration of existing social and economic patterns. Report No. 14, A Development Program for the Ada District, Based on a Socio-Economic Survey, was aimed at collecting information on subjects relevant to the removal of those institutional policies and infrastructural bottlenecks that retard agricultural development, and at using this information in the design and planning of an area development program.

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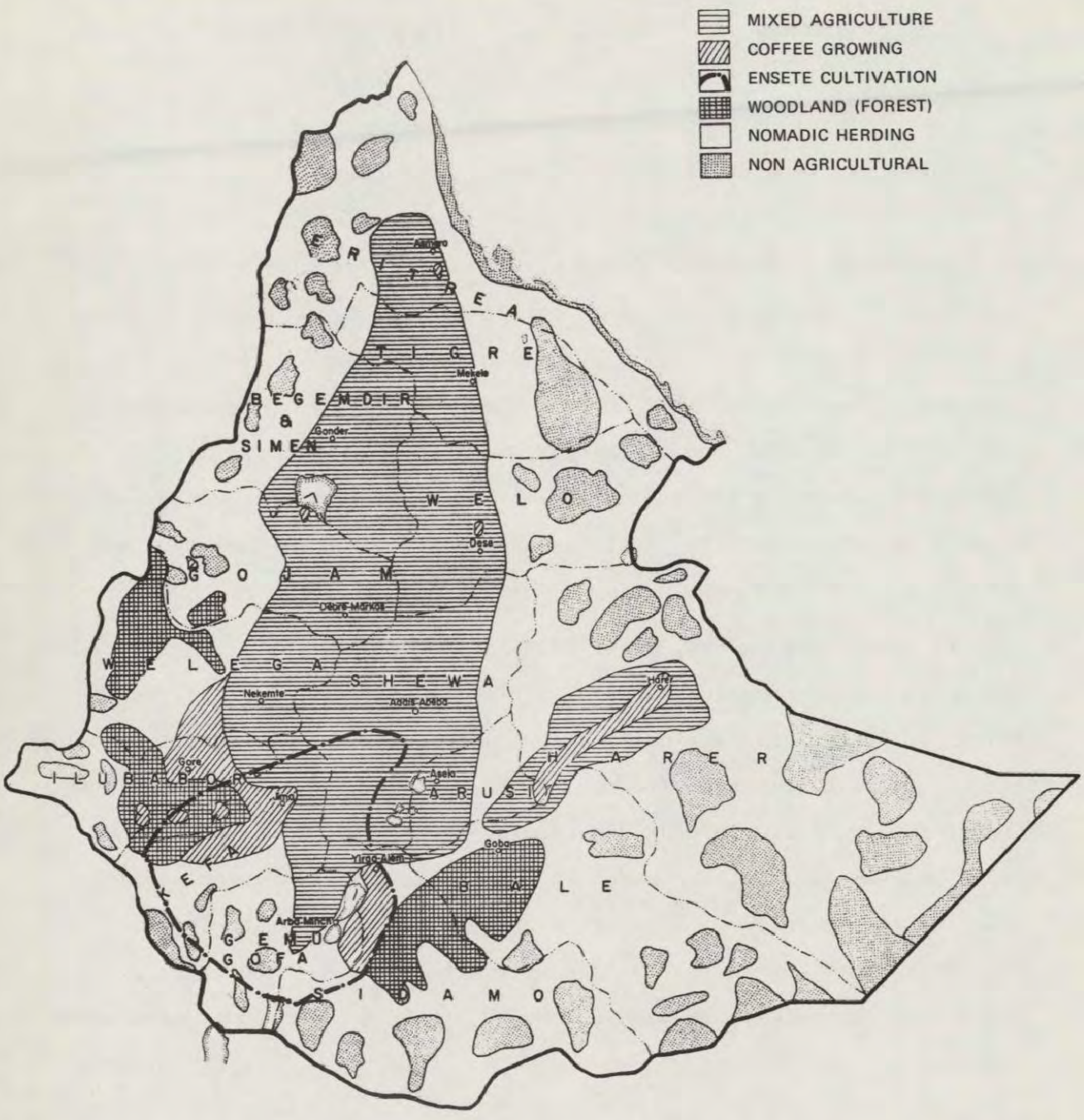
* For the general agricultural areas, see Figure 3.



SOURCE: Eng. G. Turceninoff, Mapping and Geography Institute, May 1967.

FIGURE 3 AGRICULTURAL REGIONS

A. The Ada "Package"

The study was limited to the political subdivision known as the Ada Wereda (referred to as Ada District throughout this report); Ada District is a subdivision of the Yerer and Kereyu Awraja, which is in turn a subdivision of Shewa Province. Ada District covers 1,250 square kilometers (roughly 500 square miles) and has a total population of about 100,000 people, including 20,000 urbanized residents in the town of Debre Zeyt, which is located 45 kilometers from the capital city of Addis Abeba. Ada District is known for its excellent quality grain, especially teff (the favored local grain) and wheat.

The proposed Ada District Development program, aiming at socio-economic improvement of the area, provides for the organization and management of ten multifunctional locality development centers. Emphasis is placed on increasing productivity of wheat and teff; to this end, the five development agents assigned to each development center are responsible for conducting demonstration trials with improved seeds and fertilizers on farmers' fields. The Debre Zeyt headquarters for the program would, in its early stages, sell farm inputs to the farmers, and would also buy grain during harvest season through an arrangement with the Ethiopian Grain Corporation. In this way the development centers could assist farmers in obtaining credit.

The development centers would also carry on the present activities of the community development program in Ada District; emphasis would be placed on organizing local groups to construct and maintain feeder roads and wells. The program's projected budget includes funds for drilling 50 wells in the rural areas during the first five years of the program and for purchasing and maintaining seven bulldozers from a central machinery shop in Debre Zeyt, which would assist the locally organized

groups in road building and maintenance. The proposed all-weather roads to the ten locality centers would be built and maintained by the Imperial Highway Authority.

The proposed Research, Training, and Development Center in Debre Zeyt would have responsibility for training the local agents, as well as providing supplies through a supply center and buying grain through a purchasing center. There would also be a pilot machinery-rental program attached to the motor pool that would make available seven tractors for plowing, seven threshing machines, and seven seed-cleaning machines--all to be operated on a rental basis.

Provision is made in the program budget for headquarters buildings, training facilities, and staff housing. Suggestions are made for staffing the program and adding appropriate functions as it develops. The program's annual operating cost is calculated at Eth$ 1.46 million, and the initial fixed investment is estimated at Eth$ 4.74 million.

Revenues from the project are calculated on the assumption that, over a ten-year period, 80 percent of the farmers in the area could achieve an increase of 150 percent in their crop yields. The ratio of these farmers to the development agents begins at 16 in the first year and increases to 256 in the tenth year.

The increased incomes made possible by the program are estimated to amount to Eth$ 10.6 million by the tenth year, and to continue at this level. The estimated rate of return on investment is 32 percent under these conditions.

B. Recommendations for Ada Development

Summarized below are the main conclusions reached from observations made in the Ada District and from interviews conducted there with various officials, businessmen, and local residents.

- Local organizations and a cooperative spirit exist among the rural residents. Some initial steps in the monetization of the economy have already taken place.

- Most social organizations and activities revolve around religious observances. Some organizations and activities can be used by the District Level Community Development (DLCD) workers for educational purposes. Credit and consumer purchase organizations could be encouraged by linking them to the existing credit clubs called "Ekubs."

- Cooperative work organizations are found among the rural residents, although hired labor is becoming more common. These indigenous work organizations are already being used by the DLCD workers for the encouragement of such new groupings as Farmer's Associations and Village Cooperative Shops. As commercialization progresses, more opportunities to hire labor and machines for plowing and threshing can be introduced.

- A development program will have to appreciate and use all local sources of leadership.

- Education is concentrated in the town of Debre Zeyt, although the rural people also evince great willingness to support schools. However, there is a shortage of teachers; in addition, appropriate vocational training is needed.

- Medical facilities are better in Ada than in most other districts, but are much in need of expansion into the rural areas. Improving the roads, and providing vehicles for the medical center staff to organize traveling clinics will be very helpful.

- Agricultural technology is becoming available in Ada, but few benefits are reaching the small farmers in the rural areas. The extension service, the community development programs, the local government administration, the research station, and commercial farms within the area are all sources of improved technology. However, transmission of better methods from any of these sources has been very limited, and some outside help is needed for improving the situation.

- The excellent work of the experimental station in Debre Zeyt could be expanded with a greater budget and staff. More seed growing and distribution, machinery rentals, fertilizer and insecticide sales are all to be encouraged as soon as possible.

- The initial fertilizer trials of the Freedom from Hunger Campaign have proved successful and the trials should be expanded. In addition, sales outlets for fertilizer and a credit scheme to make it possible for smaller farmers to purchase small quantities are needed. Cooperatives for the distribution of agricultural supplies are proposed; it is realized that the training required for their organizers and officers will take time.

- Landlords could benefit from the increased production that is possible through the use of improved seed, fertilizers, insecticides, and machine plowing and harvesting. As far as possible, landlords should be encouraged to cooperate in these changes. The Tedla Desta system of machinery rental should be encouraged.*

- Livestock numbers have been decreasing and more land is being used for crops. Undersowing of legumes with grains, so that stubble pasture would be improved, must be tried at the experimental station to determine its potential worth. The present animal health program is succeeding and should be expanded.

- In the rural residents' estimation, water for human and animal consumption is the most important problem. Well digging and drilling must be incorporated into any development program.

- Livestock is not shared by the tenants with the landlord; thus, any improvement goes to the tenant alone. Landlords are therefore not interested in improving forage, providing pasture land, or guaranteeing rights of way for livestock. Increased milk production therefore depends to a large extent on replacing donkeys and oxen with truck transport on improved roads and tractor plowing and threshing on a rental basis, so that land is freed for grazing cows.

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* See Report No. 14, A Development Program for the Ada District, p. 74.

- Commercial banking facilities are available in Debre Zeyt but they are not really designed or able to serve the bulk of the small rural agricultural producers. Except for a few large commercial operations, agricultural producers cannot provide the high collateral required by both the Development Bank of Ethiopia (DBE) and the Commercial Bank. Small farmers in need of credit for consumption or production turn to local sources, who may charge as much as 200 percent interest in cash or kind. A program for credit must be created to serve those producers who have a marketable surplus and need production credit for six or seven months.

- The improvement of feeder roads will assist in marketing by reducing the differential in prices between the small markets and Debre Zeyt, which is greater than the differences between Debre Zeyt and Addis Abeba markets. However, price stabilization would not be as effective in raising producers' income as would increased production and reduced marketing costs. Better roads will allow the gradual replacement of donkeys by truck transport.

- Consideration should be given to expanding the local buying station of the Ethiopian Grain Corporation to include direct purchase from producers, storage under loans, transport from small markets, and increasing discrimination against poor quality and uncleaned grain.

- The small consumer cooperatives being organized by the DLCD workers should be encouraged.

C. Other Aspects of Ada Development

Additional aspects of the total district development effort are discussed below. These projects were not included in the budgeted program, because some are considerably less important than the budgeted projects and some are being established by other agencies.

1. Education

Our survey of Ada District shows that there is a demand for education that is not now being met. This trend can be expected to continue.

At present, the Ministry of Education plans to add six junior classrooms and four senior classrooms to the secondary school in Debre Zeyt. The projected total cost of Eth$ 90,000 could come from an International Development Agency loan.

The increase in school enrollment projected would indicate the need for an additional 333 teachers and about the same number of classrooms over the next ten years. Classrooms can be built by the local people but it is difficult for them to obtain teachers. If no other way can be found to train the 33 new teachers needed each year, it is suggested that the training facilities of the proposed Development and Research Center in Debre Zeyt could include one class for rural teacher training. It is quite possible that residents of the district who have had some secondary schooling could be trained as rural primary teachers. Being residents, they would be likely to remain in the area as teachers in the future. This suggestion could be implemented as a pilot project by the Ministry of Education.

2. Human Health

Three of the main projects under the program--the building of secondary and feeder roads, the improvement of water supplies, and the increased income from increased crop productivity--will make a great difference in the level of health in the area. Because there is already a clinic in Debre Zeyt, and because the Malaria Eradication program is already active in the area, no funds are budgeted for health in this development program.

The community development workers would continue to encourage better diets and hygiene. Draft animals not needed because of the new roads and the machinery-rental scheme could be replaced by cows so that milk and other dairy products would become available to more rural families.

The Ministry of Public Health should be encouraged to increase its services; when the new roads are built, traveling clinics can operate out of the existing clinic in Debre Zeyt.

3. Animal Health and Husbandry

The animal health school and laboratory for the production of inoculation vaccines in Debre Zeyt enjoy United Nations support. The school provides free vaccinations on Saturdays for cattle brought in by the local farmers; it has also begun a campaign to make part of Ada into a disease-free zone.

The community development workers and the agricultural extension agents should be encouraged to cooperate in these activities and make them known to the people of the area. There is already a great awareness of the value of dairy products; production will undoubtedly increase as animal health improves, as the quantity of fodder increases through the crop improvement project, and with the reduction in draft animals resulting from better roads and from machinery rentals.

The Experimental Station has had animal programs for some years, and these should be continued; however, the value of the chicken breeding and distribution program will be limited largely to farmers in the immediate vicinity of Debre Zeyt who can produce eggs according to the recommendations of the station and market their eggs through the egg cooperative already in operation. The station should experiment in combining forage crops with grain crops to determine if the production of forage on stubble lands could be improved without large expenditures and without reducing the crop of wheat, teff, or other grain in which the legume or other annual fodder plant might be interplanted.

4. Grain Storage

The combination of the Freedom From Hunger Campaign program for grain storage and the building of the development centers where grains can be marketed will bring this aspect of the development program forward without the need for an extra budget. There is also the possibility of an AID-sponsored grain storage program that might be started in this area. The cooperation of the agents in the locality development centers should be encouraged.

5. Industry

Development of industry within the area will be dependent on agricultural development. Increased income and increased interest in non-farm employment will help to bring industries to the area. Debre Zeyt is already in a good location on the main railroad and, when the new road through the Awash Valley is completed, it will also be on the main truck route to the port of Aseb. Contacts with the Ministry of Commerce and Industry and the Ministry of Planning and Development will help to make it known that Debre Zeyt is interested in industry.

The proposed program could be expanded in the future to include aspects of agro-industrial development. For example, the provision of land and facilities for industrial buildings could be investigated, and perhaps the proposed Development Board could become the agency to develop land for industrial purposes.

One suggested industry for the area is the making of small agricultural tools, such as hoes, forks, hand planters, improved plows, and simple harrows. The Machinery Pool and Road Building Project Director might investigate this possibility, using the experience of the Chilalo Agricultural Development Unit (CADU), the proposals of the report on the Awasa area, and the facilities of Volunteers for International Technical Assistance.

6. Forestry and Conservation

Although the proposed program does not include special funds and personnel for forestry and conservation, it is hoped that the locality development center personnel, operating through the existing Ministry of Agriculture programs, could encourage the distribution of tree seedlings and development of good forestry practices.

There is an opportunity to develop a national forest around the Mt. Yerer area. Once the road program is underway--and particularly when the road to Buti market is improved as planned in the fifth year of the proposed development program--the possibilities of the use of the forest for both tree production and for recreation will be enhanced. It is recommended that this possibility be added to the development program at a later date if initial investigation warrants it.

Local residents in the remote area of Zukala and Liben are concerned about the control of wild animals--especially baboons and wild pigs. These have become increasingly destructive of crops since the area has been cleared of lions and leopards, their natural predators. Government assistance in protection from these destructive animals, which could become part of the forestry and conservation program, would be greatly appreciated in these areas.

7. Tourism

The Ada District is potentially a prime recreation area for residents of the capital city. Already quite a number of Addis Abeba people have established weekend homes in Debre Zeyt, and the popularity of the principal crater lake is evident on Sundays when crowds of people are seen picnicking, swimming, sailing, and water skiing, even though the lake is known to harbor possible infestations of bilharzia organisms.

The warmer climate and the several lakes in the area around Debre Zeyt make the area enticing for weekend activities.

Encouragement should be given to establishing local hotels, developing lakeside properties into public recreational facilities, converting possible hotsprings into pools, and opening up of Mt. Yerer as a camping and picnic center when the road to the Buti market has been completed. Mt. Zukala could also become a popular weekend visiting spot if church cooperation can be gained in popularizing the area for recreation as well as religious purposes. It is hoped that the forthcoming national study of tourism will include this aspect of local development and will be able to recommend further specific tourism projects to be incorporated at a later date, if suitable, into the Ada District Development Program.

8. Social and Political Aspects

The social and political benefits of a program such as that proposed in Report No. 14 are of course difficult to predict and even more difficult to measure. Some comments can, however, be made to show the direction and nature of the possible results.

Increased participation by the local people in such a program will contribute to modernization of the country and to the development of a government administration that is increasingly responsive to the needs of local citizens. As contact with the outside world is increased, and as education is broadened to include more of the rural people, the citizens of Ada District will participate more in their government. The program will contribute to this progressive tendency and will provide an outlet for the initiative of the younger people.

Movement into the cities of Ethiopia from the rural areas is occurring at an increasing rate. Although this tendency cannot be stopped, it is perhaps possible to slow it down by the provision of improved amenities and development activities in the rural areas.

D. Recommendations for Implementation of Ada District

The implementation of the Ada District Development Program will take considerable effort on the part of the Imperial Ethiopian Government to place responsibility for the program in the Central Government, to establish a capable local implementing agency, and to arrange for appropriate funding of the program.

1. Sponsorship

International agencies--particularly the World Bank (IBRD)--might be interested in making loan funds available for Ada development. USAID may also be interested in making loans for such development programs, and may be able to provide some of the technicians needed for the program. The Swedish International Development Agency is already involved in the CADU project and might be interested in spreading the lessons learned from that program to another area. Another possibility is the British technical aid program, with technical service provided through its Ministry of Overseas Development.

2. Organization

A development program of the kind outlined in Report No. 14 is seldom successful unless it has the support of the local people. Even if they are not in a position to support it financially, their moral and verbal support is essential to success.

The incorporation of the community development workers into the locality development structure is one way of helping to bring about local support, since these workers, for the most part, already know the people of their areas, have a history of several years of successful rapport, and have built up some acceptance of developmental organizations and ideas. Care should be taken to keep these local workers as completely informed as possible about the progress of plans for the development program so that they can in turn inform their local program associates about the possibilities and tell them what may be expected of them in the future. Where a community, such as Denkaka, has already organized a Farmers Association, it can be the instrument of communication and it could be the sponsor of the locality development center.

Other localities should be encouraged to organize such sponsorship groups before the program really begins and, wherever possible, the opinions and ideas voiced by these groups should be incorporated into the program. If no Farmers Association exists, it may be possible to organize one for the specific purpose of supporting the proposed locality development center. Arranging for land on which the development center building will be placed, or arranging for the loan of an existing building or piece of land, should be the responsibility of these local organizations so that they will feel that they have contributed the key item to the establishment of the center.

At the same time that interest and support for the locality centers are being encouraged, there should be organized a District Development Council that may be similar to the existing District Development Committee organized through the community development program. It would advise the Board of Directors and should certainly include a wide variety of influential local residents; great care should be taken to ensure that it does not become immediately identified as an organ of the local government, but rather as an autonomous organization with participation

of the local governor, if possible, but with assurance that it cannot be dominated by his office. Identification with the tax collection office--which has a poor reputation throughout the district and has expressed a lack of confidence in local development activities--could render the proposed program impossible to implement.

The program's Development Board of Directors, in association with representatives of the various groups and agencies involved in the work, should have the responsibility for approving the plans for the complete program and for discussing the possible changes in timing or direction that might be necessary to meet changes in local conditions at the time of implementation.

Special efforts should be made to involve the large numbers of resident military personnel in the program.

3. Responsibility

Initial responsibility for finding financial sponsorship and informing the various agencies that might be involved in the program might be taken by the Office of the Prime Minister. An official should be given the complete responsibility for the program until a sponsor has been found and a beginning has been made on organizing a Board of Directors and appointing the Program Director.

The cooperation of the officials of the Ministry of Community Development, the Ministry of Education that administers the Debre Zeyt Experimental Station, and the Ministry of Agriculture will be essential. Perhaps the first task of the designated official would be to bring together responsible officials of these three ministries--and possibly from the Ministry of Interior--to obtain some approval in principle of the proposed coordination of their activities.

When the program is actually implemented, complete authority for the direction of all its personnel must be given to the Program Director. He will also need authority over the expenditure of all funds, and no agreement with a donor agency should be signed until full accord is reached over how the various contributions are to be deposited in a special program account. Here, the Swedish experience in setting up the CADU project could be used to excellent advantage.

4. The Program After Ten Years

After ten years (or perhaps sooner), the program should change its direction in order to best serve not only the Ada community but also Ethiopia. For instance, the Debre Zeyt center could undertake the training of personnel assigned to similar area development programs throughout the country. It is hoped that this program (along with the Chilalo Agricultural Development Unit) would set the general pattern for concentrated package development programs.

The buying and selling of agricultural produce and the sale of agricultural supplies is included in this program to meet present needs. However, when the demand for supplies has increased and the amount of produce for sale has also increased, and when roads are available for bringing the produce out by trucks, then these functions could be taken over by a business-oriented organization, either a private enterprise or a semiautonomous government agency such as the Ethiopian Grain Corporation.

Some of the profitable functions of the Ada Development Authority might be separated from the government-sponsored portion at the end of the ten-year program. The machinery-rental scheme is perhaps the first that might be separated in some way, while the grain purchasing might be taken over by the Ethiopian Grain Corporation. Certain of the local agents within the program could then perhaps become employees of these

new entrants into the area. Over the ten years, it should be possible to organize some local cooperatives into viable groups for both the purchasing of agricultural supplies and the selling of produce. In these cases, the local agents could become employees of the established cooperatives.

Over the ten years, it is also hoped that the community development agents will have introduced enough experience into local, mikitlwereda organizations that the local people will be able to carry on the road- and well-building projects.

E. Package Crop Production Areas

Consideration has been given to suitable areas where package programs involving certain crop combinations might be initiated in the near future. These are shown in Figure 4. The final selection of priority areas will depend upon which crops are deemed desirable to emphasize for economic or other reasons. The reasons for selecting these particular areas and some suggestions regarding the program in each are given below.

1. Area I--Debre Zeyt/Nazret Area

This is one of the major producing areas for wheat, teff, chickpeas, broad beans, and peas. The branch experiment station of the Haile Selassie I College of Agriculture at Debre Zeyt has developed improved varieties of wheat and teff which, when multiplied in adequate quantities, can be utilized in the program. This institution has also served as an extension center and has worked with agricultural extension agents in conducting fertilizer and other demonstrations with farmers on these crops. The area is accessible and is close to the Addis Abeba market. If land ownership does not cause a problem, this area would undoubtedly be one in which rapid progress could be made in increasing yields of

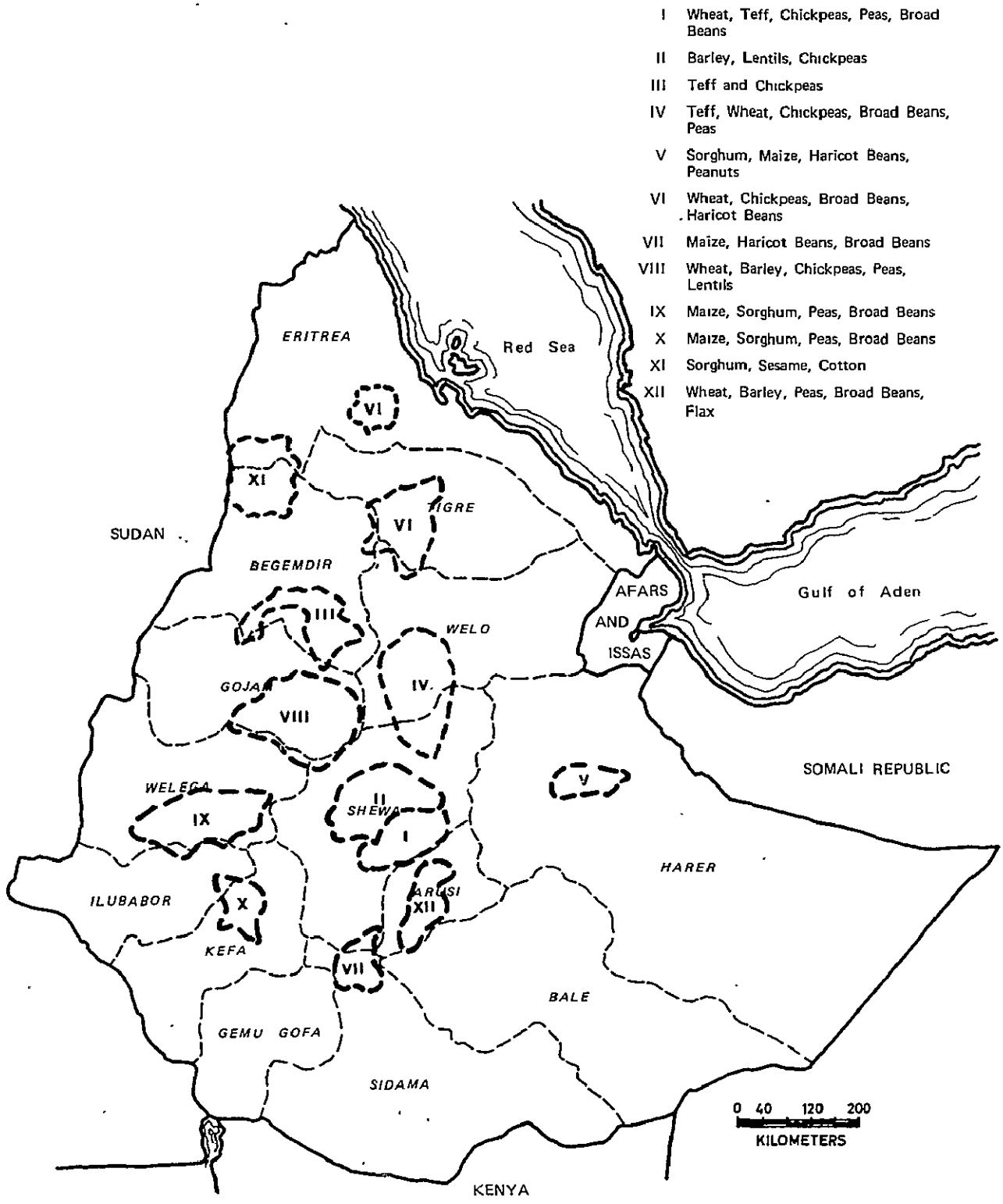

FIGURE 4 POTENTIAL AREAS FOR INCREASING PER HECTARE PRODUCTION OF GRAINS, PULSES, AND OTHER CROPS

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wheat, barley, teff, and pulses. Development of one area near Debre Zeyt (Ada) was discussed above.

2. Area II--Addis Abeba/Debre Berhan-Fiche Area

Barley, chickpeas, and lentils are well adapted here and are produced in large quantities. The Institute of Agricultural Research Central Experiment Station at Holeta can serve as a center of information for the culture of these crops. Agricultural extension activities can be carried on with farmers with easy access from five main all-weather roads radiating from Addis Abeba in all directions.

3. Area III--Lake Tana Area

This is one of the major teff producing areas in Ethiopia. Chickpeas also do well here. Yields can undoubtedly be improved with the introduction of some better local varieties and with improved cultural practices. The area is very accessible. If teff production can be increased here, perhaps some area in the better wheat producing sections could be diverted from teff to wheat production.

4. Area IV--Dese Area

This is a diversified area that raises crops similar to those in the Debre Zeyt area. It has great potential for increasing teff, wheat, and pulses. Sorghum and maize can also be grown in many of the valleys in the area. No variety trials have been conducted here to determine the adaptability of improved varieties of wheat and teff to this area. However, increased yields could undoubtedly be obtained through the use of improved cultural practices and fertilizers.

5. Area V--Harer Area

If it is desired to increase sorghum, maize, haricot beans, and groundnuts, this is recommended as a priority area. It is accessible and has the facilities of the Haile Selassie I College of Agriculture at Alem Maya to spearhead the program.

In the area between Harer and Jijiga, there is a potential for about 40,000 hectares of groundnuts. At five quintals per hectare, this amounts to about 20,000 tons. The climate and soil seem well suited to groundnut production. In addition, there are, at present, three oil mills in the vicinity--two near Harer and one in Dire Dawa. Because of the potential, production of groundnuts should be given stimulus in this area.

The potential increase in yield per hectare for groundnuts seems much greater than for sesame. For example, while the average groundnut yield in Ethiopia is about five quintals per hectare, it is as high as 19 quintals per hectare in Nigeria. It seems that, with good cultural practices and new varieties, the yield in Ethiopia could be at least doubled. If this should prove to be true, the income from groundnuts would be doubled and the cost of production reduced; this would put Ethiopia in a more competitive position in world markets.

In some discussions at Harer with the owner of the most recently completed groundnut oil mill, the question was raised as to how he expected to obtain enough of the crop to keep his plant operating, when the present production was only sufficient to keep the other two mills operating three or four months a year. His reply showed a way to stimulate production of various crops that could be processed. He indicated that groundnut producers would like to farm larger units but that they needed tractors to carry out the cultural practices. A proposed solution was to provide tractor services for a charge that he will collect when

the nuts are harvested and presumably sold to his mill. By this approach the plant would help to increase production and could offer a market for the increased production. He could offer similar services with fertilizers and pesticides.

6. Area VI--Asmera/Northern Tigre Area

This is a major area in northern Ethiopia for wheat and pulse production. Since this part of Ethiopia is a grain-deficient area, it may be desirable to promote increased grain production here, even though the soils are generally poorer and the magnitude of yield increases may not be as great. Improved wheat varieties from Mexico have proved superior in trials in the Asmera area and seed of these varieties could be imported to launch a program immediately. The proposed area is accessible to the consuming center of Asmera.

7. Area VII--Shashemene Area

This area should be considered as high priority if increase in maize production is of concern. Haricot bean production could also be expanded here. This is a diversified crop area and a wide variety of crops other than grains and pulses could be promoted. Production of oilseeds--particularly soybeans, castor beans, sunflower, and sesame--a variety of vegetables, and various tropical and sub-tropical fruits is possible. Of all the areas observed, this one would rank in top priority for an area in which to develop diversified agriculture.

8. Area VIII--Debre Marqos Area

Soil and climatic conditions in this area are very suitable for the production of wheat, barley, and pulses. Variety and fertilizer trials should be initiated as soon as possible in this area so that information

on which to begin a package program will be available. Such information is lacking now.

9. Area IX--Bako-Lekempti-Gimbi Area

10. Area X--Jima-Bedele Area

These areas are both suitable for the production of maize, sorghum, peas, and broad beans. Good yields of these crops are obtained during the first few years after cultivating this land for the first time. However, the soils are rapidly depleted of their native fertility and soil acidity increases, so that soon it becomes necessary to supply phosphate and potassium fertilizers and limestone if good crop yields are to continue. Erosion is also a problem, and soil conservation practices must be employed. These practices, coupled with a land-use program, which will include cropping systems with high percentages of hay crops and/or pasture on the steep slopes, are essential if a permanent system of agriculture is to be maintained here.

Research has not been sufficient to provide the necessary information on how to manage these soils, nor is there trained manpower available to carry out essential educational and action programs. The area is also distant from markets, particularly for export. Nevertheless, research and demonstrations should be accelerated at the two centers of the Institute of Agricultural Research at Bako and Jima, to provide the basis for future programs in these areas. The Jima Agricultural School can also play a leading role in agricultural development in the Jima area.

11. Area XI--Setit-Humera Area

This area will undoubtedly develop in the near future by the expansion of the area cultivated, rather than through any increase in per hectare yields. Until the first flush of settlement has subsided

and farmers take an interest in increasing per hectare yields instead of farming more land, efforts should go forward to establish research and extension facilities in the area.

Production will be expanded on either side of the Setit or Tekeze River. An estimated 46,000 hectares are already under sesame production in the Setit-Humera area. The potential area suitable for sesame production in this region is about 100,000 hectares. Even though most of the sesame grown here is exported, the yields are still fairly low--five quintals per hectare. There is a potential for doubling this, and certainly for increasing it by at least 50 percent. Thus, 100,000 hectares might well produce 70,000 tons of sesame seed.

12. Area XII--Asela-Ticho-Robi-Beqoji Area

This area has perhaps the greatest potential of any part of the country for increasing yields of wheat, barley, peas, broad beans, and lentils. A program has already been initiated here by the Chilalo Agricultural Development Unit, with assistance from the Swedish Government.

13. Possible Areas for Castor Bean Production

Several areas in Ethiopia seem well suited to the commercial production of castor beans, although further, continued testing in these areas must be carried out to determine exactly how well the crop is adapted.

The recent tests in the Awash Valley show possibilities of high yields in that irrigated area. Other irrigated areas that might prove good possibilities are the Desset Valley near Mitsiwa and the Gash Valley in western Eritrea.* Just west of the Ethiopian border in the Gash Valley

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* See Irrigation program for implementation of this suggestion.

is an area of the Sudan where castor beans are already being grown on a commercial scale. It is understood that the Sudanese use flood irrigation during the high water season on the Gash River for producing castor beans of particularly high oil content.

Another possible area for castor production is south of the Tekese River in western Begemdir. Since the rainfall increases toward the south, it is thought that new areas in the vicinity of Metema might be particularly good if the transportation of the harvested seeds could be facilitated through the construction of roads and a bridge over the Tekese River at Humera.

F. Research Designed to Increase Oilseed Production

Each oilseed has its own peculiar requirements for best cultural practices, its own peculiar disease and insect pests, and its own peculiarities of harvest, storage, and shipping requirements. To discuss these separately for the oil crops would simply be to repeat the problems detailed in many bulletins and articles describing the culture of these crops. For this reason, the development of methods of increasing production will be carried through using sesame production as the main example. On occasion, pertinent examples from other crops will be drawn upon to illustrate points.

On the basis of ecological requirements for growth, an attempt has been made to outline the areas where production of selected oilseeds might be expanded. In Figure 5, the shaded areas indicate where the heat-loving oilseed crops such as sesame, castor beans, groundnuts, and cotton might be grown. The narrow strip in the center represents the Awash Valley, where irrigation will be necessary; however, plans are in progress to provide water to irrigate 80,000 to 90,000 hectares. About 8,000 hectares in Eritrea are under irrigation, but the remaining areas are non-irrigated. The striped area in Harer Province represents the

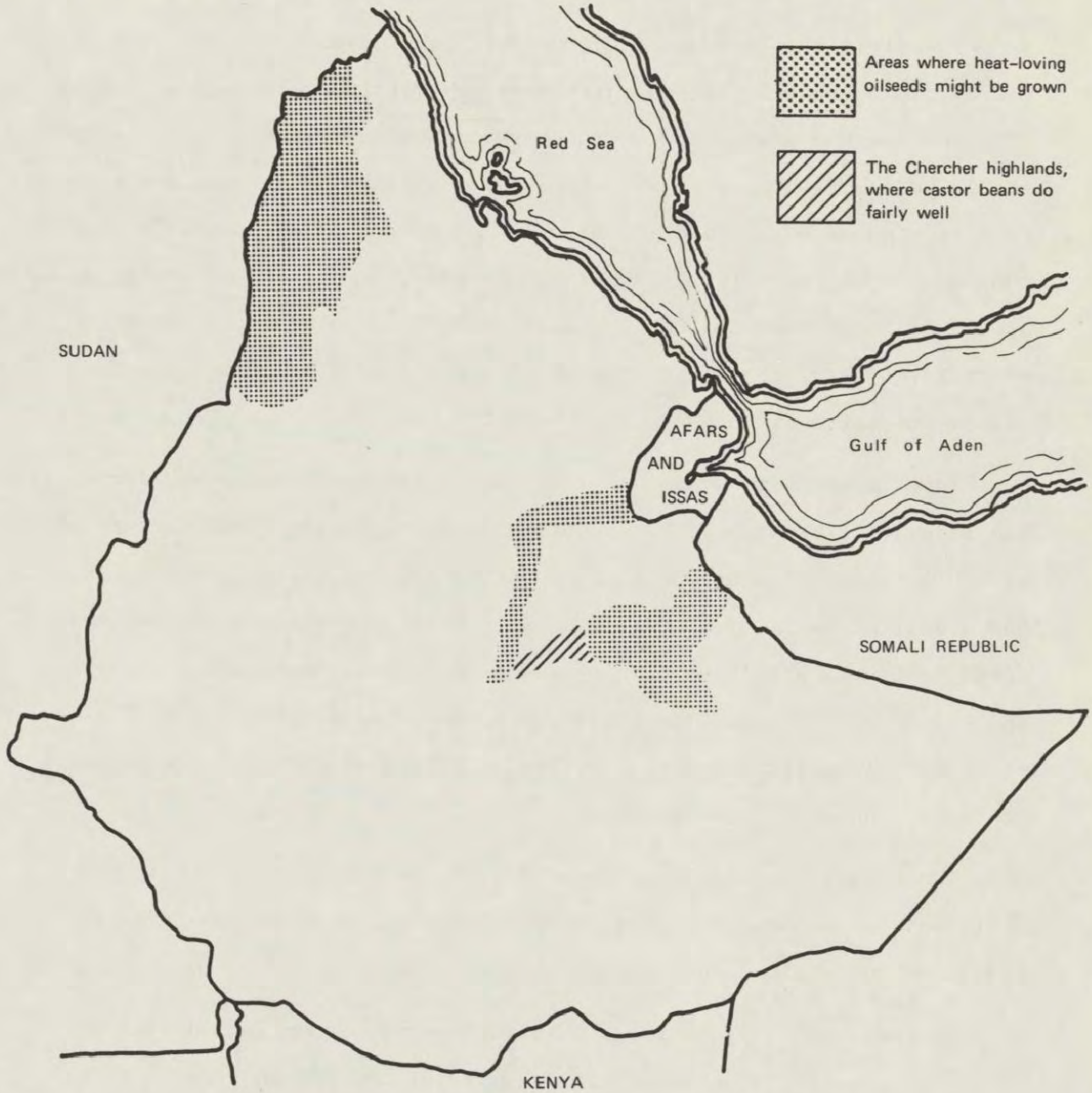

FIGURE 5 AREAS WHERE HEAT-LOVING CROPS MAY BE GROWN

Chercher highlands, where castor beans do fairly well. Thus, under present conditions of irrigation, the areas in which cotton, sesame, groundnuts, and castor beans can be grown seem fairly limited.

The first step in conducting research work designed to improve yields of any crop is the establishment and continued long-range support of an experiment station where the work can be conducted. This station should be located in a climatic area suited to the crops that are to be investigated. Thus, since the majority of sesame is and probably will continue to be grown in the Setit-Humera area, an experiment station should be located in that area. This station can also serve growers of whatever other crops are grown in the area, such as cotton, castor beans, and sorghum.

In establishing such a station, the importance of adequate facilities and adequate staff cannot be stressed too much. Basic staff members should probably include two agronomists, a plant pathologist, an entomologist, and a soil scientist to handle the basic problems of soils, varieties, seeds, cultural practices, insect and plant pests, harvesting, and storage and shipping problems. The individuals should be selected on the basis of technical ability, and also on their ability to convey the importance of their findings to the growers.

The facilities should include adequate arable land of 100 to 200 hectares and the necessary laboratories, including a soil analysis lab and laboratories for handling plant materials.

The problem of financing such a station is of course a difficult one. The simple and perhaps ideal way is for the IEG to finance it in its entirety. If--as a result of research--the yields of sesame were increased by only two quintals per hectare, and 50,000 hectares of sesame are grown at an ex-farm price of Eth$ 30/quintal, an increased income of Eth$ 3 million would result. This would easily pay for the station.

Another method of financing research work is to assess the growers a small amount for each quintal produced, say Eth$ 0.25 or Eth$ 0.50 a quintal, and use these funds to finance the research. There are many combinations of the two methods. The IEG could purchase the land and build the facilities, and the assessed funds could then pay for the research and for operating and maintenance costs. For example, in the United States, cotton growers are assessed US$ 1.00 a bale. This provides a fund of several million dollars that is apportioned out to various organizations to conduct research on cotton growth, production, and fabric improvement of cotton. Such a source of funds has the advantage that it is not reduced at the whim of the government; it has the disadvantage that often, during periods of poor production when the research is needed the most, funds are the lowest.

The above comments are directed primarily toward an experiment station situated near Humera, which would conduct investigations designed to increase yields of sesame, and reduce the production cost per quintal.

The establishment of a groundnut field experiment station near Harer or Jijiga would provide a stimulus for increased production there, especially if, at the very beginning, the staff makes efforts to set up demonstration plots among certain growers to demonstrate the possible effect of improved varieties, good seed, fertilizers, and pest control.

Stimulus for this increased production might come immediately from the staff of the Agricultural College at Alem Maya, which is only some 20 kilometers from Harer. They could, in the next growing season, establish demonstration plots in the Harer-Jijiga area for the use of fertilizers and other cultural practices on groundnuts, similar to the ones they have conducted with growers of vegetables, sorghum, and corn in the Alem Maya/Dire Dawa area.

While these studies are being carried out during the first year, a permanent staff and facilities could be assembled for the establishment of a field station in the Harer-Jijiga area. Because of the nearness of the Agricultural College at Alem Maya, certain laboratory facilities--such as a soil analysis laboratory, and some of the seed testing facilities--need not be constructed. However, a field station should be established with representative land where variety tests, fertilizer trials, and so forth can be conducted right in the growing area.

G. Cattle Package Production Areas

The primary cattle program is the Regional Livestock Agriculture Program (not studied in depth by SRI), carried on with the assistance of USAID, the Livestock and Meat Board, and the Ministry of Agriculture.* The long-term objective of this project is the improvement of commercial livestock production and marketing in the country. This objective will be realized through the widespread adoption of practices proving beneficial on pilot management units during the development period, which began in 1967 and should be completed in 1972.

By 1977 the annual takeoff of cattle for slaughter in the southern region should have increased on the pilot management unit from the present 3 percent (approximately) to an estimated 9 percent. This will result primarily from improvement in water ponds--where the cattle can get adequate water--and improvement in grazing practices through controlled grazing under the direction of the project leaders. It is estimated by USAID experts that many areas in the nomadic cattle grazing region could be increased through similar methods--that is, by utilizing water resources that are available either through wells or ponds and by using

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* See "The Regional Livestock Development Project in Ethiopia," USAID, Addis Abeba, March 1, 1968.

controlled grazing to increase the production of feed for the benefit of the cattle, in addition to other practices such as improved veterinarian services and improved management on the part of the herders.

Under the project approach for the pilot range management units, others will be developed; each half of a pilot unit will encompass an area of approximately 800 square miles or slightly over 2,000 hectares. The completion of the first half of the pilot demonstration area, at Yabelo, is planned currently in 1969, and the second half by 1971. The second area at Adamitulu should also be completed in 1969. The first half of the third area to be established, in the Awash Valley, would be completed by 1970. The first half of the Negele area would probably be completed by 1972 and the second half by 1973.

H. A Five-Year Plan

Recommendations for the five-year period pertain to two sets of packages--one series for areas considered as containing primarily crop farms, and the other for areas containing primarily grassland ranching. The latter have been adapted from the stated USAID program, and are accepted by SRI. The third type of typical agricultural production enterprise, involving both crops and livestock, has not been studied in depth by either SRI or USAID; consequently a package for that type of farm area cannot be presented in this report. It is suggested that such a study should be conducted in the near future.

First Year

Crops

- Initiate the Ada Project (Area I). (G)
- Conduct a feasibility study for the Setit-Humera area (Area XI). (G)

Cattle

- First full year for the Yabelo Project (first half) and for the Adamitulu Project (second half). (G)

Second Year

Crops

- Initiate the Setit-Humera Project. (B)
- Build Experiment Station. (G)
- Conduct a feasibility study for the Shashemene Area (Area VII). (G)

Cattle

- First full year for the Awash Project (first half). (G)

Third Year

Crops

- Initiate the Shashemene Project. (B)
- Build field Experiment Station. (G)
- Conduct a feasibility study for the Harer area (Area V). (G)

Cattle

- First full year for the Yabelo Project (second half). (G)

Fourth Year

Crops

- Initiate the Harer Project. (B)
- Build field Experiment Station. (G)
- Conduct a feasibility study for the Dese area (Area IV). (G)

Cattle

- First full year for the Negele Project (first half). (G)

Fifth Year

Crops

- Initiate the Dese Project. (B)
- Build field Experiment Station. (G)
- Conduct feasibility study for Addis Abeba area (Area II). (G)

Cattle

- First full year for the Negele Project (second half). (G)

Budget Recapitulation for Five Years

The capital costs, according to the anticipated source, for the five-year program are given below.

CAPITAL COSTS FOR FIVE-YEAR PROGRAM
(Thousands of Ethiopian Dollars)

Government	Private
Eth$ 35,171	--

The costs and income for the fifth year, according to beneficiary, are expected to be:

RECURRENT COSTS AND INCOME--FIFTH YEAR
(Thousands of Ethiopian Dollars)

Government		Private	
Costs	Income*	Increased Costs	Increased Income
Eth$ 7896	Eth$ 4231	Eth$ 3988	Eth$ 13,479

* Income is composed of fees for services and income taxes based on increased production.

PROGRAM III. SUPPLEMENTAL IRRIGATION FOR AGRICULTURAL PRODUCTION

Ethiopia offers many opportunities for investing in moderate-sized irrigation works, both in areas not previously farmed and in areas where additional water will raise the output from land already under production.* Advantages of such investments include the following: the size of the investment can be modest at the outset; expansion can occur more or less as a duplication of the initial investment; financial returns can be obtained quickly; and local groups, including private investors, can often carry out the work with a minimum of national government assistance. Investments in this category might include tube wells and hand-dug wells, pumps to convey water directly from a lake or river, diversion canals, spreader ditches, small earth dams, and some drainage.

The importance to the Ethiopian economy of the Desset and Borkenna studies† can be better understood if a schedule is worked out for implementing these projects and some related projects. It is recognized that any such schedule is tentative and unlikely to be followed precisely. Nevertheless, the schedule serves the dual purpose of showing (1) the nature and magnitude of the program, and (2) some of the steps the IEG should follow in initiating that program.

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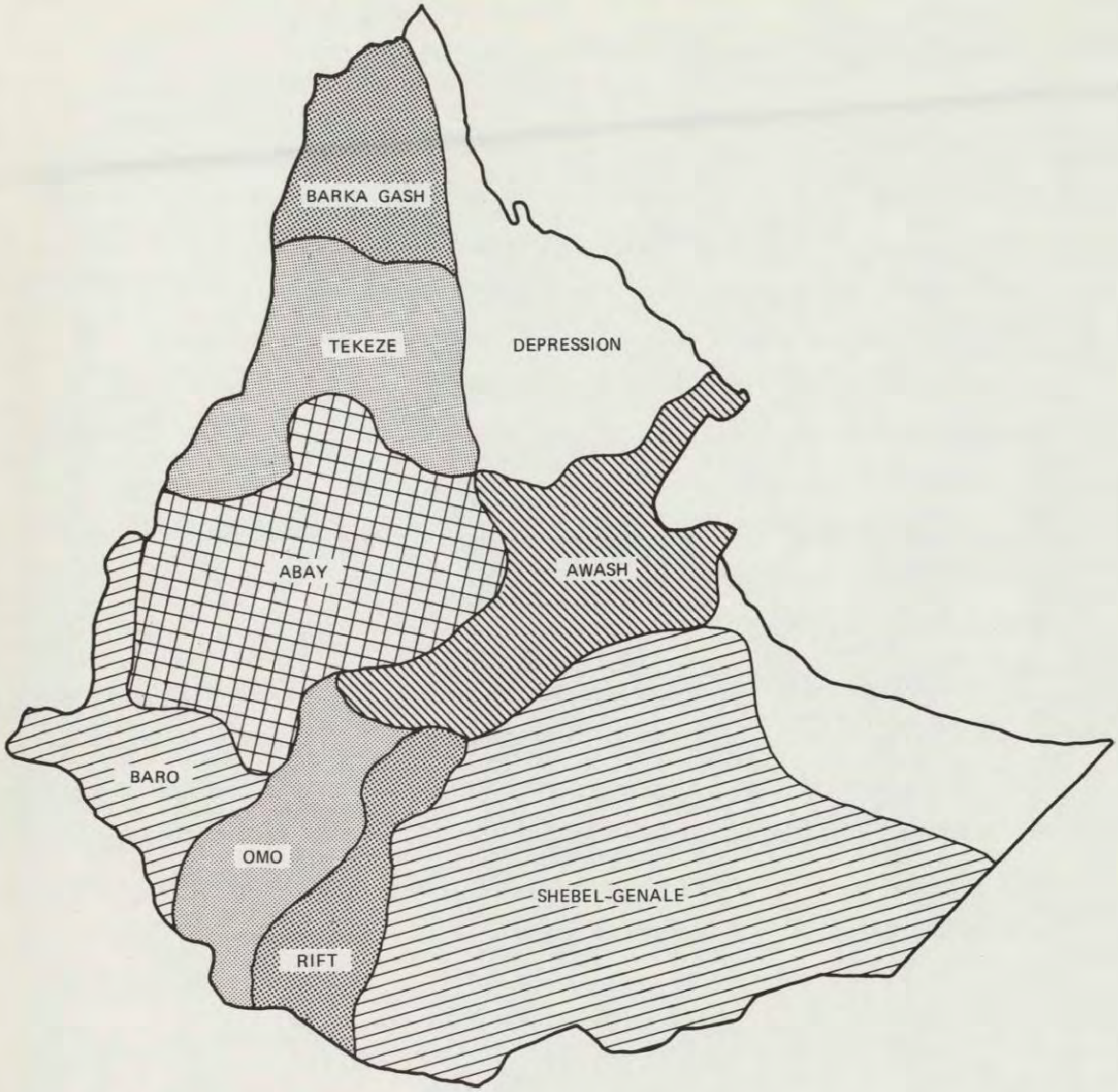
* For outlines of major river basins, see Figure 6. See also the discussion in Appendix D.

† Report No. 15, Supplemental Irrigation Projects on the Desset River, and Report No. 17, A Supplemental Irrigation Project in the Borkenna Valley.



SOURCE: Mapping and Geography Institute, May 1967.

FIGURE 6 RIVER BASIN REGIONS

Table I presents the hectarages and total value of production for a set of six projects that might realistically be undertaken during the period of the third and fourth five-year development plans. Additional projects have not been listed for the rest of the fifteen year period, not because further opportunities do not present themselves, but because a realistic program of action should await results from project experience to be gained during the earlier years.

A. Implementation of Dogali Project*

Steps needed to bring the Dogali project to fruition include investigation of the land ownership pattern, market studies, experimentation with different crops and varieties of crops, study of alternative means of production, government construction and maintenance of roads and provision of an extension agent, and so on. Other aspects of implementation cannot be ascertained until it is known whether the projects are carried out by an agency of the IEG or by private investors: final agreement on land usage rights; selection of specific plots of land for development, together with the sequence for their development; final design of the irrigation system, along with location of buildings and other facilities; and loans and other financial requirements. What remains for consideration is to discuss alternative means for organizing and financing the project and to bring to the attention of the IEG steps it can take, in addition to those already mentioned, to facilitate the development of the project.

* See Report No. 15, Supplemental Irrigation Projects on the Desset River.

Table I

A POSSIBLE SET OF MODERATE-SIZED IRRIGATION PROJECTS FOR ETHIOPIA

Year	Area Under Cultivation (Hectares)							Total Value of Production* (Thousands of Eth$)
	Dogali	Borkenna	Emberemi	Erer-Gota	Gash	Robi-Kombolcha Valleys	Total	
1969	0	0	0	0	0	0	0	0
1970	50	0	0	0	0	0	50	80
1971	150	0	0	0	0	0	150	240
1972	300	400	100	0	0	0	800	960
1973	450	1,125	300	1,000	0	0	2,875	3,300
1974	450	2,250	600	2,000	500	0	5,800	6,480
1975	450	3,700	1,000	4,000	1,000	500	10,650	11,880
1976	450	5,200	1,600	6,000	1,500	1,000	15,750	17,640
1977	450	6,900	2,400	8,000	2,000	1,500	21,250	23,880
1978	450	8,600	3,200	10,000	3,000	2,000	27,250	30,720

* Per hectare values of production for the Dogali and Borkenna projects are taken directly from their feasibility studies. The per hectare value for Dogali is Eth$ 1,600; for Borkenna, it is Eth$ 800. The value for the other projects, except Emberemi, is assumed to be Eth$ 1,200, which is a compromise between the two foregoing figures. Emberemi is assumed to be Eth$ 1,600.

Source: Stanford Research Institute.

1. Organization

The type of organization that might be adopted for the Dogali project could take on a variety of forms. Alternatives brought to light during the course of the study were: (1) an agreement among one or more of those who have the right to farm the land and a private organization that would finance and manage the undertaking; (2) the formation of a share company that would lease or acquire title to the land and manage the project; (3) a contract between a private firm and the local farmers, with the latter continuing to farm their own land, but employing improved farming methods; and (4) a government-supported irrigation district made up of local farmers.

The first two alternatives should be the easiest to initiate, since management would have the most direct control over operations. Two private organizations that might have an interest in the project are the H. V. Stranger-Ford Company in Asmera, which now has a farming interest in the Dogali area, and the Ethiopian Farm Development Share Company, which has experience in initiating and managing farm development schemes. Should the farmers wish to form an irrigation district cooperative, assistance could be requested from the Ministry of National Community Development and Social Affairs. The Governor of Mitsiwa, within whose jurisdiction this area lies, has also offered his help.

2. Financing

In addition to whatever private capital might be available for financing these operations, three other sources of funds are worth mentioning. First, discussions with the manager of the Ethiopian Investment Corporation revealed that a portion, at least, of the equipment could be financed by his organization, provided the buyer is willing to purchase items from the United States. Terms of the loan are 7 percent interest,

with ten or more years to repay. Second, a member of the Department of Agriculture in Eritrea has offered the suggestion that the IEG acquire the principal items of equipment and regulate their use. This suggestion, however, was contingent upon an arrangement whereby the local farmers would be the ones primarily responsible for production. Third, the Food for Work program, sponsored by USAID, might be able to supply grains should the production remain largely with the farmers. Such assistance might help defray the costs of preparing the land and constructing wells, bunds, and diversion dams; it could not be used to purchase equipment.

3. Additional Government Involvement

As the Dogali and other areas develop along the Desset, the Government will ultimately be called upon to take part in regulating the use of water from this source. This could involve legislation governing water rights, the establishment of an irrigation district, or other means of control. Part of the Government's activities will be to collect, directly or indirectly, additional information on the amount and quality of the water supply and the extent of present and anticipated use.

Potential health problems should also be investigated. Malaria and bilharzia are two of several possibilities. Measures to combat and treat malaria could probably be handled as part of the activities of those currently looking after these matters in the Mitsiwa area. The threat of bilharzia might be investigated by the Pathobiology Institute of the Haile Selassie I University.

The need and desirability of providing additional community facilities, such as police and local government, might best be determined after the project gets under way.

B. Implementation of Emberemi Project*

It is recommended that three test wells be drilled in an area near Emberemi. The Department of Development in Eritrea is reported to have personnel and equipment capable of drilling these test wells, and the possibility of having the Department do this work should be followed up. After drilling, one or both of the end wells should be test pumped in carefully controlled programs to provide the data for an aquifer analysis.

Drilling, test pumping; and analysis of the data should be done under the supervision of a qualified groundwater expert. The cost of this work will probably not exceed Eth$ 30,000, which is a small investment considering the gains to be received if the project proves feasible. If properly done, these tests and analyses will provide answers to four important questions:

- Will the wells produce adequate flows for irrigation purposes?
- Will the aquifer sustain the necessary yields through the periods between occurrence of recharge?
- What should be the spacing between wells in order to avoid significant interference?
- What should be the type of construction for the completed wells?

If the well and aquifer studies prove to be favorable, two of the wells might be developed for irrigation use, and the other might be developed for domestic use by the villagers. (This development should not be considered as proposed herein if irrigation wells prove to be infeasible.)

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* See Report No. 15, Supplemental Irrigation Projects on the Desset River.

1. Pilot Farm

If irrigation from wells is found to be feasible, it is proposed that a pilot farm be established near Emberemi to demonstrate the new techniques and prove the economic advantages of more intensive farming. This demonstration farm should be about 50 hectares, and it should be equipped with enough machinery to allow production of two or more crops per year.

The farm should be developed and operated under competent management of a private company, or organized as a cooperative with the help of an experienced technician. It could serve as a test and demonstration farm, and could be used to train the farmers of the village in improved methods of growing cotton, maize, chilies, and other crops.

Variety test and fertilizer trials could be conducted to determine the best varieties and kinds and amounts of fertilizers to use in the area. Preliminary estimates indicate that the profitability of this area would not be unlike that of the Dogali project. Thus, revenues from the project should amply cover its costs.

Should the water supplies prove adequate, the farming methods and cropping systems demonstrated on the pilot farm could be applied to a much larger area. The soils in the 1,700 hectares now being farmed are certainly suitable, and it may be possible to develop substantially more.

2. Training and Advisory Services

Since the farmers of the area are inexperienced in the suggested methods of production, it is essential that the IEG provide the full-time services of an agricultural extension agent for the initial five years of development. The agent's duties and responsibilities will be similar to those required for the Dogali project, but on a larger scale. He will work closely with the farm manager of the pilot farm in developing technical recommendations for the production of the various crops. He will

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also work with the organization that markets the crops, so that planting, harvesting, and marketing schedules will be properly coordinated.

3. Monitoring Groundwater

Beginning with the initiation of the pilot farm operation and expanding as new operations are started, the water levels in all wells should be monitored in order to continually reassess the adequacy of storage capacity in the aquifers and of the recharge to the aquifers. At the same time, records of river flows should be made near Emberemi, downstream of Emberemi near the coast, and upstream above the proposed Dogali project in order to assess the losses of water and to evaluate the possible need for additional conservation measures to ensure an adequate water supply for full development around Emberemi.

4. Storage Reservoirs

Should the above monitoring program reveal that the amount of underground water is insufficient to irrigate all of the suitable land, additional water could be made available to the area by constructing one or more reservoirs upstream. These collection basins would be filled by the annual floods and the stored water would be allowed to percolate into the underground aquifers during the dry season. Specific sites for these dams have not been identified, but several locations above Dogali appear to be suitable for this purpose. Care should be taken not to expand the Emberemi project beyond the limits of available water; also, of course, the reservoirs should not be constructed unless the increased net value of farm output sufficiently covers the added costs involved.

C. Implementation of Borkenna Project*

1. Project Planning and Financing

The Borkenna River is a tributary to the Awash River, and development and water utilization within its watershed is the responsibility of the Awash Valley Authority (AVA). The additional studies needed for evaluation and planning of the Borkenna Valley project can best be done by the AVA. The AVA can also assist in establishing public districts that may be needed and setting up the government offices and functions required by the community.

The AVA, with the approval of the Imperial Ethiopian Government, might assist in financing a project. For instance, the public works facility for the proposed project was estimated to cost nearly Eth$ 10 million. It is possible that these works could be financed with 40 percent from the IEG and 60 percent from a foreign loan. If so, the AVA would administer the loan and would be responsible for design and construction of the works.

The AVA also can, under proper conditions, provide some financial assistance to small farm operations for seasonal production purposes. This financing would provide for seed, plowing, planting, spraying, pumping, and other production costs.

2. Water Rights

The AVA and other government agencies are working toward adoption of laws necessary for regulation of water uses, granting and protection of water rights, and other measures to assure orderly development and proper utilization of water resources. Any project developed in Borkenna

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* See Report No. 17, A Supplemental Project in the Borkenna Valley.

Valley would require proper protection of the water supplies. The AVA could best assure this protection until the legislation is in effect, and in a manner conforming to the IEG resources policies.

3. Project Area Landowners

The area of the proposed project is now divided into nine different ownerships, most of which are a portion of larger holdings. Several of the landowners have expressed interest in development of the swamp and improving productivity and living conditions in the area. These property owners would represent a significant capability for financing, particularly if they would be willing to form a common corporation for a coordinated project. The individuals involved also have had varying amounts of management experience.

The proposed project might be financed through some combination of a private corporation for farm development and government financing of the public works facilities.

4. Loan Sources in Ethiopia

Inquiries at the time of this study disclosed no good source of long-term loans for agricultural enterprises. However, there are two institutions within Ethiopia that might provide some assistance in financing--the Ethiopian Investment Corporation and the Development Bank of Ethiopia.

The Ethiopian Investment Corporation could provide some short or medium term loans, suitable for seasonal production credit needs or possibly equipment purchases. This organization might also invest in shares of a project development corporation if the final analysis of project feasibility is favorable. The Development Bank of Ethiopia has little capability at present for financing of the type that would be needed at Borkenna

Valley. It is possible that this organization could get financing for this type of operation in the future through the World Bank or other international sources.

5. Possible Foreign Investment

One possibility for development of the Borkenna Valley is to grant a concession or long term lease to a foreign corporation or company.

There are investment groups in the United States, for instance, that have experienced agricultural management personnel and are looking for foreign investment opportunities. Ethiopia is already considered as one of the favorable areas for such investment.

It might be possible to develop the Borkenna project by providing a long term lease or concession that would allow for recovery of the investment plus a reasonable profit. At the end of such a contract, the project would be a going operation, and there would be a substantial cadre of experienced Ethiopian personnel to take over the management and operation.

This arrangement would relieve the early strain on investment funds and on foreign exchange that would result from local financing.

6. Other Considerations

The best means of implementing a project in Borkenna Valley should not be determined until additional studies have been completed, a revised design can be developed, and a new economic analysis made. If the project is finally determined to be a favorable one, as now appears to be possible, there will be several methods available for implementation.

A reexamination of the design flow is strongly recommended before any final plans for flood control and outlet works are undertaken. It is possible that the levees could be lowered, the area in floodways could

be reduced, the outlet channel capacity could be reduced, or that some reduction could be realized in all three.

The upstream reaches of the Borkenna River should be explored for a possible dam and reservoir site. If feasible, this storage might reduce the peak flood flows and therefore reduce the costs for levees and outlet channel, and at the same time provide carryover water for enhancement of river flows during the dry season.

This revision might be economically justified, even though the project costs might not be reduced, because of the increase in irrigated area and in project revenues.

The proposed initial project is based on using only the available streamflow for irrigation, and the economic feasibility has been analyzed on this basis. There is a possibility, however, that groundwater supplies will be adequate for the entire project area, and that irrigation from wells would be more economical and convenient than diversion of stream flows.

It is recommended that an investigation of the groundwater potential be made before implementation of the project. Such an investigation could show that it will be feasible to irrigate the entire project area, using a combination of streamflow and groundwater, or it could show that it will be more economical to plan the irrigation entirely from groundwater.

7. Crop Suitability

If an irrigation project in Borkenna Valley is to be seriously considered, some additional information on crop suitabilities and possible productions could be acquired before actual execution. This might be especially desirable in the case of rice, which appears to be one of the most profitable of the potential crops. The project revenues might be

increased very significantly if rice could be grown during the summer rains and harvested during the autumn.

D. A Ten-Year Schedule for Implementation

The Dogali project is clearly an attractive possibility for investment. The rate of return is good, and--with a modified cropping pattern--it could be excellent; in addition, the project would seem to have few problems of implementation. If action is taken quickly on this project, production on 50 hectares could begin during 1969. In fact, plans have already been made by one private entrepreneur for expanding production in the area.

The Borkenna project is less attractive because of its lower expected rate of return and the large initial investment. It is included as a project for implementation because there are several possibilities for improving its profitability. More than a full year is allowed for further study of the area. Then after another year (for the initial construction) the first year of production would occur in 1972. As with the Dogali project, the rate of development is that given in its feasibility study.

By 1978 the total value of production--measured in farm-gate prices--from the six recommended projects would amount to nearly Eth$ 30 million. The relevance of this increase in output can be seen from Table II, which compares the increases in the values of output from these projects with increases from what is classified in the Third Five-Year Plan as commercial agriculture. The contribution made by these projects in fulfilling the planned increases is not significant until the last year of the Third Five-Year Plan. However, during the next five years the contribution averages more than one-sixth of the requirements, with indications that the amount would continue to rise during the last five years of the fifteen-year Plan of Action period.

Table II

COMPARISON OF THE SET OF SIX IRRIGATION PROJECTS
WITH THE PLANNED INCREASE IN COMMERCIAL AGRICULTURE

(1) Year	(2) Annual Increase in Value of Production from the Set of Projects (Thousands of Eth$)	(3) Annual Increase in Value of Planned Production from Commercial Agriculture* (Thousands of Eth$)	(4) Column (2) as a Percent of Column (3)
1969	0	7,400	0%
1970	80	19,000	<1
1971	160	20,500	1
1972	720	22,600	3
1973	2,340	24,100	10
1974	3,180	25,400	13
1975	5,400	28,000	19
1976	5,760	30,000	19
1977	6,240	32,000	20
1978	6,840	34,000	20

* Based on figures from the Third Five-Year Plan for the first five years and a continuation of that trend for the next five years.

Source: Stanford Research Institute.

1. Net Foreign Exchange Earnings

Net earnings of foreign exchange from the set of proposed projects depends on the crops to be grown in these areas. All of the sites are well situated, both for transporting commodities to the ports for exports or to the major cities for processing and manufacture or final consumption. Obviously, commodities used domestically will earn foreign exchange if they displace imported items. An estimate of the net foreign exchange earnings for the set of projects was derived from calculations made for the Desset and Borkenna feasibility studies. Using an average of US$ 70 per hectare per year, net foreign exchange earnings for the set of projects would amount to US$ 0.2 million in 1973 and US$ 1.9 million in 1978--not an impressive figure when compared with a possible balance of trade gap by 1973 of US$ 85 million.* But these estimates understate the potential of the projects. Being situated close to both ports, the international air terminals, and the major cities, these areas can be used to grow many of the different types of agricultural commodities that will make up the IEG's future programs for export promotion and import substitution.

2. Other Strategy Considerations

The contribution made by these projects in providing additional food for domestic consumption and raw materials for domestic industries will, of course, depend upon which crops are to be grown. For example, the Dogali, Emberemi, Erer-Gota, and Gash areas all seem to be well suited for producing cotton. By 1970, total hectarage in these four areas is projected to be over 16,000, which, along with expansions elsewhere, should be ample to meet the textile industry's future needs for cotton lint. Or, if one

* Estimated in the Third-Five Year Plan.

out of the possible two or more crops per year for all six projects were devoted to grains such as sorghum and teff, 100,000 tons could be produced by 1978. Furthermore, oilseeds for domestic mills could be supplied, as well as chilies for the spice extraction plants. Thus, since the areas are well suited for a variety of crops, the producers will have a wide selection from which to choose.

Profits from the development of the areas could be put back into the farms as a means of financing their expansion. The opportunity to expand the scale of operations by bringing in additional land can be an important stimulus to the re-investment of earnings.

3. Employment

Farm labor requirements on the six projects could be substantial. At an average of 1-1/4 hectares per farm worker, about 2,300 would be employed by 1973 and nearly 22,000 by 1978. The importance of these magnitudes becomes apparent when it is realized that the sugar estates have been hiring less than 10,000 agricultural workers and that the additional unskilled labor force required to fulfill the manufacturing targets in the Third Five-Year Plan amounts to 24,800. The extent to which these workers are hired or self-employed will depend upon the organizational form of the six projects. In any case, those who are rightfully concerned about the social and political objectives of finding employment for the growing labor force should be particularly satisfied with this aspect of these irrigation projects.

4. Suggestions for Government Action

Success of this program will depend in large part on the steps taken by the IEG, although some private investors may develop portions of the land on their own initiative. Exploration of the country's resources--

in this case soils and water supply--is widely accepted as an effective area for government action.

To implement the program, the IEG should consider forming a committee composed of members from the Ministry of Agriculture, the Ministry of Land Reform and Administration, the Department of Water Resources, the Awash Valley Authority, the Technical Agency, and perhaps other organizations. The purpose of this committee would be to set policy guidelines whereby a working research group would be formed to conduct the investigations necessary for bringing the projects to fruition. The research group might consist of no more than three permanent members--an agronomist, a water resources engineer, and an economist. The leader of the group should be the economist, who would call on the assistance of other specialists as needed. The research group and its consultants should have capabilities in geology, water resources engineering, soils, agronomy, agricultural economics, land tenure and social problems, and project evaluation.

The tasks of the research group would include the following:

1. Conduct a careful reconnaissance of the six project areas and any additional areas that are of particular merit

2. Arrange for the necessary tests to determine the suitability of the soils for irrigation, the quality and quantity of water, and other needed information

3. Suggest the types of crops suitable for each area

4. Conduct a feasibility study of each area

5. Take the necessary steps to implement those projects considered desirable.

To the extent that they are available, use should be made of (1) the facilities of the Department of Water Resources for well drilling and testing, (2) the facilities of the Institute of Agricultural Research and the Haile

Selassie I University's College of Agriculture at Alem Maya and its experiment station at Debre Zeyt for soil and water quality testing and for crop selection, (3) the Department of Agriculture in Eritrea for studies and assistance in that province, and (4) the Technical Agency for guidance in project selection, evaluation, and promotion. Should the Department of Water Resources not be able to fit the drilling program into its near-term schedules, the work could be done by one or more of the private water drilling companies that are based in Ethiopia. Soil and water quality tests could always be done abroad if local laboratories cannot handle this work.

The costs of conducting these studies is not large considering the benefits to be obtained and the costs of alternative studies. They could probably be carried out over a six or seven year investigation period at an average annual cost of no more than Eth$ 250,000. The principal cost item would be the drilling and pumping tests. Preliminary estimates for this work have varied widely, with costs per site ranging from Eth$ 25,000 to Eth$ 150,000, depending on the number of wells to be drilled, their depths, and locations. Total staffing might cost the IEG Eth$ 50,000 to Eth$ 75,000 per year, according to the amount of participation by foreign-financed expatriate staff. Soils and water quality testing, per diem, travel expenses, and miscellaneous costs would probably amount to less than Eth$ 25,000 annually.

E. A Five-Year Plan

As with the other programs, recommendations are made for only five years, because of the many uncertainties involved in projections extending over a longer period. Each irrigation project may be considered as "a package program, with water"--in other words, the same concentration of inputs would be used as with any package program planned for dryland farming.

First Year

Dogali

- Clear and prepare first 50 hectares for irrigated farming. (P)

Borkenna

- Test well drilling and continued feasibility studies. (G)

Second Year

Dogali

- Clear and prepare next 100 hectares. (P)
- Ministry of Agriculture to supply one Agricultural Extension agent for the project. (G)

Borkenna

- Start preliminary construction (assuming feasibility studies have indicated good results). (G)

Emberemi

- Test well drilling and feasibility studies. (G)

Third Year

Dogali

- Clear and prepare next 150 hectares. (P)

Borkenna

- Continue preliminary construction. (G)
- Clear and prepare 400 hectares for irrigated farming. (P)

Emberemi

- Clear and prepare 100 hectares for irrigated farming. (P)

Erer-Gota

- Test well drilling and feasibility studies. (G)

Fourth Year

Dogali

- Clear and prepare next 150 hectares. (P)

Borkenna

- Clear and prepare 725 hectares. (P)
- Ministry of Agriculture to supply one Agricultural Extension agent for the project. (G)

Emberemi

- Clear and prepare 200 hectares for irrigated farming. (P)

Erer-Gota

- Clear and prepare 1000 hectares for irrigated farming. (P)

Gash Valley

- Test well drilling and feasibility studies. (G)

Fifth Year

Borkenna

- Clear and prepare 1125 hectares. (P)

Emberemi

- Clear and prepare 300 hectares. (P)

Erer-Gota

- Clear and prepare 1000 hectares. (P)
- Ministry of Agriculture to supply one Agricultural Extension agent for the project. (G)

Gash Valley

- Clear and prepare 500 hectares for irrigated farming. (P)

Robi-Kombolcha Area

- Test well drilling and feasibility studies in a selected valley. (G)

Supplemental Irrigation Program for Five Years

In addition to the items mentioned in the year-by-year plan above, other infrastructure needs will be a continuing expense. These include road construction and maintenance, investigation of land ownership, and consideration of methods of taking joint action; in addition, stream and underground water data must be collected, and health hazards must be evaluated. If serious health hazards exist, corrective programs must be undertaken. Eth$ 50,000 is allocated for each project for the above purposes. A large proportion of government investment in irrigation facilities should be recovered through user fees.

The capital costs, according to anticipated source, for the five-year period are:

CAPITAL COSTS FOR FIVE-YEAR PROGRAM
(Thousands of Ethiopian Dollars)

Government	Private
Eth$ 13,683	Eth$ 5815

The costs and income for the fifth year, according to beneficiary, are expected to be:

RECURRENT COSTS AND INCOME--FIFTH YEAR
(Thousands of Ethiopian Dollars)

Government		Private	
Costs	Income	Costs	Income
Eth$ 350	Eth$ 100	Eth$ 2683	Eth$ 3052

PROGRAM IV. AGRICULTURAL CREDIT

Private and public investment from internal sources and private foreign investment are needed to develop new agricultural land in Ethiopia, to increase the productivity of land presently being farmed, and to finance agro-industrial enterprises. These needs must be met by a variety of credit programs, some of which are briefly outlined in this section.*

Certain institutional factors have retarded the provision of adequate rural credit for agricultural development: small and fragmented landholdings that may not justify bank loans; the landlord-tenant relationship, in which the tenant is a poor credit risk because he is subject to the will of the landlord and unable to provide security to receive a bank loan; the communal ownership of land in some areas, which limits land tenure and restricts the use of land as collateral; and the lack of clear title to farm land, which prevents the issuance of a mortgage.

A. Farmer Classification for Loan Purposes

For reasons that will be apparent when the mechanism of loan-making is discussed, Ethiopian farmers have been classified into four groups.† Class I (subsistence) farmers, composing 87% of the agricultural population, usually have credit needs during a season of less than Eth$ 50;‡ most of these loans are for consumption rather than farm production purposes. On the other hand, Class IV farmers (educated, with large tracts

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* For a detailed description of the recommended program, see Report No. 9, An Agricultural Credit Program for Ethiopia.

† See Report No. 9, An Agricultural Credit Program for Ethiopia.

‡ Only 10% of this class reported loans of more than Eth$ 51.

of land) have no need of small loans--they are eligible to receive loans from development banks or international financial institutions, or undertake joint investments with private local or foreign capital.

Class II and Class III farmers (who cultivate at least two hectares of arable land, but may now be operating at subsistence level), who would be able to make use of small loans for production purposes and repay them, are of prime interest in any small loans program being considered. They represent some 500,000 farm families in Ethiopia. Incentives for these farmers to participate in a small loans program could include: (1) the desire for an improvement in their standard of living, and (2) the need for technical assistance from agricultural specialists, which the program would bring.

B. Proposed Credit Program

The proposed reorganization of the Development Bank of Ethiopia (DBE) and the Ethiopian Investment Corporation (EIC), in which the DBE would become an agricultural development bank and the EIC an industrial development corporation, is of major importance to the economy of the country and would strengthen Ethiopia's banking structure. Each bank would become more efficient in its own specialized field.

This reorganization plan considers that the DBE should direct the use of its resources to finance only what may be termed development projects in the agricultural sector. It should not make either small agricultural loans, which are short term and rather seasonal in nature, or industrial loans. It is suggested that the minimum loan of a reorganized DBE should be Eth$ 6,000.

The DBE's authorized capital is Eth$ 13 million, but Eth$ 2 million of preferred shares have never been issued. In addition to the paid-in capital, the DBE received an additional loan from the IBRD equivalent to

Eth$ 5 million and an AID loan of Eth$ 5 million. Up until 1967, the total of Eth$ 21 million in paid-in capital and loans has constituted the Bank's working capital. In 1967, the DBE received a suppliers credit equivalent to Eth$ 6.25 million from a West German bank, subject to certain lending restrictions.

The Third Five-Year Development Plan considers that Eth$ 12 million may be channeled through the DBE, and that Eth$ 30 million will be needed by the multi-purpose agricultural cooperatives. However, there is a question whether the cooperatives will be organized soon enough to justify the suggested amount, or that they could use that amount of money effectively. It does appear that without a detailed study of the Bank's loans and equity holdings, an amount in excess of Eth$ 30 million will be required to permit the Bank to fulfill its expected role as an agricultural development institution.

There is no particular model to follow in structuring a development bank, and many variations are to be found in developing countries; often adjustments have to be made to fit the local environment, but their basic objectives of implementing development programs remain the same.

It can be expected that the DBE would continue to make private medium and long term agricultural loans and equity investments in agricultural and agro-industrial complexes. The Bank must also be prepared to accommodate the financial requirements proposed in the Third Five-Year Development Plan for financing agricultural cooperatives. Since the DBE currently lacks adequate funds to make many loans, there is no question that additional funds must be obtained.

It is presumed that in the study of the reorganization of the DBE and the EIC that will be necessary, the DBE's lending policies will be reviewed to discover the cause and nature of overdue loans, so that sound policy may be incorporated in its charter, by-laws, and rules and

regulations. If necessary, additional staff training should become part of the reorganization program so as to provide strong management and avoid such past errors as acceptance of exaggerated estimates of crop yields, or overestimates of loan requirements.

At present, the DBE's reported lending policies pertain to projects that must be economically and technically feasible and that will tie in with the government's economic development programs. Also, there must be a collateral of 200 percent for each loan (loans are equal to one-half of the collateral). While the concept of the DBE was to supply venture capital and take risks over and above those expected of commercial banks, provision was also made in the charter that the bank should act "prudently."

In the reorganization of the DBE, it is suggested that consideration should be given to a modification of the collateral required so that sound, yet more progressive, development may take place. The present system results in discrimination. Often large loans are made only to farmers who have city property to offer as collateral, the value of which may be more easily determined, and the sale more readily negotiated, than mortgaged property in a small town or rural area.

One of the governing factors in granting agricultural loans should be repayment capacity. An application for a loan should assure the bank that the farmer will (1) be able to keep his assets, (2) increase his output, and (3) not be forced by repayment to reduce his living standards.

The proposed reorganization of the DBE and the EIC offers the opportunity to develop a strong institution. If well organized under sound guidance, and administered under strong management, the DBE should be in the position to deserve and receive additional support from international lending agencies.

C. Small Agricultural Credit Loans Account

It has been recommended that the DBE should not make loans below Eth$ 6,000 from its capital account. However, there is a pressing need for small agricultural loans if the economy is to advance. It is recommended that, instead of organizing a new institution, a special account be established in the DBE to make small agricultural loans. The account would be separate from the DBE's development funds so that there would be no commingling of money. The special account, referred to as the small loans account, may ultimately become a small loans bank, but this is not contemplated at the present time.

It is recommended that, to meet demand requirements, the account should be built up to Eth$ 5 million. When an amount in excess of Eth$ 5 million is required, the account may become the base for a small loans bank. It is suggested that loans valued between Eth$ 100 to Eth$ 6,000, should be authorized. Assuming that the loans may average Eth$ 1,200, it is suggested that the initial capital in the small loans account be Eth$ 3 million. This would permit some 2,500 loans to be made, or almost twice the number that were made during the 1951-60 period. Some of the loans would be seasonal, and some would be for development purposes. (As there are approximately 100 agricultural extension agents who could supervise the loans, and assuming that the loans are fairly well scattered in areas with extension agents, each officer could supervise approximately 25 loans, if his workload were adjusted for this purpose. Such a scattering of loans nationwide is not recommended, however.) Increasing the small loans account from Eth$ 3 million to Eth$ 5 million would be based to a large extent on an increase in the number of agricultural extension agents, because the success of the loan program would depend upon supervised credit.

It is recommended that the working capital be provided by the IEG from the funds allocated for agricultural development in the Third

Five-Year Development Plan. The program could affect some 12,500 farm families during the five-year period (in addition to farmers participating in package programs), and would fill a gap that now exists in the field of agricultural development.

It is recommended that instead of establishing branches of the DBE throughout Ethiopia to handle these loans, the existing and planned branches of the DBE, the Commercial Bank of Ethiopia, and the Addis Abeba Bank be used to service the loans. Conferences were held with the managing directors of the two latter banks, at which time they expressed a willingness to participate in the program, provided that their banks would not be responsible for the soundness of the loans or for active participation in their collection. For loans made from the DBE's Small Loans Account, the larger loans are expected to cover the cost of the smaller loans and to provide sufficient returns so that the working capital will not be depleted, but may be regarded as a revolving fund. The fund should gradually increase through profits to permit the establishment of reserves for bad debts and for meeting unexpected contingencies, such as crop failures, that may arise through no fault of the farmer. In such cases, the loan could be renegotiated. Experience may prove that the maximum loan limit of Eth$ 6,000 might have to be raised to avoid the need for government subsidy of the Small Loans Account.

The small loans made by the DBE through 1960 were costly because the services of the agricultural extension agents or the community development officials had not been used to any great extent. Since these services were established to promote rural development, they should be incorporated as a support in the proposed small loan program. To do so will require close cooperation between the DBE and the Ministries of Agriculture and of National Community Development and Social Affairs.

1. Establishment of a Loan Committee

It is considered necessary that a loan committee be established in each of the areas meeting the criteria established below. It is suggested that the loan committee include the following five members, although experience may justify a change in the suggested membership.

1. The agricultural extension supervisor, who would be chairman of the committee.

2. The agricultural extension agent covering the area in which the farmer requesting the loan is located.

3. The community development official who would either know the farmer or his family, or could obtain information or advice from the welfare workers.

4. Two village elders who would be familiar with the farm families and be able to judge their honesty, integrity, and reliability, and have an opinion on the tenure of the land ownership. They must be literate to serve effectively.

In those centers where the DBE has a branch office, the manager could replace one of the village elders as a member of the committee. The committee would not be considered to have decision-making powers.

Consideration has to be given to eliminating the possibility of a committee member requesting or receiving money to assure favorable consideration of a loan. The committee members must be made aware of their social and moral responsibility, emphasizing that the program is designed to advance the welfare of the people and the economy of the country. It should be explained to the members that the program is new and that, while government funds are involved, they must be repaid at an agreed interest rate; that the program will help reduce dependence upon the money lender; and that the success of the program depends upon the committee's sound judgment, recommendations, and back-up support should there be a repayment problem.

2. The Role of Agricultural Extension Officers and Community Development Officers

The Extension officers will need special training in two specific subjects to permit them to participate effectively in a credit program. First, they need training to be able to help the farmer develop a plan to expand agricultural production on his land. Second, they need training in the principles of agricultural credit. The scope of such training includes purposes for which credit may be given, short and medium term credit, eligibility of the applicant, preparation of the loan application, security requirements, loan conditions, and repayment schedule based upon crop maturity.

The Third Five-Year Development Plan contemplates an expenditure of Eth$ 6.6 million for expanded and more effective extension services. The credit program cannot expand beyond a relatively few selected areas without additional manpower support. The expenditure of such funds for additional manpower and for a more effective service is essential for agricultural development.

Without special training, the proposed credit program cannot succeed, because there must be a policy that loans will not be approved from the Small Loans Account unless there is reasonable assurance of repayment.

The community development officers, as well as the extension officers, must be able to teach the meaning and use of credit and how it may be a means of agricultural development. The community development officials in the rural areas may be taught through the distribution of books dealing with credit as a means of development, and simple methods of accounting. It is suggested, however, that in the training of all new community development personnel, these courses be included in their basic educational program. They must also be able to teach the farmers, especially those in Classes II and III, the basic principles of accounting so that they may be able to record the yields of their crops and their income

and expenditures. Without this information, it would be difficult to prepare a sound loan application. The teaching would be a part of the adult education program.

3. Selecting Areas for Small Loans

The proposed small loan program cannot be considered for the entire country at one time; it must expand from selected areas that currently have the required back-up support. Initially, it is suggested that the selection of an area should be based upon the following criteria:

1. There must be a branch bank in the area.

2. The area must have agricultural extension agents or community development officials, and welfare workers; it must also be within reasonable travel time of the office of the agricultural extension supervisor.

3. There should be grain storage facilities available to the farmer within a reasonable distance.

4. The town should be located on a developed transport network to permit access to marketing centers.

5. The town should preferably be a capital of a province or sub-province, where the services of a governor may be used if necessary.

6. There should be retail outlets for the purchase of those input commodities approved by the loan agreement, so that the farmer may have seed, fertilizer, or insecticides when needed.

7. There should be a sufficient number of Class II and Class III farmers so that the program may have an effective impact upon the community.

A close proximity to an agricultural experimental farm would be preferable so that visual education would create a desire among the farmers to adopt new farming methods and advance beyond the subsistence

level. The ability to use the services of an agronomist and a veterinarian would also be desirable.

In principle, the proposed rural credit program may be started before the planned reorganization of the DBE takes place. For example, the following urban areas meet most of the prescribed criteria:*

Province	Town	Population
1. Arusi	Asela	13,600
2. Begemdir	Gonder	30,100
3. Eritrea	Asmera	145,600
4. Gojam	Debre Marqos	21,100
5. Kefa	Jima	30,000
6. Shewa	Debre Zeyt	21,600
7. Shewa	Addis Abeba	489,400
8. Shewa	Nazret	27,200
9. Welo	Dese	39,800

If these areas were selected, their agricultural extension agents could be given the required training in planning and credit at the earliest opportunity to initiate the program. It is estimated that four or five months may be required for the training program. The recently established Center for Ethiopian Management might assist for this purpose. It is also recommended that the proposed courses be included in the training programs for all new agricultural extension personnel. For example, as the banking network and warehouse facilities spread through the country, the agents will be prepared to participate in the expansion of the rural credit program.

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* Debre Zeyt and Nazret are not provincial capitals.

In selecting the areas, consideration might also be given to those regions that have major current problems, such as the increasing shortage of grain in the Tigre area, and the increasing shortage of food in Addis Abeba as the population increases through an influx from rural areas.

The following urban areas lack one of the facilities that are considered desirable in establishing the program. Implementation of a credit program in any such location would only involve furnishing the missing factor.

Province	Town	Population	Factor Needed
Begemdir	Setit-Humera	2,700	Extension Agent
Ilubabor	Gore	7,800	Storage
Harer	Harer	41,900	Storage
Shewa	Shashemene	7,700	Storage
Sidama	Awasa	5,500	Storage
Harer	Dire Dawa	49,700	Extension Agent
Sidama	Yirgelem	10,500	Storage
Tigre	Maqele	22,600	Storage
Welega	Neqemte	12,400	Storage

4. Individual Loan Procedures

The suggested agricultural credit program should be directed toward Class II and Class III farmers in the selected areas who agree to follow the instruction of the agricultural extension agent.

The loan application should cover all of the requirements needed by the farmer for a successful operation, and each item to be purchased should be specified so that the loan may be released on a phased basis.

The inclusion of labor costs in a loan application should be avoided as much as possible, since this may allow the farmer to obtain more funds than he needs.

When the majority of the members of the committee have viewed the loan application favorably, they should sign the form, after which the application will be forwarded by the agricultural extension supervisor to the DBE's Department of Small Loans Account. In making the decision to authorize a loan, the Department must be satisfied that the loan request meets their required standards, that there is sufficient evidence to indicate that the loan can be repaid, and that the farmer will benefit from the use of the loan.

Should the DBE consider it necessary, a member of the staff may visit the area to make an investigation of any doubtful loans before approval. While the procedure of working through a committee with clearance in the DBE's main office may be somewhat cumbersome, there has to be an improved system of granting small agricultural loans. Every effort should be made to see that the program is a success and that it will not follow the pattern of previous small loan programs.

It is suggested that the farmer sign the loan agreement in the presence of the governor, who would also sign to indicate that the agreement had been completed in his presence. The governor should emphasize the importance of the repayment of the loan.

It is also recommended that the farmer should not normally receive cash. Instead, the bank would issue purchase orders to the farmer for the procurement of the items specified in the loan and in the order in which they are to be issued. The farmer would present the purchase order to the dealer concerned, who would issue the merchandise with a delivery receipt that would be signed by the farmer to show that he had received the merchandise. The dealer would present copies of the receipt to the

bank for payment, and the bank would be compensated from the DBE's Small Loans Account.

When the agent receives the copy of the delivery receipt, he will start the supervised credit program by checking with the farmer to see that the item, such as improved seed, is being used as planned. Should he discover any major violation of the loan agreement that would affect the probability of repayment and could not be rectified, he would issue a written notice through the agricultural extension supervisor to the bank that the loan is cancelled. When the farmer complies with the terms of the loan agreement, the agricultural extension agent will continue checking on the disbursements throughout the period of the loan, and from time to time should check with the farmer to determine whether there are any problems that might affect the planned program.

The number of farms that an agricultural agent could supervise would depend upon the mode of transportation provided and the proximity of the farms. On the basis of interviews with the agents, it is presumed that under the most favorable conditions, an agent could handle at least 40 farms if this were his sole activity.

D. Storage and Marketing Facilities

It is recommended that, to improve marketing conditions, grain storage facilities be built in areas where agricultural credit is provided. The farmer may not wish to repay when the loan falls due because the price of the crop, such as grain, may have declined so that it would be to his advantage not to sell, but to wait until a more normal market price prevails. Under such circumstances, he could bring his grain to the storage facilities and receive a warehouse receipt which could be turned over to the bank as security for the loan. Repayment, plus an extra interest charge, could then be made at a later date.

Another advantage of storage facilities is that, even though the farmer may repay the loan by selling part of his crop, he may wish to place the remainder in the storage facilities and receive a warehouse receipt. This could be used as collateral for a loan from a source other than the DBE's Small Loan Account. For example, one of the branches of the Addis Ababa Bank has constructed a bonded warehouse in the bank's premises, and will lend up to 60 percent of the value of the stored grain.

In order to make the agricultural credit program successful, it is necessary to have a market outlet. In this connection, the Ethiopian Grain Corporation could play an important role in the proposed agricultural credit program if its services were extended and its scope of activities broadened. For example, if the Ethiopian Grain Board were to exercise its power to establish an end-of-the-season purchase price satisfactory to the farmer, the Corporation could be included in the loan by agreeing to purchase at the established price. The Corporation would receive notification of the loan and, at the time it purchases the crop, it would deduct the loan and turn the remainder of the purchase price over to the farmer. The Corporation would then repay the bank for the amount of the loan. This procedure has proven most successful in several African countries--for example, in Malawi, where it is used by the marketing board. It is recommended that consideration be given to the development of a grain purchase system that would permit the Ethiopian Grain Corporation to contract for the purchase of the excess crops raised as the result of the farm loan, and to deduct the loan at the time of purchase. By this means, the problem of repayment would be simplified and a market outlet would be established.

E. Recommended Changes in Bank Practices

1. Interest Rates

As a means of increasing bank deposits, it is recommended that consideration be given to the establishment of a uniform interest rate of 5 percent or more on savings accounts. Under the existing system, the 5 percent rate applies only to deposits up to Eth$ 10,000.

There is also a wide variation among interest rates charged by the various financial institutions and other organizations, part of whose purpose is to lend for agricultural development. It is recommended that a study be made of interest rates to determine whether the IEG is subsidizing DBE and EIC loans and, if so, whether the lending rates for government development institutions and commercial banks should be raised. If the DBE were to raise the interest rate on agricultural loans from 7 percent, a rate of 8 percent might be considered. While a commercial bank must make a reasonable profit, a government development bank is in a somewhat different status. Its interest earned should be more than a breakeven point in order to avoid government subsidy, and to establish various reserves. To date, the DBE's profits have not been large. However, if it is to become a specialized bank, making only agricultural loans, it may have to raise the rate to 8 percent, as the value of its industrial loans to date has exceeded the combined value of the agricultural and coffee loans. The recommended study would have to consider the effect on such organizations as agricultural cooperatives and the various private agricultural development projects that have considered DBE loans as a part of their program, because their rates would have to be increased accordingly.

While the suggested study of interest rates may result in an increase for savers, such an increase would require a corresponding increase in the loan rates for borrowers.

2. Publicity to Increase Bank Deposits

A review of the psychological approach to encourage bank deposits, as illustrated by the distribution sheets prepared by the banks for public circulation, indicates a need for improvement. It is suggested that a skilled public relations technician be employed who would fully use the various media to increase bank deposits.

Several of the branches visited had no publicity sheets available for general distribution, even though they could be obtained from the main office. This lack of publicity may indicate that no serious attempt is being made to attract bank deposits in the various branches. Some of the banks in developing countries have devised a system of giving a prize each month to the branch that has the largest increase in deposits. It is suggested that this incentive system might be considered in Ethiopia.

3. Deposit Insurance

It is recommended that consideration be given to the establishment of a system of deposit insurance in all private banks. The amount of the insurance might be based upon the average deposit, such as Eth$ 1,500. This procedure would help to establish confidence in the proposed private rural banks, even though they may have quarterly inspections.

4. Chattel Mortgages

It is recommended that consideration be given to the passage of legislation permitting chattel mortgages on standing crops. It is further recommended that this right be given only to financial institutions, to prevent unscrupulous money lenders from obtaining a mortgage on the entire crop. The legislation would overcome many problems of advancing credit to farmers and would permit an expansion of rural credit.

5. Other Credit Organizations

It is recommended that emphasis be placed upon the establishment of a postal savings system. For many people who live in areas where banks may never be feasible, postal savings will offer the opportunity to deposit small sums of money in a secure organization. Such sums may be used to meet social or emergency conditions, and may also lessen the role of the money lender.

It is also recommended that a study be made of the permanent Ekubs in Ethiopia to determine whether a banking system could be developed similar to the Japanese Mutual Loans and Savings Banks that grew from the Mujim Kaisha. Because of the popularity and understanding of the Ekub principles by all classes of people in Ethiopia, the Ekubs may be an already-established basis for such a banking system.

It is further recommended that the proposed agricultural cooperative program in the Third Five-Year Development Plan be augmented. It will materially advance the social and economic conditions in the rural areas. On the basis of the history of cooperatives in Ethiopia, it is recommended that the members handling funds be bonded. It is also recommended that agricultural or community development officers aware of the formation of a cooperative report the formation to their Ministry so that the cooperative may be registered and required to comply with existing regulations.

It is also recommended that greater emphasis be placed on the credit union movement during the period of the Third Five-Year Development Plan to encourage savings and to meet credit requirements that cannot be obtained through normal banking channels. Credit unions can be more easily organized than multipurpose cooperatives, and will help to diminish the role of the money lender.

F. A Recommended Private Rural Bank Program for Ethiopia

It is recommended that a privately operated rural bank program be considered for Ethiopia. It is recognized that a plan suitable for Ethiopia will require from three to four years before it can be fully implemented, especially in areas in which there are no banks. For example, it may be necessary to legislate a rural bank law to include the suggestions described above as well as other regulations applicable to small bank operation. Also, the present stipulation requiring Eth$ 2 million as a minimum capitalization before a private bank can be established would have to be reduced. It is further recommended that an educational program be developed and directed toward the rural population so that they may understand the principles of banking and the advantages of placing their money in sound financial institutions as a safety measure and as a means of putting idle money to work. Since many farmers are unable to read or write, the educational program through the Ministry of National Community Development and Social Affairs may use such information media as lectures, radio programs, picture books, and motion pictures. The cost of such a program would be nominal in relation to the potential advantages gained.

One of the advantages of small rural banks is that they are relatively easy to establish. They provide the means to encourage local savings and permit people with savings to remove the funds from the so-called "mattress banks," and place them in an institution where they may benefit the local area. By accumulating local funds, the banks can make small loans to the farmer and to small business and industry. A private local bank is perhaps better informed about the people in the community than the manager of a branch of a commercial bank, who may not have resided in the area for any length of time and who must clear loans through the head office where contact with the rural area is more remote. A private local bank may be in a stronger position through decentralization.

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G. A Five-Year Credit Plan

In view of the plans discussed previously for dryland package production programs, irrigation programs, a seed project, and others--in which the future need for increased credit for farming operations is apparent--the following schedule is recommended for the installation of DBE branch operations in various locations, to implement the recommended small agricultural loans program.

First Year: Debre Zeyt, Asmera, and Asela

Second Year: Setit-Humera, Addis Abeba (local operations), and Awasa

Third Year: Kombolcha, Nazret, Shashemene, and Jima

Fourth Year: Harer, Dire Dawa, and Meqele

Fifth Year: Dese, Gonder, and Debre Marqos.

It will be noted that the majority of the locations suggested follow closely the development locations recommended in Programs II and III, which are primarily concerned with the farmers involved in crop and livestock production. Other locations are suggested in view of present or near-future development plans (such as the Chilalo Agricultural Development Unit and the World Bank); still others are in areas with numerous farmers who are already commercially-oriented, and where there is good potential for increased agricultural production.

It is suggested that each branch begin with one agricultural extension agent spending full time on credit supervision during the first year of the branch's operation, and that one additional agent be added to each branch staff in each succeeding year. If the average small loan is

Eth$ 1,200 and each agent can supervise 40 loans, in the fifth year of the program there would be 48 agents supervising loans totalling Eth$ 2,400,000. The estimated cost of agents (approximately Eth$ 300,000) would be paid by the IEG from additional funds provided by the usual agricultural taxes which farmers would be able to pay out of their increased production and sales.

PROGRAM V. PROCESSING OF AGRICULTURAL PRODUCTS

Processing of agricultural products* is an important step toward industrialization; in Ethiopia, some of the most immediately possible industrial plant investments are directly related to agricultural products and their preparation for either local consumption or export. Processing occurs at all levels and on a wide variety of products. It begins on the farms with drying hides and skins, winnowing grains and pulses, and sorting such items as carrots and potatoes for market.

In this section, the concern will be largely with the industrial processing of agricultural products, especially those that can be encouraged as independent industries. New agricultural processing industries can be launched and expanded now; they will provide training in both technical and managerial fields for other industries that will gain importance in Ethiopia as industrialization gets further underway, as incomes rise, and as exports of manufactured products expand.

Throughout Ethiopia many agricultural processing industries are already in operation or in process of being established. In several instances the processing capacity is already available in Ethiopia for the current production. Hence, throughout the SRI Agro-Industrial Sector Study, more emphasis was placed on increasing farm production than on expanding the capacity of processing industries. Establishing new industries without adequate production to supply raw materials leads to failures and discouragement. There is ample evidence of sufficient

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* See also Appendix C.

local entrepreneurs quite willing and ready to build or expand their processing facilities to meet increased farm production.

Establishing new agricultural processing facilities in Ethiopia may require that the processor involve himself in production also in order to ensure his supply. The most successful firms engaged in agricultural processing are those who have integrated their operations with both production and marketing to the point of being assured of the continual use of their facilities and a continual outlet for their products.

In three cases--oilcake processing, the production and processing of castor seed and oil, and the initial stages of hides processing--the SRI feasibility studies found promising opportunities for establishment of processing facilities.

A. Solvent Extraction of Oilcake

SRI Report No. 12* proposes the establishment of a solvent extraction plant to reprocess the oilcake produced in Ethiopia and exported. This oilcake has a high oil content that reduces its quality and causes high fire risk in export shipments. Although oilcake is now being sold in this form (as produced from mechanical expellers), the market for oilcake in the future will depend on a better-quality, lower-oil-content, less-flammable product that will be sold in larger quantities and eventually transported completely in bulk-handling equipment. A plant that could process 100 tons of oilcake per day is proposed; this could reprocess practically all of the oilcake now being exported from Ethiopia. It is anticipated that the actual amount will include only that produced in

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* Solvent-Extraction of Ethiopian Oilcake.

the southern region of Ethiopia and that increased production in all areas could lead eventually to the establishment of a similar plant in the northern part of the country.

The organization proposed for the plant is in the form of a joint venture of existing oil millers. Together they should be able to finance such a plant, and it would help save all of them from losing their market for exported oilcake in the near future. A longer term increase in oilseed production will make this venture more secure by providing enough oilseeds and oilcake to more than meet the capacity of the proposed plant.

It is estimated that, by the fourth year of operation, the plant would be earning over Eth$ 1,300,000 of net income before taxes annually. It would require Eth$ 6,000,000 of initial investment and Eth$ 1,000,000 of working capital.

It is possible that if the proposed plant is built in the next five years, perhaps one or two more could be built in the second five years--depending on expansion of oilseed production in the Asmera and Dire Dawa areas. Increased production in northern Ethiopia would make placement of a second plant in Asmera essential; it is also possible that production in the Awash Valley and the area between Harer and Jigjiga could add large amounts of cottonseed and groundnuts.

One of the benefits of the proposed plant is that its product can be controlled more carefully than can the current exports of oilcake. Ethiopian oilcake is getting a particularly bad reputation because of several cases of misrepresentation of the quality, deterioration en route caused by infestations, and both unusually high moisture and oil content. The old sacks often used in these low-value shipments also deteriorate en route and cause considerable loss in the unloading procedure.

With a plant of this type and with the reduction in oil and moisture content that it would provide, meaningful guarantees of quantity and quality could be given with export shipments. Whether government control would need to be exercised would depend on the group of millers and exporters who combined their efforts and resources in setting up the plant, and government policy toward them.

A government requirement that all oilcake for export must be processed through the proposed mill would perhaps be necessary, although it is possible that this could be organized without government restrictions. Quality guarantees would probably have to be given by a government agency.

Part of the government control of the plant could come through part-ownership. Ways of carrying this out will be presented in the section on implementation. Part-ownership by government would alleviate fears that such a plant would become a monopoly without control if all present millers and exporters cooperated on organizing and financing that facility.

1. Inter-Industry Relationships

The setting up of the plant would make it possible for the oilcake industry to continue to operate in Ethiopia as at present--that is, with about 10 to 15 medium-sized mills operating throughout the country. Without the addition of the proposed solvent-extraction plant, these mills will continue to produce low-quality oilcake, and some will eventually be forced out of business--largely because of the lack of efficiency of their equipment and their inability to control enough of the oil market to make it profitable to invest in the large equipment that is necessary for the solvent-extraction plant.

The proposed plant would also be useful for expanding present oilseed extraction capacities if and when this is needed. The increased

production of cottonseed that may become available as cotton production increases in the Awash Valley might be processed in this plant, although some cotton ginners are already making plans for cottonseed processing in connection with their present operations.

The oil that the proposed plant will produce could become a source of supply needed for a margarine and vegetable ghee plant planned for the near future by a local businessman.

The new plant would also be able to work with animal feed producers, as they may develop in Ethiopia. The oilcake produced in this plant should be better than that now available, because of its slightly higher protein but lower oil content, which should make it suitable for the feed industry.

2. Labor Availability

Training in the operation of the equipment will be an excellent addition to the technical know-how Ethiopia needs for expanding industrialization. With proper supervision in the early years and careful attention to the training and experience of the operators, it should be possible to operate the plant effectively.

3. Implementation

Because the size of the planned investment is too large for any one of the existing oil millers to handle individually, it is proposed that some sort of pooling of resources between the largest millers take place for the financing of the solvent-extraction plant. The cooperation of the existing millers is needed in order to ensure steady supplies of raw material; incorporating the millers into the investment would help to guarantee the plant's success.

The following are possible methods of organizing such a combined investment, with or without the addition of foreign capital:

1. Ordinary Partnership--any partnership not covered by other designations.

2. Joint Venture--a mutual agreement subject to laws relating to partnerships.

3. General Partnership--partners who are fully liable among themselves and to the firm.

4. Limited Partnership--with both general and limited partners.

5. Share Company--with capital divided into shares; liabilities are met by the assets of the company.

6. Private Limited Company--with members who are liable only to the extent of their contributions.

Each of these kinds of organizations incorporated abroad and having offices in Ethiopia are subject to the Commercial Code. Share companies are the most prevalent among larger ventures in Ethiopia, and this form would probably best apply to the proposed oilcake plant.*

By obtaining the cooperation of a group of existing millers for this investment, no one local entrepreneur would have to be responsible for such a large investment; at the present time, it is too large and perhaps too risky for each to consider individually. Some of the millers have already indicated that they are willing to consider such an arrangement, but--at the same time--they voiced fears that government approval might be difficult to get because of the possible monopoly implications. In this case, it would be necessary to include some sort of IEG approval, and perhaps participation through one of its financial institutions, such

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* See SRI's Report No. 2, Industrial Investment Climate in Ethiopia.

as the Ethiopian Investment Corporation (EIC). If the project were proposed by the IEG to a group of investors, their hesitation might be easily overcome.

It is possible that a single entrepreneur interested in manufacturing livestock feed for both domestic and export markets could add an oilcake plant such as that proposed to his existing or planned operations. Oilcake that has been processed through a solvent plant has as much feeding value in terms of protein as present oilcake--and, in fact, might have a higher protein content. The uniform quality produced by the oilcake processing would be a distinct advantage for mixing feeds for export, and the reduced oil content would also reduce flammability and, hence, insurance rates of shipping.

B. Castor Oil Production

Castor seed is now being exported from Ethiopia, and there is a good opportunity to increase production for expanded exports. However, if the production is increased to roughly twice the amount now exported it would be quite possible--and it is shown in SRI Report No. 11* that it is economically feasible--to process the castor seed and export the oil and the cake (pomace), thus retaining in Ethiopia some of the value added through processing and at the same time providing some industrial experience and additional foreign exchange. The pomace could also be used locally for fertilizer in the growing of fruits and vegetables, since it is high in nitrogen and acts as an organic conditioning agent for the soil.

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* Development of Castor Seed Production and Processing in Ethiopia.

Castor oil production for the world market seems likely to remain favorable for some time to come. There are several industrial uses for the oil, including the making of nylon, jet engine lubricants, and special paints and varnishes; it is possible that eventually--as industrialization progresses in Ethiopia--these products might be made and used on the domestic market. Reaching this point may be beyond the 15-year program considered in this report, but the initiation of castor seed production and processing now will make more of this kind of industrialization possible in the future.

The castor seed processing plant proposed, which would use 60 tons per day, involves both a prepress through expeller extractors and a second extraction using solvent similar to oilcake processing. The plant is proposed for Mitsiwa, since an increase in production is likely to come from the northern areas; however, in the event that production seems to be increasing more rapidly in the southern regions, it could be built in Aseb as well. The possibility of building plants in both ports is good if production can be increased sufficiently to meet the combined capacities.

Perhaps the most probable time sequence would be that the first plant be established in about three years and the second plant within a period of three to five years after the first, putting one in the current third Five Year Plan period and the second in the Fourth Plan Period.

After full operation has been reached it is projected that the castor seed processing plant would earn Eth$ 7.47 million in foreign exchange each year, with an initial investment of Eth$ 1.2 million in foreign exchange.

1. Assistance to the Enterprise

No direct controls or subsidies are necessary for the establishment and operation of the castor seed processing plant. However, a number of suggestions are made below for making the implementation easier.

a. Seed Imports

For the production of castor seed with high oil content from hybrid varieties--which contain up to 10 percent more oil than existing varieties--it would be necessary to import the hybrid castor seed. The genetic stock for most of these hybrids is under the control of seed companies who carefully supervise seed production. Seed is not directly reproducible, since hybrids degenerate in their second generation to a variety of types from which they have been developed. Therefore, it would be very helpful to make the import of castor seed for planting purposes duty-free until domestic seed production can supply the needs.

b. Port Development

Because castor oil and castor meal could be shipped in bulk, the operation of the castor oil export business would be encouraged by the improvement of port-handling facilities. For the plant proposed in this report, improvements in the Mitsiwa facilities would be helpful.* In the future, it is probable that similar facilities would be needed at Aseb.

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* See recommendations in Report No. 4, Improvement of Ethiopian Ports.

c. Land Development Encouragement

Since the castor seed would most easily be produced by new commercial farming enterprises, any encouragement that could be given to land development would be helpful. In the Awash Valley, this is already in process; leases could be given that would favor those who would produce castor seed, as well as cotton or other crops. In the Setit-Humera region, there is need for greater security of land holdings, since--at the present time--most farmers are operating with verbal permission of a district or provincial governor. Also, expediting the road development through to that region will be one of the most helpful things that the government can do to encourage development in that area. In addition, an experiment station for trial of castor and other crops is immediately needed in order to help ascertain the best varieties and systems of production adapted to that area.

d. Inter-Industry Relationships

In the production stage, castor seed is a crop that can be grown in rotation with other crops of a tropical nature, such as cotton and peanuts. It can also be harvested from wild stands and from small plantings in dooryards. Hence, it is versatile in its adaptation and would not subtract from needed food crops. In the medium to lower elevations, where it grows best, there is land for expansion of cropping areas; thus, in general, growing this crop would add to total production without subtracting from other crops.

As an industrial oil, castor oil provides possibilities of use in future manufacturing that might develop in Ethiopia. Because it can be used in so many ways, it could contribute to the expansion of the paint industry, the plastics industry, the lubricants industry, and in other organic compound industries where new uses might develop. These

kinds of industry developments will take considerable time, perhaps, but the possibilities are inherent in the development of the castor oil industry.

One of the newest uses--that of producing haveacrumb* in the natural rubber industry--could develop a wider market for castor oil in the natural rubber producing areas of the world; in this way, castor oil might be traded with some of the developing countries as well as with the developed areas.

2. Implementation

a. Production Stage

For increased production, considerable encouragement must be given to commercial producers of castor seed, including action on the part of the Ministry of Agriculture through its Institute of Agricultural Research to test castor seed on its station in the Awash Valley and its projected station at Setit-Humera. Samples of seed need to be provided to commercial growers in these areas for testing, in addition to tests made at the stations. Other commercial producers who might be encouraged include Ciaffa Plantation, the concessions being opened up in the Rift Valley, producers of irrigated crops in the Gash and Desset Valleys, and possible producers in Welega, Gemu Gofa, and Kefa. During this stage, efforts should be made to import samples of higher oil-producing varieties.

Suggestions for the implementation of increased production might include appointment of one staff member of the Ministry of Agriculture to be responsible for the investigation and promotion of

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* A natural rubber product using castor oil in the process.

castor beans; he should be given the means to travel to all the possible areas of production. Opportunity to visit the castor producing areas in the Sudan and perhaps also in Kenya-Uganda-Tanzania would be informative, and the transfer of information and experience between countries would be helpful. This exchange might be arranged through the newly formed Association for the Advancement of Agricultural Science in Africa.

Involvement of a castor-seed-using firm such as Aquitaine Organico* in France and a castor-seed-producing company such as Pacific Oil Seeds† in the United States could certainly assist in carrying out this stage. In addition to providing samples of seed, these firms might also provide some technical advice for such a program.

b. Processing Stage

Once a program for increasing production is underway, organizing and establishing the company for processing may begin, taking into consideration the progress of the production program and projected increases in production. As castor seed can be exported as seed, increases in production can be sold even before the processing plant is operative; however, plans to make the increase of production coincide with the operation of the processing plant would be highly desirable.

It is suggested that either a foreign company with experience in this field and connections into the castor oil markets be encouraged to join in setting up the processing, or that an existing oil crusher in Ethiopia be encouraged to expand his operation to this new processing field. It is possible that some combinations of these two elements

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* 23, Avenue F. D. Roosevelt, Paris 8e, France.

† P. O. Box 1008, Woodlane, California.

might be encouraged. The expertise and market connections of a foreign company now operating in the castor market, coupled with the local experience and knowledge of a locally-owned oil mill, would be ideal for carrying out this project.

For the encouragement of such a combination, the assistance of a representative of the Ministry of Commerce and Industry, both in Addis Abeba and Asmera, would be necessary; perhaps the Chamber of Commerce could also be helpful. Encouraging such investments demands that certain government officials be appointed or given the responsibility for pursuing and promoting the specific development; information gathered by such a designated individual should be made available to as many people as possible who might be concerned, such as the various financial institutions, companies working in the agricultural development field, and both national and provincial offices working on the development of Ethiopia.

One method for developing the proposed plant even before castor seed production meets the goals set would be to purchase seed from Sudan for processing in Mitsiwa. It is possible that the transportation costs might be less going through Ethiopia than through Sudanese ports. Investigation of this possibility should be made the responsibility of an official of the IEG, who would be able to obtain the necessary information from the Sudan about the production there, the price at which it might be available, and the possible arrangements needed to facilitate importation through the border at Teseney.

3. Other Uses for the Plant

One attractive feature of the proposed plant is that it might be used to process other vegetable oil seeds, as well as castor, if the need should arise. Some modifications might be necessary in certain circumstances, but the plant is designed to process high-oil-bearing oilseeds. Thus, it could be shifted to the processing of sesame or

peanuts with ease and to safflower with some adjustments in equipment. Each of these seeds might become more important in the areas served by Mitsiwa. The processing of cottonseed would demand additional modifications; however, an oil miller in Asmera is already making plans for processing this seed in a new plant, which will reduce the demand for this type of processing.

C. Dry Salting Treatment of Cattle Hides

Although initially proposed on a small scale of 50,000 hides per year, the economic gains of the project proposed in SRI Report No. 5* are excellent and the project lends itself to duplication in other areas throughout the country.

The annual net increase in foreign exchange is calculated to be Eth$ 275,000 within five years. In addition, the increased receipts to the salt and transport industries will be about equal to the above estimate of foreign exchange earnings. The increased quality of the dry salted hides could also encourage the expansion of domestic leather tanning and leather goods manufacturing in the future, when more of the present hides and skins are processed in Ethiopia. The investment cost for such a project is estimated at Eth$ 196,000. This amount is largely for land, buildings, and pick-up truck, drying frames, and rope.

The proposed hides treatment is an example of a lower-level processing installation that could make considerable impact in the long-run improvement of Ethiopian exports of hides and set the stage for further developments in the leather goods industries.

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* Economic Feasibility of Dry-Salting Treatment of Cattle Hides from Malgue Wendo Abattoir and Local Slaughter.

1. Expansion Potential

The dry-salting unit budgeted is a prototype project, capable of expansion at Malgue Wendo and replication at slaughter sites throughout Ethiopia. It should be possible to institute the dry-salting method at locations slaughtering nearly one-third of total hide production within a period of five years. Several of the replicated projects should prove to be more profitable than the Malgue Wendo unit, because of lower supply and marketing costs.

The development of more commercial cattle slaughter, with the attending increase in concentration of slaughter and continued improvement in the highway network, will make it feasible to treat a larger proportion of hides in the green state. It is estimated that two-thirds of the hides produced will be accessible for green treatment within 10 to 15 years.

Because of the wide dispersion of the human and cattle population in Ethiopia, and the geography of the country, there will continue to be locally slaughtered and dried hides. These, too, can be improved by a combination of educational effort and market incentives, for which this project and its replicates can provide examples and assistance.

The ultimate source of increased income from hides is improved productivity and output in the cattle industry. A program with this goal is presently being undertaken by the Imperial Ethiopian Government Ministry of Agriculture, the Livestock and Meat Board, and the United States Agency for International Development.

2. Inter-Industry Linkages

The major direct impact of dry-salting projects on other industries will come through the increased domestic consumption of salt and its transport, both to the project sites and in the form of salted hides.

Based on the salt and transport costs used in budgeting the Malgue Wendo unit, the increased revenue generated annually in these industries by dry-salting projects is Eth$ 275,000 within five years. These figures will be lessened to the extent that future dry-salting sites are closer to a salt source and a port. Minor additions will result from transport and use of other supplies and increased labor.

If the increased use of salt would stimulate the development of additional salt sources, the entire population should benefit from lower salt prices and transport cost. Both are currently very high.

In addition to the educational contribution made by the project employees in the direct performance of their duties--such as instructing local butchers in correct methods of flaying--the projects will build up a reservoir of local personnel with knowledge of proper hide handling. Over time, a source of trained labor will become available to both public agencies and private firms.

Other, non-quantifiable, beneficial linkages exist. The domestic tanning industry will benefit from the availability of better quality raw material. The benefits will accrue from both lower tanning costs and higher-valued leather. Should the proposed large-scale tannery become a reality, the benefits will be substantial, with some 25 percent of the country's hide production involved. This development could occur within a five-year period.

3. Implementation

a. Organization and Financing

It is envisaged that the project will be organized and operated by a private investor. The type of organization might be a single proprietorship, partnership, or corporation. It might be under the same ownership and operation as the abattoir, or it might be a separate company

with arrangements to operate at the Malgue Wendo site and process abattoir-slaughtered hides.

Potential investors include companies or individuals now engaged in hide or leather operations in Ethiopia, such as tanners and export dealers, and foreign investors interested in hide curing as part of a larger cattle feeding-slaughtering-processing enterprise at Malgue Wendo.

Sources of investment capital for the project might be the Ethiopian Investment Corporation or the Development Bank of Ethiopia. Operating capital might be obtained from the Commercial Bank of Ethiopia or the Addis Abeba Bank.

b. Reactivation of Malgue Wendo Abattoir

The implementation of the project is dependent upon operations of the Malgue Wendo abattoir.* Therefore, the time schedules for the two projects must be coordinated. If negotiations† for a feed-producing, cattle-feeding, meat-processing complex--including the Awasa Farm and the Malgue Wendo abattoir--are successful, the abattoir is expected to begin limited-volume operation by the end of 1969. This is the current target date for beginning dry-salting of hides at Malgue Wendo.

If the hide curing project is undertaken by a company other than that operating the abattoir, a working arrangement would have to be agreed upon. The essential elements of the agreement will include the terms of hide ownership transfer, use of land and the existing building, consumption of water, and disposition of waste (liquid and solid). Also,

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* See SRI Report No. 7, Development of the Ethiopian Livestock Industry.

† Negotiations were underway at the time this report was written.

if abattoir quarantine standards will not permit hides from local slaughter on the premises, provision will have to be made to cure these hides outside the quarantine area. This would not affect the marketing of the hides.

c. Cooperation with Livestock and Meat Board

Before firm commitments are made for the project, the investor will need to learn the existing licensing and other legal requirements for hide flaying and curing in Ethiopia. These requirements are under the jurisdiction of the Livestock and Meat Board. They are currently being revised and are therefore not given in this report.

It would also be prudent for the investor to cooperate with the Board on matters of education with regard to hide quality. Such cooperation might include the assignment of Board technicians to the project (particularly local hide procurement), jointly sponsored demonstration and training programs, the use of Board literature and other educational aids, etc.

d. Local Buying Stations

When definite arrangements for future operation of the abattoir have been concluded, the hide project management should work out the details of the program for procuring locally slaughtered hides. This will include a survey to determine the location of buying stations, the identification of local slaughterers willing to sell green hides, the volume of hides available by days of the week and seasons of the year, and the route and time schedules for hide pickup.

The number and location of buying stations, and the frequency of pickup, will be determined by the volume of hides available. Initial attention should be given the communities of Awasa, Shashemene, Kofele, Wendo, and Dila.

e. Hide Marketing Arrangements

Unless the project is operated by a company having its own market outlet for hides, such as a tannery or export dealer, arrangements for marketing the hides should be concluded before operations begin. Because of the initial modest volume, it is assumed that the hides will be sold through existing outlets in the Addis Abeba wholesale market. However, the method of sale must be determined. The alternatives to be investigated include private treaty (individual negotiation), written or sealed bid by potential buyers, or public auction. The merits of contracts versus open market sales should be weighed, as well as provisions for grading, quality premiums, guaranteed volume, etc.

Provision must also be made for regular pickup of cured, dried hides at Malgue Wendo for shipment to Addis. This can be accomplished by contacting a private trucking company or the National Transport Company in Addis Abeba, which serves as a clearing house for private truckers.

f. Construction of Building

Sufficient lead time should be budgeted for completion of the building before hide curing operations begin. While no imported materials are required, the logistics of assembling the materials, as well as actual construction, dictate that a minimum of three months be allowed. Use of a private building contractor from Addis Abeba or from another community would be a logical means of accomplishing the construction.

g. Recruitment of Labor Force

The project manager and the driver-buyer should be employed in advance of actual curing operations. This will enable them to become thoroughly familiar with the project before they are fully occupied with day-to-day duties of operation.

The manager should have previous experience in hide handling, as well as in business management and labor supervision. The driver-buyer should have a knowledge of factors affecting hide quality and should be able to maintain as well as drive a vehicle. Personnel with these qualifications might be recruited from the staff of other Ethiopian hide handling firms, such as abattoirs, tanneries, and hide dealers.

The initial responsibilities of the manager would include supervision of building construction, ordering of tools and supplies, setting up a record-keeping system, studying the marketing alternatives, and recruiting and training the laborers. The driver-buyer should assist in setting up the local hide procurement system and be the general understudy to the manager.

The laborers need not be employed until the actual operations are about to begin. Training can be accomplished during the start-up period.

h. Purchasing Equipment, Tools, Supplies

Most of the needed equipment, tools, and supplies can be purchased in Addis Abeba and trucked to the project site on short notice. Unless savings can be effected through quantity buying, these items can be purchased on a schedule determined by the volume of hides processed.

Exceptions to the above would occur in the case of chemicals. Boric acid crystals and naphthalene crystals must be imported from

Europe. Significant cost savings are possible by ordering direct from the manufacturer in one ton or larger lots. Three to six months lead time should be allowed. AGECA Company--chemical importers, Addis Abeba--is a source of information.

Salt can be purchased in truckload lots (22 tons) and hauled from Aseb. Shipping arrangements can be made through the National Transport Company, Addis Abeba.

The pickup truck to be used for hauling locally slaughtered hides to the processing unit should be purchased, registered, licensed, and insured prior to initiating the truck route.

Hide drying frames can be assembled prior to curing operations, and during slack periods.

i. Initial Pilot Operations

The abattoir will no doubt begin slaughtering operations on a small scale pilot basis, while testing out the various parts of the system. The hide curing unit should do the same. This period of limited operations, which will probably continue several weeks, will afford an opportunity to train the crew, make the local buying station system operational, perfect the treatment procedure, and test the marketing arrangement. Accomplishing these tasks under full-volume operation would be much more difficult.

j. Expanding to Full Volume

Achieving the budgeted 50,000 hide annual output is primarily dependent upon the operation of the abattoir. The plans of the current negotiations for the abattoir call for slaughter at an annual rate of approximately 30,000 by the end of 1973. Beyond 1971 the volume would exceed that budgeted, and by the end of 1973, the volume would be over twice that budgeted, allowing for no increase in locally procured hides.

k. Replication of the Project

Plans should be formulated for replication of the dry-salting project at other slaughter sites in Ethiopia. Based on estimated volume of slaughter, the following order of priority is suggested:

1. Addis Abeba
2. Asmera
3. Meqele
4. Keren
5. Gonder
6. Dire Dawa
7. Kombolcha

For each site a study similar to that of Malgue Wendo, with modifications to meet local conditions, should be conducted. The projects that are economically feasible should be developed, again following the implementation steps outlined herein. The above list of projects should be capable of implementation within five years.

The 10 to 15 year expansion program should be based on increased volume of the earlier initiated projects, the dry-salting of hides from additionally established commercial slaughtering facilities, and dry-salting projects at local slaughter centers that have been found to be feasible.

D. A Five-Year Program

The solvent plant will not be replicated during this period, although the opportunity for doing so at some later date should be kept in mind. A second castor seed enterprise is planned for the Fourth Five Year period. Seven additional dry-salting operations are planned within the present five-year period, as suggested above. Livestock and Meat Board

personnel should be assigned as needed to work with hide producers and plants. By the fifth year at least three men will be needed full time.

First Year

Oilseeds

- Start construction of solvent-extraction plant in Addis Abeba. (B)
- Start construction of castor oil plant at Mitsiwa. (B)

Hides

- Construct first dry-salting project (Malgue Wendo). (P)

Second Year

Oilseeds

- Continue construction of both plants. (B)

Hides

- Construct second dry-salting project (Addis Abeba). (P)

Third Year

Oilseeds

- Begin operation of both plants. (B)

Hides

- Construct third and fourth dry-salting projects (Asmera and Keren). (P)

Fourth Year

Hides

- Construct fifth and sixth dry-salting projects (Gonder and Meqele). (P)

Fifth Year

Oilseeds

- Conduct feasibility study for location of second castor oil plant, probably at Aseb. (G)

Hides

- Construct seventh and eighth dry-salting projects (Dire Dawa and Kombolcha). (P)

Budget Recapitulation for Five Years

The capital costs, according to the anticipated source, for the five-year program are:

CAPITAL COSTS FOR FIVE-YEAR PROGRAM
(Thousands of Ethiopian Dollars)

Government	Private
Eth$ 50	Eth$ 14,269

The costs and income for the fifth year, according to beneficiary, are expected to be:

RECURRENT COSTS AND INCOME--FIFTH YEAR
(Thousands of Ethiopian Dollars)

Government		Private	
Costs*	Increased Income†	Increased Costs‡	Increased Income‡
--	Eth$ 945	Eth$ 8956	Eth$ 12,098

* Costs of the three employees of the Livestock and Meat Board are not included.

† Income tax of Eth$ 794,000 would not be collected by the IEG until after the fifth year of operation of the oilseed plants; when income tax is collected, the total increased income would be Eth$ 1,739,000 annually.

‡ Castor seed processing is a new enterprise; thus the entire costs and income are included.

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PROGRAM VI. MARKETING AND EXPORT PROGRAM

This program is concerned primarily with the staple food crops--grains, pulses, and oilseeds--and with livestock; however, other agricultural products are necessarily involved when general marketing policies are considered. Pricing, storage, transportation, and export strategy are given special attention.

A. Livestock Marketing*

The main elements of a strategy designed to increase the financial returns from cattle are (1) increasing the marketable supply of cattle for slaughter, (2) establishing an effective marketing system for live cattle and meat, (3) identifying the markets for Ethiopian beef, and (4) adapting the entire system--from cattle raising to meat marketing--to produce the kinds and qualities of products to be sold, in quantities adequate for efficient operations.

1. Potential Supply During Fifteen-Year Period

Ethiopian beef production has been at a fairly constant level for the last 15 years. A small surplus has been exported during the last five years. The domestic demand for beef in urban centers is increasing and will continue to expand as further increases occur in population and income. Beef production capability will be hard pressed to keep pace with demand during the next 15 years. However, increased demand probably will support some increase in the price of beef during the next five

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* See Report No. 7, Development of the Ethiopian Livestock Industry.

years, and this should stimulate sufficient production of higher-cost beef to maintain a balance with increasing demand.

A substantial expansion of cattle production from settled highland farms requires an increase in feed resources there at profitable price relationships; it also requires a reduction of death losses, particularly in calves and yearlings. If the efficiency of cattle production could be increased in this manner, producers would be able to expand operations. Over the long term, a group of producers in the highlands could emerge with considerably larger cattle holdings.

Reduction of cattle death losses could be achieved through control of major diseases--a goal that is expected to be realized by 1975 under the International Cooperative Effort. Disease control through the establishment of strict quarantine districts and massive efforts for elimination of disease should receive a high priority.

The disease-control program, extending over the next seven years, should be coupled with improved nutrition. Such a program should open some higher-priced export markets now closed to Ethiopian beef, which should expand the income from cattle exports and stimulate increased production of more and better quality beef.

A fundamental long-term policy should be based on action programs that would channel investment into projects where the possibilities for expansion are greatest, emphasizing projects best adapted to each area, such as water supply in desert areas and feed supplements in farming areas.

2. Cattle Marketing

Once surplus stock becomes available, transportation and communications are the first major obstacles encountered. Market organization and pricing arrangements must also be developed to assist in the assembly, processing, storing, and distribution of livestock and meat among alternative outlets.

To obtain maximum flow from basic production areas, the market pricing system must provide incentives to induce the producer to make available the kind of livestock that will yield maximum returns from each segment of the market.

Livestock marketing in Ethiopia is characterized by numerous transactions in the system between the producer and the slaughterer; long, exhausting trail drives; highly fluctuating price and volume; and individual bargaining for each animal. Lack of feed and water on the trail routes and in markets is responsible for severe weight losses. Religious fast periods and seasonal rainfall create sizable changes in demand and supply. Bargaining for live animals and meat is carried on without quality standards, scales, or market information other than that which passes by word of mouth. A current proposal for a United Nations project to provide training and demonstration in livestock marketing will help to remedy this situation.

a. Transportation

Trucking cattle to markets could achieve savings up to 30 percent relative to trailing costs when the weight and death losses due to trailing are included in the trailing costs. However, lack of cattle trucking experience and suitable equipment, and--in many areas--lack of roads, have prevented the development of cattle transportation by truck.

Trucking companies should be encouraged to investigate the possibilities for developing the potential traffic in cattle.

In areas with inadequate highways--or areas where truck transportation is not available--the IEG should undertake to improve feed and water service and to provide veterinary inspection along the trails. Public lands might be used for this purpose.

b. Credit for Use in Marketing Livestock

No organized source of credit appears to be available for livestock dealers. The dealers borrow from whatever sources they can at monthly interest rates ranging up to 10 percent. A study should be made of means for developing a credit system to suit the needs of livestock dealers. The transportation and marketing facilities recommended in SRI studies should reduce the dealers' risk and make lower interest rates possible. The overall effect should be to substantially reduce livestock marketing costs.

c. Buying Stations*

Existing livestock market facilities do not provide the services needed for operating efficiency and well-informed pricing. It is recommended that a few pilot buying stations be established in the Southern Livestock Region, to test the probability that cattle can be assembled more efficiently and purchased more cheaply if proper facilities are provided. Buyers representing the recommended feedlot operation,† the Addis Abeba market, and perhaps other groups would be encouraged to be located

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* Previous partial attempts to provide buying stations have failed, but the need for such services remains.

† See Program I.

at these stations. Each marketing facility would provide adequate services--such as feed, water, scales, and veterinary inspection--with charges made on the basis of services rendered. Cattle volume and price information would be collected and made available. A simple system of live animal grades could be developed and incorporated in the market information reports. Purchased cattle would be trucked to the feedlot or to urban markets.

d. Procurement

Procurement of an adequate supply of cattle for slaughter is a pressing and continuing problem for Ethiopian meat-processing plants. Although the solution depends upon expansion of cattle production, the present situation could be improved by better company organization and the availability of supply information. The larger plants could bring about improvements in obtaining cattle by establishing their own procurement departments, rather than depending on dealers. Consideration should be given to establishing organized markets or concentration points for buying and selling cattle. Purchasing should take place at regular intervals, with announcements to cattle owners.

e. Processing Plant Facilities

Slaughtering, cooling, and canning facilities at all exporting plants are modern and adequate. Their floors and walls are constructed so that the plants can easily be kept clean and sanitary. Slaughtering facilities and sanitation in all municipal abattoirs and at slaughter slabs are substandard. The correction of these conditions is essential for obtaining the confidence of consumers and improving the image of the industry.

f. Taxes and Fees

The fees, taxes, and duties paid by meat processors include a municipal tax, import duties on supplies used in meat processing, a transaction tax on exported meat, a fee to the railroad in Asmera when exports are trucked to Mitsiwa, and a Livestock and Meat Board assessment. The meat processors consider that, in many instances, the charges are not justified on the basis of services rendered. It is necessary to improve the processors' competitive position in world markets to the maximum extent possible. Therefore, consideration should be given to the effect of the various taxes and fees on the processors' competitive position and to possibilities for revising them, if warranted.

g. Plant and By-Product Utilization

All meat plants producing for the export market are operating at less than 50 percent of capacity, on the basis of a 30-week annual production season. In addition to improving their procurement programs, managements of these plants should seek other means of achieving greater utilization of plants and equipment. Managements of plants located in fruit and vegetable producing areas should investigate opportunities in fruit and vegetable canning, if found economically feasible, since little additional equipment would be needed.

Some plants are not equipped to fully utilize their by-product--such as blood, bones, meat scraps, tallow, and ingredients for making glue. Most intestines are made into fertilizer, rather than being processed into casings for export, with a higher value. Moreover, no glands appear to be salvaged. The managements of these plants should investigate the relative economic advantages of selling their by-product raw materials to other manufacturers, or establishing their own facilities for processing the materials into higher-valued products.

h. Location and Size of Additional Plants

Slaughtering and processing capacity in northern Ethiopia now exceeds the supply of cattle and probably will continue to do so for a number of years. However, additional facilities may be warranted in the south. By reducing the long distances over which cattle are trailed, and the resulting weight and death losses, additional plants in this area would increase the supply of meat.

The slaughter capacity of new plants in southern Ethiopia probably should not exceed a combined total of 150 head per day. They probably should include meat canning and by-product processing facilities. Relatively simple, hand-operated equipment would appear preferable to automatic equipment, in view of the ample supply of low-cost labor and the lack of mechanical skills in the labor force.

Any plans for establishing new cattle slaughtering and processing plants in southern Ethiopia should be preceded by economic feasibility studies, with particular attention given to the supply of cattle, transportation costs, and markets for the fresh and processed products.*

B. Pricing and Marketing Policies for Food Crops†

When considering long-run pricing strategy, several related factors must be taken into account. Scattered field data assembled by the SRI team tends to suggest that in many cases the farmer may barely recover his costs of production when he sells his crop. Yet the basic need of Ethiopia is for increased crop production at lower prices, both

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* The closed National Meat Corporation of Ethiopia at Malgue Wendo is a special case, which has been discussed in Report No. 7, Development of the Ethiopian Livestock Industry.

† For further discussion of this subject see Report No. 16, Marketing of Grains and Pulses in Ethiopia.

to provide for the increasing population and urban consumers, and to supply foreign demand. These apparently contradictory goals (higher income for the farmer if he increases production, and lower prices to buyers, especially foreign importers) must somehow be reconciled.

The tentative recommendations of the SRI team contemplate more stable prices combined with an improved marketing system, and increased production obtained at drastically lower costs per quintal of product. The latter would be obtained through the introduction on selected farms of combinations of improved inputs of production combined with better farm management.* The resulting increased volumes of crops marketed and the improved marketing system are expected to force the domestic wholesale market price of crops down to levels that would allow foreign markets once again to bid competitively for grains and oilseeds in Ethiopia, and to purchase much larger amounts of pulses. At lower prices, the domestic consumption would expand, so the production increase would have to supply both markets. Increased net farmer incomes would come from the much lower costs of production per quintal of product, and from the much larger volume of crop available for sale from the same area of cultivated farmland. At lower crop prices, it may become possible to think more realistically about using these products for animal feeding, or for providing industrial raw materials.

It would not seem well-advised for the IEG to take over extensive marketing of Ethiopian grains and pulses either domestically or in international trade: it has neither the financial resources nor the necessary expertise. Instead, the objective should be to improve and develop the performance of the existing system, eliminating or at least reducing its imperfections as rapidly as is feasible.

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* Programs I, II, and III.

Improvements in the marketing system should aim to:

1. Provide producers with better access to markets and market information

2. Reduce seasonal price fluctuations by increasing the demand by buyers during the post-harvest period and by providing credit to producers and produce organizations to hold inventories

3. Reduce the year-to-year fluctuations in supplies and hence prices by storing supplies from especially bountiful years for sale and consumption in years of poor harvests

4. Improve the storage facilities and practices of both producers and merchants, and hence reduce storage costs, especially losses

5. Increase the intermarket integration of the marketing system so that prices throughout the Empire are more closely related with supplies moving in response to any price differences greater than the cost of transportation and risk involved

6. Develop commodity grades and encourage their adoption by the marketing system so as to more effectively reward preferred varieties and discourage the production and sale of poor varieties, adulteration of produce, or an excessive foreign matter content

7. Make more effective the essential government regulations of the marketing system, especially in regard to export shipments

8. Strengthen and expand the services needed by the marketing system, such as market information, cheap and accessible communication facilities, clean and efficient market facilities (stalls and warehouses), technical advice on the storage and distribution of grains and pulses, credit, and business training for merchants.

In the longer term, the strategy should concentrate on improving and developing the public and private facilities and services (the infrastructure) used by the marketing system. In the short term, the strategy should concentrate on improving and developing those institutions that can operate somewhat independently of the marketing environment, the

most important of which are the Ethiopian Grain Board and the Ethiopian Grain Corporation.

The specific recommendations fall into three basic groups. The first relates to the immediate strengthening of certain structural components of the system, and the second to longer-term improvements in the facilities and services used by it. The third group of recommendations are conditional programs.

1. Organization of the Marketing System

To date, the IEG has not defined its policy on the pricing and marketing of grains and pulses. It should prepare and disseminate a general policy designed to direct, guide, and inform its own ministries, agencies, and instrumentalities, as well as the general public. It must, however, remain flexible and be prepared to alter its policy as conditions warrant.

a. Ethiopian Grain Board

The Board should be reactivated to perform both regulative and operational functions in the national interest. This would include responsibility for the overall level of grain output, storage of adequate reserve supplies to provide for all major contingencies, and the regulation of the marketing system (especially exports) so as to ensure conduct and performance consistent with the national interest. Its present legislative basis is generally adequate to meet these responsibilities, but its scope and composition should be expanded to emphasize its proposed greater role in stabilizing domestic supplies and prices.

The Board should have a paid, full-time staff, the executive members of which would be a president and three vice-presidents.

Functionally, the Board should have three divisions, each headed by a vice-president: (1) a Regulations Division in charge of such functions as the licensing and regulation of grades, cleaners, brokers, and exporters, the issue of export certificates, and the establishment and regulation of grades and standards; (2) an Operations Division responsible for such functions as the management of a National Reserve Stock Scheme aimed at carrying over supplies from year-to-year in order to reduce the risks and price fluctuations associated with abnormal crop years (the Board should own these supplies but use the Ethiopian Grain Corporation or some other merchant to handle them), and the collection, analysis, and dissemination of crop, market, and other information; and (3) a Central Administrative Division performing such functions as the keeping of accounts and other records and the financing of inventories held in the National Reserve Stock Scheme. The Ministry of Commerce and Industry, particularly outside of Addis Abeba and Asmera, could be used to perform many of its regulative functions.

The full Board should be served by two working committees, a Regulations Committee and an Operations Committee. To be effective, the Operations Committee should work closely with the Ethiopian Grain Corporation, but it should not attempt to dictate policy to it. A Joint Board-Corporation Committee should be established to ensure coordination between the two organizations.

b. Ethiopian Grain Corporation

The Corporation should expand its trading operations as fast as its resources and expertise allow, so as to improve the operation and performance of the marketing system as a whole. Within its capacities it should assume responsibility for helping to stabilize the flow and prices of commodities within seasons, and for improving the intermarket integration of the system. The magnitude of its carry-over supplies should be

determined on the basis of commercial prudence. The expansion of the Corporation's operations could be pursued, if it proves financially feasible, through the Commodity Stabilization Scheme for grains, described later.

The existing expansion plan of the Grain Corporation should be supplemented by additional studies as needed to determine the optimum location, size, and type of the new facilities that will be required. The Corporation's expansion should be horizontal, concentrating on the functions that it is already performing. Existing assemblers, wholesalers, and retailers should be used to the maximum extent possible, as agents if necessary. An exception to this path of expansion could be the use by the Corporation of its own staff and facilities to handle the distribution of farm input supplies. This activity would be a logical complement, since such inputs are most in demand when the Corporation's marketing activities are at their seasonal low. The Corporation may also wish to arrange distributor workshops on the methods and advantages of using these nontraditional but increasingly essential inputs, and to assist in the development of a broad-based producer cooperative movement.

c. Government Regulations

Several aspects of merchant behavior should be regulated more effectively. Particularly important here are those regulations--such as the limits on the foreign matter content of export shipments--designed to protect Ethiopia's reputation as an exporter of grains, pulses, and oilseeds. These regulations and their enforcement should be the responsibility of the Regulations Division of the Ethiopian Grain Board.

Other regulations already exist for governing most aspects of markets and marketing, such as the formation, registration, licensing, and operation of businesses; standard weights and measures; standard court procedures and requirements; and unfair trade practices. The

problem is much more one of obtaining compliance with these regulations than of developing new ones. Enforcement of existing regulations should be actively pursued.

2. Marketing Facilities and Services

Certain facilities and services need to be improved in many parts of the marketing system so that it can, in the long run, perform its functions more efficiently.

a. Markets

A need for better sanitation and more hygienic conditions in the sale of foodstuffs exists throughout the Empire. Important here is the provision of latrines, water, and garbage disposal facilities, at least in the larger markets. Improved transportation and communication facilities should also be considered.

Improvement and development effort should be concentrated on the larger and more centrally located traditional markets that will continue to grow in overall importance both for assembling and distributing. Among other items, the construction of suitable permanent short-term storage (warehouse) facilities for rent with convenient and easy loading facilities should be undertaken wherever feasible.

The growth of permanent buying stations in and out of markets should be recognized. They will become even more pervasive once a system of grades and standards is generally accepted and communication and transportation facilities are improved.

b. Grades

The IEG should begin planning for the establishment of a formal system of commodity grades, and should begin a program to educate the public regarding their need, application, and usefulness. Although the marketing system as a whole will not be ready to adopt a formal system of grades in the near future, the government should be fully prepared to introduce it as soon as possible. More urgent is the need to develop and encourage the use of simple devices for cleaning grains and pulses.

c. Price Information

A major service needed at all levels of the marketing system is current and relevant price information. Until the proposed Operations Division of the Ethiopian Grain Board can take over responsibility for providing this service, the news media--both radio and newspaper--should be encouraged to assemble this information from the present collecting agencies, as well as to disseminate it on a daily basis. Average daily prices in Addis Abeba, Asmera, and a large selection of other markets should be included.

d. Credit

An improved and expanded system of producer and merchant credit is urgently needed, especially for the seasonal storage of supplies and the financing of farm inputs. The supply of seasonal credit extended by the banking system should be expanded and the amount of security currently required for a loan should be reduced. The extension of credit by the larger merchants, including the Ethiopian Grain Corporation, to other merchants, such as producer cooperatives, should be encouraged.

3. Conditional Programs

Certain conditions must be met before either of the two programs proposed below could be implemented. Substantial capital is required for the commodity stabilization scheme, and more research is needed to prove the demand for and usefulness of bonded public grain warehouses.

a. Commodity Stabilization Scheme for Grains

Possibly one of the most effective improvements that could be made in Ethiopia's marketing system would be a Commodity Stabilization Scheme run by the Ethiopian Grain Corporation. It would require a four-fold increase in the volume of grain handled by the Corporation over the six-year period suggested for developing the scheme, and capital investment on a scale likely to be possible only through a foreign assistance loan.

Such an increase in the magnitude of the Corporation's operations should assist generally in the more orderly marketing of grains. Specifically, the scheme would: (1) induce the marketing system as a whole to pay higher relative producer prices, (2) offer minimum ("floor") producer prices, initially established on a day-to-day basis but eventually set, in the period before planting of the crop, for the entire following season, (3) help stabilize and lower relative consumer prices, and (4) to the extent that it is commercially prudent, carry over supplies from season to season. (The Ethiopian Grain Board, through its proposed National Reserve Stock scheme, should be responsible for carrying over supplies needed to safeguard the national interest.)

In the short term, only the major grains--teff, wheat, barley, maize, and sorghum--should be included in the scheme. Eventually, pulses and oilseeds could be included.

The exact magnitude of operations required to achieve the objectives of a stabilization scheme depends both on the efficiency of the existing marketing system and on the magnitude of the intra- and inter-seasonal fluctuation of supplies and prices. Although a certain amount of experimentation will be required to find a suitable "rule of thumb" for the scheme, it is recommended that the Corporation initially aim for a seasonal turnover of supplies equivalent to at least 25 percent of total supplies consumed by the market-dependent population included in the scheme.

Five phases covering six years are recommended to develop and implement the scheme in an orderly fashion. Initially, all efforts should be directed toward stabilizing supplies and prices in Addis Abeba (Phase 1) and Asmera (Phase 2). The scheme should then in the following two years be extended to the remaining urban centers with populations over 10,000 persons (Phase 3), to the small urban centers the following year (Phase 4), and finally, in Phase 5, to the market-dependent rural population, possibly about 25 percent of this population initially.

If such a scheme were to begin in 1969, it is estimated that the Corporation would handle an extra 36,700 tons of grain valued at Eth$ 6.1 million in Phase 1 and 127,200 tons valued at Eth$ 19.7 million six years later in Phase 5.

The capital to hold these inventories would account for the major share of the capital required by the scheme. The other major capital requirement is that associated with the construction of about 88,000 tons of additional storage capacity by Phase 5. Assuming that most of the storage will be undertaken in the large urban centers and in flat (bag) storage facilities, the approximate cost of the additional storage capacity required is Eth$ 3.5 million.

With astute management, the scheme should be entirely self-supporting in the long term. In the early years of its operation any losses should be reimbursed by the IEG, if necessary. In general, the Corporation should engage in seasonal storage and inter-market arbitraging of supplies when the difference (margin) between its buying and selling prices is more than an acceptable minimum. The minimum acceptable margin for storage should be related to the direct costs of trading (buying and selling in the market plus transportation) along with the normal cost of storage; the margin for the inter-market arbitraging of supplies should be related only to the direct cost of trading.

The exact success of the scheme should be measured by how much of the extra Eth$ 28 to Eth$ 36 per ton return now received by the marketing system to perform seasonal storage is no longer required by it. There is a real possibility of the scheme inducing a general rise of Eth$ 10 per ton in the average price received by producers and a fall of the same magnitude in the average price paid by consumers on the produce requiring seasonal storage. By the end of Phase 5, this could well mean that producer incomes are increased by over Eth$ 5 million per year, with consumer savings of a similar amount.

b. Bonded Public Grain Warehouses

If the demand for public grain storage facilities proves adequate, regulations enabling the establishment of bonded public grain warehouses should be adopted and licenses issued accordingly. If established, such warehouses would issue receipts on the acceptance of produce for storage. These receipts could then be used as the basis for a commodity loan. In addition, receipts should be such that they could be sold or assigned, although full development of this benefit must await the adoption of a formal system of commodity grades. The proposed Regulations Division

of the Ethiopian Grain Board should be responsible for the licensing and regulation of these warehouses.

C. Storage of Food Crops

A vital part of the marketing system for oilseeds, pulses, and grains is efficient and inexpensive storage. Several reasons favor the development of an oilseeds storage network.* It will: (1) facilitate bulk handling, thus lowering transportation and handling costs; (2) enable the storage of oilseeds during the coffee season, when transportation costs are higher; (3) allow oilseeds in storage facilities to be retained for export at times when foreign market prices are favorable; (4) allow stored oilseeds in large bins or elevators to be easily chemically treated, avoiding losses from pests and rodent damage.

With the major exception of the Ethiopian Grain Corporation, present on- and off-farm storage facilities and practices are generally traditional and inefficient when compared with known modern techniques, and certainly result in more physical waste than need be the case. However, storage facilities designed for ease in handling the stored commodity as well as for protecting it from losses caused by moisture, bacteria, insects, rodents, etc., generally would require a substantially larger investment than is necessary in Ethiopia at present.

The major need, at present, would seem to be for slight structural modifications and for improved storage practices. A research program to study traditional and improved storage facilities and practices is needed. The reactivated Ethiopian Grain Board, through its proposed Operations Committee, could take a direct role in first stimulating and

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* See Report No. 8, Development of the Ethiopian Oilseeds Industry.

coordinating this research, and then in drawing up and implementing a general storage-improvement program.

Some of the items that should be investigated are: (1) rodent control and proofing of structures, such as through the use of wire gauge and rat guards; (2) low-cost and effective mechanical devices for artificially drying grains, for use in those areas where grains have a high moisture content at harvest; (3) types, timing, and rates of application of fumigants, pesticides, and insecticides; (4) the traditional methods of using facilities, including the effect of not cleaning out facilities before new grain is added; (5) the proper ventilation of structures; (6) the proper method of stacking bags, including the use of dunnage to minimize the absorption of moisture from the floor; (7) new and improved storage facilities.

1. Storage Margins

At present, a relatively high degree of risk is associated with commercial storage because of the uncertainty of price levels likely to prevail later in the season. Examples can be quoted of the price reaching its low point very early in the season, such as October, and its high point either early, such as March, or late in the season (August). Transactions at improvident times are therefore very possible and will frequently result in large and often ruinous losses. Transactions at the propitious moment, however, are almost certain to result in very large gains. For 223 observations of different seasons,* the average maximum return when the commodities are bought and sold under the most favorable conditions was 40 percent for both grains and pulses.

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* See Report No. 16, Marketing of Grains and Pulses in Ethiopia.

2. Farmer Storage

The marketable surplus is classified from the farmers' point of view into three categories: (1) the landlord's share, (2) crop sold into commercial channels by the farmer immediately after harvest, and (3) crop stored for later sale by the farmer. The proportion of the crop that eventually moves into commercial channels was shown by an SRI survey of over 200 farms in 1968. For medium-sized farms--that is, between 3 and 10 hectares--the study showed approximately 50 percent of the crop moving into commercial channels for teff, 45 percent for wheat, and approximately 25 percent for those farms reporting maize production.*

One estimate places sales of grain by farmers at 30 percent of total sales by the end of February, with another 20 percent sold in March. Certainly by May most farmers have generally sold all but a fraction of their marketable surplus.

It may be concluded that modern-styled storage facilities are probably not the major need of small producers at present for on-farm producer storage, where the facilities are generally well-adapted for their purpose and average losses over a season do not appear unreasonably high.

3. Off-Farm Storage

Since farmers sell the bulk of their surplus soon after harvest and since consumers demand a fairly even distribution throughout the year, considerable seasonal storage must be undertaken by the marketing system. As retailers do not store for more than a few months at most, this means that this storage is undertaken by assemblers and wholesalers (and also millers in the case of wheat).

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* See Report No. 10, Production of Grains and Pulses in Ethiopia, Appendix B.

The storage facilities--urban dwellings and warehouses--frequently afford the stored commodity relatively little protection, other than protecting it from direct exposure to the elements. Facilities are very frequently poor in design and construction and are thus conducive to both a loss of weight and of quality. Average storage margins also appear to justify consideration of additional storage capacity.

Small merchant storage facilities are typical of many urban dwellings; most have an earthen floor. Except for a few storers of grain, fumigants are not used to control insect damage, which is often considerable by the end of the season. The rapid rate of growth of the market-dependent urban population suggests that merchant storage, particularly in the major urban markets, will need to be expanded.

A significant amount of storage is undertaken by a relatively small number of larger merchants who are able to amass considerable resources for the holding of grains and pulses. The largest of these, the Ethiopian Grain Corporation, possesses 29,000 tons of modern bulk storage capacity and 10,000 tons of bag capacity at 13 locations. Although the Corporation is the most active in chemically protecting and conditioning its inventory, other large merchants sometimes follow good storage practices.

It is recommended that the IEG, through its financial intermediaries, help finance the construction of new warehouse facilities, as desired, by wholesalers. In this way, considerable control could be exercised over the type and suitability of the new facilities constructed. This could be reinforced by the pertinent municipalities drawing up and implementing ordinances requiring the conformance to minimum standards for all warehouses to be used in storing grain, pulses, and oilseeds.

If a government price-support program were in operation, it might be necessary to have government purchasing at times and also possibly to have storage contracted for or owned by the government, available to take unusual seasonal surpluses for temporary storage.

One recommendation* is for the Ethiopian Grain Corporation to expand its activities fairly rapidly. The Corporation should be able to store and protect the commodities it handles in suitable storage facilities and so minimize storage losses and maintain the quality of the products it handles. The exact location, size, and type of storage facilities required to enable the Corporation to effectively undertake this expanded assignment requires considerable information. Information on each commodity would have to be required about (1) the location, size, and buying of the market-dependent population; (2) the location, size, and consistency of the surpluses; (3) the economic and engineering aspects of the various types of facilities that could be used; (4) the likely location, size, and consistency of demand for storage space by private clients; (5) the availability, seasonality, and costs of transportation available for inter-facility commodity movement.

D. Transportation

It has been estimated that 80 to 85 percent of Ethiopia's rural people live ten or more kilometers from even a dry-weather road. Most of what is marketed from Ethiopian farms is carried from the farm to market by donkey or by human back; purchased items are carried to the farms from the markets by the same methods. As Report No. 16 shows, the distance to market for a majority of farmers in the Highlands part of the country varies from 6 to 12 kilometers. Most of this distance is usually on trails and not on constructed roads.

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* Report No. 16 , Marketing of Grains and Pulses in Ethiopia.

An effective transportation network is an absolutely essential ingredient of the marketing system, because all marketed supplies must be transported at one time or another. The availability and cost of transportation is one of the major determinants of the cost and efficiency with which the marketing system performs its functions. In fact, the spread of the market economy is very closely associated with the expansion of the transportation network.

In recent years both the coverage and condition of roads throughout the empire have improved significantly. Accompanying the improvement in road surfaces has been a very marked downward trend in freight tariffs. Rates paid in 1966 were generally one-half or less of those paid in 1953 for truck transportation. An example of the effect of the condition of road surface on the truck rate charge is the rate from Addis Abeba to Gimbi, which fell to one-third the previous rate per ton following the completion of an all-weather road.

For the most part, merchants express satisfaction with the transportation system--in the larger urban centers, transport is generally readily available, with price being the major point of contention. Even at the more accessible small markets, transport is usually available where a regular demand for it exists.

The rural area access (dry weather) road system is much less satisfactory. During the period of the Second Five-Year Plan (completed in 1967), 77 percent of the primary road program in that plan was implemented; only about 40 percent of other categories of roads were realized. If future construction were to take place at the same rate, it is evident that dry-weather roads would not be constructed to the extent considered necessary, even on a conservative basis, by responsible authorities.

1. Movement for Export*

If the IEG drive for increased foreign exchange is to be successful, it follows that there will be increased movement of raw and processed agricultural products. Since there are no roads or railroads suitable for the economical movement of goods in significant quantities between Ethiopia and the Sudan, and Kenya and Somalia to the South, almost all exports and imports except those going by air must pass through the three ports serving Ethiopia.† Funds have recently been made available for the engineering and some construction of a road to Kenya; however, this road will not significantly affect the port traffic because trade with Kenya will be relatively low.

The port of Mitsiwa, serving Eritrea and northern Ethiopia, is connected by all-weather highway and by the narrow-gauge Eritrean Railway with the marketing center of Asmera. All goods must be shipped to and from the port by rail unless a waiver is granted by the railroad.

Djibouti is connected to Addis Abeba and vicinity by rail only, since there is not an all-weather highway all the way. The narrow-gauge railway, which is half-owned by the IEG, is efficiently managed and its equipment is being modernized.

Aseb, on the other hand, is connected with Addis Abeba and vicinity only by an all-weather highway. Although there have been discussions about extending the railway to Aseb from a connection somewhere between Djibouti and Addis Abeba, this possibility is not considered to be feasible because of (1) the high capital cost, (2) the low quantities of traffic to be handled, and (3) the fact that an all-weather highway is being built within the next few years between Awash and Tendaho, giving

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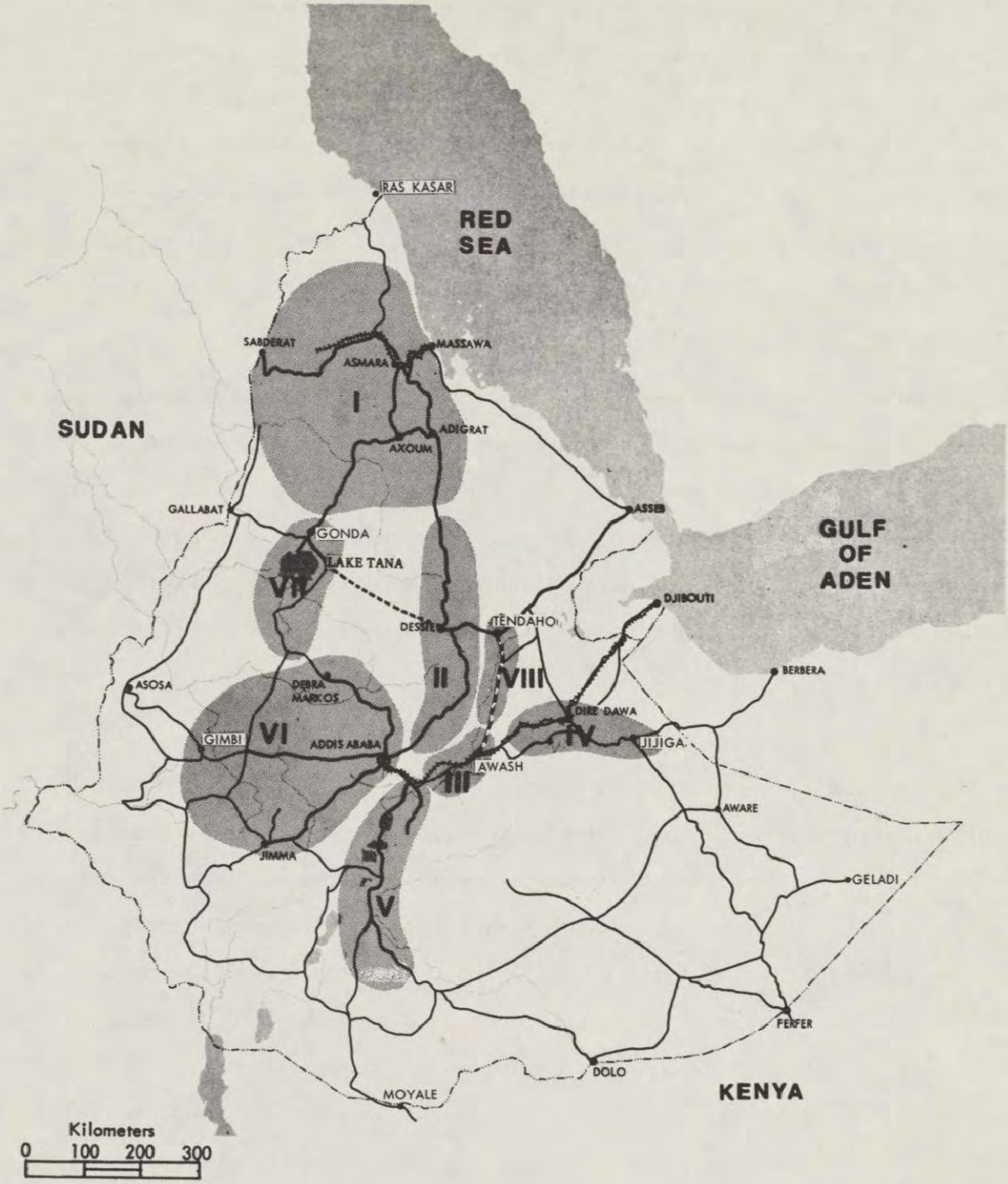
* See SRI Report No. 4, Improvement of Ethiopian Ports.

† Transport networks are outlined in Fig. 7.



SOURCE: Stanford Research Institute.

FIGURE 7 ETHIOPIA'S PRINCIPAL NETWORKS AND MAJOR AGRICULTURAL PRODUCTION AREAS

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a better paved highway from Addis Abeba to Aseb than now exists, and (4) the developing efficiency and capability of Ethiopia's trucking concerns. Assuming that both Aseb and Djibouti offer similar service and cost characteristics, the choice between them for moving exports and imports should be based on the relative service and cost characteristics of trucking and the railway. Since 1962, when its major expansion was completed, Aseb's traffic has been increasing, partly by winning some traffic away from Djibouti.

A major factor that must be taken into account in planning increased Ethiopian exports is the high cost of moving products and its effect on Ethiopia's competitive position. For example, it is estimated that for a typical pulse export transaction, with the pulses being produced in Begemdir Province and exported to London through Mitsiwa, marketing and transportation costs amount to about 72 percent of the value of the transaction.

It has been pointed out that Ethiopia could not enter the export market for grains competitively at this time. Not only are Ethiopian wholesale grain prices presently either equal to or above the prices obtainable for grain delivered to the major import markets, but the marketing and transportation costs would almost prohibit Ethiopian grain exports at the present level of world grain prices. The situation for pulses and for some oilseeds is more favorable, owing to higher world prices. Livestock will apparently need to move into world markets primarily in the higher-priced forms--alive, fresh, or frozen--in order to overcome internal costs of transportation, as well as to meet high domestic prices paid by Ethiopian consumers.

2. New Road Construction

As the Third Five-Year Plan suggests, transportation policy should be based primarily on the central role of transportation in providing basic services to the entire economy. Investment policy for new roads should therefore stress the integration of costly primary road and other transport projects with those of the production sectors of the economy and thus with the actual needs of agriculture (as well as industry, mining, and commerce). If the suggestions of the Third Five-Year Plan are followed, costly and premature primary road projects will be avoided and stress will be placed on a much denser network of modestly designed secondary, feeder, and service roads. Heavy stress will also be placed on proper maintenance and administration of the system, with adequate control of overloaded vehicles and other activities detrimental to the system.

There appear to be two major hard-surface roads of interest in the next few years. The road with the greatest potential for impact will run through the Awash Valley to Aseb. This road connects important industrial centers--as well as an important agricultural area--with Aseb, and should have a major influence, especially since it will reduce appreciably the time and cost involved in truck transportation between Addis Abeba and Aseb.

The second road extension likely to have major influence is that extending south of Addis Abeba into the coffee and cattle country of southern Ethiopia. Although this will be a short stretch of road, it will tap important agricultural resources, and should noticeably affect the agriculture of the southern region almost immediately after it is completed.

New roads to the west approaching market centers there should also have some effect on the national economy--probably less than those above, because they are not as near to export markets.

The development of the feeder road network is, of course, of primary interest to agriculture. Such a network can have a major impact by providing the opportunity for farmers to turn to commercial instead of subsistence farming. It is interesting to speculate under what conditions farm penetration roads would be justified. It is known, for instance, that the use of animals and human porters is very expensive. The Imperial Highway Authority has estimated the cost of carrying goods per ton/kilometer by mule or camel at Eth$ 1.44; it is probable that human porterage costs over Eth$ 2.00 per ton/kilometer. The ability to use wheeled vehicles on the new roads enables the shipper to take advantage of lower transportation costs. For example, the early 1966 representative trucking tariffs charged for grain movements (when the route was not entirely on all-weather roads), were no higher than Eth 45 cents per ton/kilometer.

If one took as an example the building of a 10-kilometer dry-weather road into a farming area from a market or from a primary road, one would have a total cost for building the road of about Eth$ 85,000 and an estimated annual cost (including both maintenance and repayment) of somewhat over Eth$ 7,000 annually. If the building of a penetration road saves the farmer shipping costs of approximately Eth 50 cents per ton/kilometer, then the farmers from that farming area would be able to pay for the cost of building the road and for maintenance (on their savings from approximately 1400 tons of shipments annually). The government need not recoup the cost of new roads through road tolls, although consideration might be given to this system if it were the only way by which some key penetration roads could be initially financed.

The size of the supply area serving each market is determined primarily by two factors: (1) the price paid at the market--the higher the price, the farther the farmer can afford to transport his product; (2) the cost of transportation--the higher the cost, the lower will be the net price received by the farmer after that cost is subtracted from the

market price. Therefore, lowering the farm-to-market transportation costs will increase the size of the supply area associated with each market. This would probably mean an increase in marketable surplus supplies and a lowering of marketing margins as a result of the lower assembling costs.

E. Agricultural Exports*

One of the overall objectives of the SRI studies has been to increase foreign exchange earnings from increasing exports or by reducing imports. Imports have increased at a greater rate than exports in the past decade and in most years have exceeded exports. Under these circumstances, and assuming that increasing amounts of exportable products will be produced through various programs recommended in the SRI studies, the IEG will need to be concerned with the problem of facilitating increased exports.

An example of appropriate IEG action is the export of grains and pulses, which began in a major way in 1942 as a result of a deliberate policy by the IEG and the temporary British Administration to encourage production for export. The United Kingdom Commercial Corporation (UKCC) guaranteed "to purchase at reasonable prices all grain of good quality offered at approved collecting stations."*

In 1943, the guaranteed minimum per quintal price was raised from Eth$ 5 to Eth$ 12; the resulting production response was converted into an export surplus and is now a matter of record. Although the UKCC ceased operations in 1945, the severe world grain shortage following the war kept export prices high, so that the peak export of grains and pulses was achieved in 1947-48. Thereafter, except for a brief revival during the

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* See Report No. 6, Ethiopia's Export Trade in Major Agricultural Commodities.

period of the Korean War, exports declined and then ended. In contrast, pulse exports have continued to rise since the war, with a peak of 116,400 tons being exported in 1965 at a value of Eth$ 14 million (Eth$ 21 million in 1966).

A typical pulse exporter is described in Report No. 16.* His expenses and margin account for about 34 percent of the London selling price. The cost of assembling supplies from the producer ready for sale to the exporter accounts for another 38 percent of the London price. The producer in this case would receive about 28 percent of the London price. The margins of the exporter, wholesaler, and first and second assembler were all estimated on a conservative basis, and they might well be somewhat higher in practice.

When the services performed are considered for the pulses exported, that of transportation and handling is the largest--39 percent of the London price. Cleaning, weight losses, and packaging account for 12 percent; direct taxes account for 6 percent.

When one considers the future of all exports from Ethiopia, Report No. 4† has some very preliminary estimates for the next fifteen-year period. By approximately 1983, it is estimated that the total value of exports of goods f.o.b. Ethiopia may amount to somewhere between Eth$ 404 million and Eth$ 732 million. Even exports near the lower estimated figure would represent a sizable increase over the present annual exports. Almost all exports within the next 15 years are expected to be agricultural products or derivatives thereof.

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* Marketing of Grains and Pulses in Ethiopia.

† Improvement of Ethiopian Ports.

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1. Present Problems Connected with Exports

a. General Problems

A number of problems encountered by exporters and importers apply to more than one commodity.

(1) Quality and Standardization

The greatest number of comments from all sources concerned the high degree of impurities in bagged products, and the failure on the part of some Ethiopian exporters to live up to the contractual specifications of quality. In cases where importers subsequently won a settlement under arbitration, they often found difficulty in obtaining the awards. The lack of an effectively enforced arbitration system in Ethiopia, particularly on matters of quality, was frequently cited as a hazard of doing business. While the exporters blamed farmers and local traders for adding impurities, they themselves are entirely responsible for the presence of impurities when the products are shipped. For example, exporters are required under existing regulations to clean all export shipments of grains, pulses, and oilseeds, which must be accompanied by a certificate issued by the Ministry of Commerce and Industry showing the maximum percent of impurities. It is the discrepancy often found between the certified and the actual percent of impurities that is the principal subject of complaint by foreign importers.

(2) Packaging and Bagging

Inadequate packaging for shipment was another problem frequently mentioned. While this results in greater loss to the exporter, the importer also suffers to the extent that he is often unable to meet his commitments to his clients. If he also must enter arbitration and wait for an award, his profits are reduced and he may thereafter negotiate

with Ethiopian exporters on more stringent terms. Exporters also complain about the high cost of new bags and the fact that there is a duty levied on the import of bags and bagging materials, even though they may be used for export. Under present policies, bags for the packing of salt and sugar produced in the Empire and exported abroad are imported duty free. This is not true of bags and bagging materials imported for the re-export of other agricultural products. A change in this policy should be considered. The common practice of using second-hand bags, even in the export of agricultural commodities, has caused a number of problems, chief of which is excessive breakage of bags. Another problem is that some second-hand bags that were previously used for packing chemicals or fertilizers, are--on the second use--used to package products intended for human consumption. This results in contamination of the product and subsequent rejection by importers.

(3) Duties and Taxes on Exports

Export duties on certain products such as sheepskins and goatskins and the 2-percent transaction tax on all exports add to the cost of Ethiopian exports. It is believed desirable to consider whether these duties and taxes could be shifted or removed from agricultural exports. Coffee may be a special case requiring different treatment.

(4) The National Bank and Exchange Transactions

One criticism by exporters and importers is that the National Bank sometimes refuses to allow an export transaction if the price shown on supporting documentation appears to be significantly below the 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 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.

The second criticism is that when European importers have been awarded claims against Ethiopian exporters, as a result of contract arbitration, some exporters have sometimes not been able to pay because they have been refused the necessary foreign exchange by the National Bank. If this condition does exist it deserves close study, since Ethiopia's reputation for financial probity would be affected.

(5) Credit for Commercial Transactions

At the present time all trade, including foreign trade, appears to be limited in Ethiopia by the difficulty of obtaining sufficient credit. Traders now work on very slim margins and with limited capital. Trading opportunities may frequently be lost because of the alleged shortage of working capital.

(6) Crop Information and Statistics

Another general comment that deserves serious consideration pertains to the lack of information in Ethiopia on estimated annual production of crops. No reliable statistics are available that would enable merchants as well as exporters to obtain a realistic estimate of the size of the crop. This lack makes it difficult to establish fair prices and to finance exports.

(7) Ports

Present or potential problems concerning the ports, and their projected role in handling increased exports, include:

1. Lack of firm Ethiopian control over port handling of goods at Djibouti.

2. Political unrest in Aden is causing foreign ships to stop elsewhere for servicing; Ethiopian ports might attract some of this business if they were prepared. Such plans would depend on the reopening of the Suez Canal.

3. Cargo handling is inefficient, expensive, and slow.

4. Maintenance and repair expenditures have not been sufficient to arrest deterioration of facilities.

5. Customs services are not available at all hours when needed.

b. Problems with Specific Commodities

(1) Live Animals and Processed Meat

The following are problems encountered with live animals and processed meat:

- The European Common Market countries and the United Kingdom will not accept fresh, chilled, or frozen meat from East African countries because of animal disease problems.

- Moslem countries prefer the importation of live sheep and goats, while Ethiopia has for sale primarily processed beef. Ethiopia does have numerous sheep and goats, but domestic demand is good and the problems of exporting the live animals are difficult.

- Processors and exporters find it difficult to meet foreign contract commitments because of variations in cattle supplies.

- The ports do not have refrigerated warehouse facilities large enough to store a shipload of fresh or frozen meat.

- Competing suppliers of processed beef are reputed to offer better quality than that supplied by some Ethiopian processors.

- Domestic cattle prices are high enough to discourage purchase for processing into low-value export products.

(2) Oilseeds

The following are problems encountered with oilseeds:

- Domestic prices of most oilseeds in Ethiopia appear too high to allow them to compete easily on the world market.

- Sesame often obtains lower export prices because its red and white varieties are often mixed together in Ethiopia.

- Both seed and cake when exported often obtain lower prices because of the high percentage of impurities they contain.

- Cake often has too high an oil content to make a satisfactory export.

- Groundnuts and their cake have had a recent history of aflotoxin in some shipments.

- Apparently, bagged products (Ethiopian oilseeds and cake) are discriminated against in European ports that are designed to handle bulk commodities efficiently.

(3) Grains and Pulses

The following are problems encountered with grains and pulses:

- Domestic market demand is growing at a faster rate than population, which indicates that future consumption will take an even higher proportion of total production than at present.
- The demand for wheat and for pulses is likely to grow faster than that for other grains, since this demand is related to increases in urban incomes.

2. Strategies for Expanding Exports

For all Ethiopian export commodities the traditional markets should receive first emphasis; a concerted effort should be applied toward maintaining and possibly expanding these markets. Nevertheless, the development of new export markets would tend to strengthen the structure of Ethiopia's exports and facilitate export expansion. Such developments should be vigorously pursued. Particular attention should be given to the possibility of reducing Ethiopia's large unfavorable balance of trade, through bilateral and multilateral trade agreements and by strenuous export promotion, to expand both the sale of particular commodities and the markets for all Ethiopian export commodities. In particular, there should be more vigorous exploitation of the country's favorable geographic position in relation to the Middle Eastern and Asian markets. This is especially true as long as the Suez Canal remains closed, since the canal's closure makes it much more difficult and expensive for Ethiopia to reach its traditional markets around the Mediterranean and in Europe. The consumer preferences and other characteristics of major market areas provide the guideline for developing Ethiopia's export drive.

Trade channels are already established for almost every commodity exported by Ethiopia. In most cases the difficult task of breaking into

the highly competitive world market in primary agricultural products has already been accomplished. There remains, however, the significantly important task of serving these basic markets efficiently and carefully and gradually upgrading the quality of the products sold. Other major tasks are the increase of production for export and the improvement of those services for producers (as well as consumers) associated with ordinary marketing activities such as processing, transportation, storage, inspection, arbitration procedures, and trade relations. The commodities with limited domestic markets--such as coffee and hides and skins--have provided the largest surpluses in the past for marketing abroad.

Export expansion effort should now be centered on those commodities for which world demand (as imports) is growing faster than average and for which Ethiopia is in a strong competitive supply position. Highest on such a list among the major traditional exports are pulses and oilseeds. Both of these have moderate to high income elasticities of demand, particularly in developing countries. The prospective world demand-supply relationship indicates that a substantial increase in foreign trade is likely. However, the quality of Ethiopian exports must first be effectively standardized and then improved if they are to compete successfully.

If the stringent sanitary regulations of European importing countries can be met, the market for Ethiopian processed meat should be favorable. However, the smaller and less demanding markets in such regions as the Mediterranean, the West Indies, and the Far East may be easier to break into.

a. Foreign and Domestic Outlook: Grains and Pulses

Ethiopia has the potential of remaining a significant exporter of pulses and of again becoming a major exporter of grains. However, with the market-dependent population within Ethiopia growing in excess of 3.5 percent each year, the task is formidable.

Given a favorable outcome of new production and pricing policies, imports of wheat and wheat flour, rice (brewing), barley, maize, and other grains would be entirely replaced by increased domestic supplies. In fact, significant exports of grains might be possible. However, this would necessitate a decline in Ethiopian grain prices relative to world market prices if Ethiopia is to compete in the world market.

The export outlook and the competitive position of Ethiopia is considerably more favorable for pulses. Ethiopia's position as a pulse exporter is well established, accounting for about 5 percent of the total world market supplies in an expanding world market. The approximately equal mix between the low-priced pulses (chickpeas, horse beans, and dried green field peas) and the high-priced pulses (haricot beans and lentils) gives Ethiopia good access to a wide variety of markets. The Japanese market is particularly favorable, especially for the export of horse beans, because of the relative trade imbalance between Ethiopia and Japan. Furthermore, Ethiopia's major competitors are located in Africa and Asia, so that producing conditions are somewhat similar--although frequently less favorable in competing countries.

b. Characteristics of Western European Markets

Unprocessed agricultural products constitute the bulk of Ethiopia's exports to Western Europe, where markets are characterized by relatively uniform market practices and by competition. In each of the Western European countries, Ethiopia's exports must compete with the

products of many similar exporting countries. Occasionally, political considerations supervene--as in the case of preferential treatment of France or the United Kingdom for products of countries that were former colonies. However, one evidence of the general market uniformity (in Western Europe) is the brokerage system centered mainly in London, Amsterdam, and Hamburg. Brokers who purchase for European customers must be certain of the product's acceptability throughout a wide market area.

The rising standard of living that has characterized nearly all of Western Europe since World War II has not only increased the per capita consumption of basic commodities but also the demand for new and different foods. There have been marked changes in the buying patterns of Europe in recent years. There has also been a strengthening of consumer preference for products of higher quality. In many cases price, although still an important characteristic, is secondary.

Consumer buying standards associated with health and sanitation are high, requiring suppliers to enforce seemingly rigid restrictions. Unlike the Middle East, Western Europe has fewer cultural and religious practices that tend to restrict Ethiopian imports. Thus to increase Ethiopian exports to Western Europe, primary emphasis must be given to improving the standardization and quality of exports, to reliable delivery, and to consistently dependable business practices. Such efforts will, in the long run, be rewarded with higher relative prices and increased volume of trade. However, while the Suez Canal remains closed, shipping around the African continent remains expensive and slow, and brings Ethiopia commodities into conflict with export products from other African countries located closer to Europe by sea lanes.

c. Characteristics of Eastern European Markets

Eastern Europe, which imports some products from Ethiopia, tends to be conscious of both quality and price. Purchases are usually made through government procurement organizations and may often be based on political as well as economic motivation. The irregularity and large size of many purchases for the Eastern Bloc countries can cause sudden and dramatic price fluctuations in the exporting countries. In general, supply and demand trends are more difficult to forecast for the centrally planned economies than for the Western European countries, but standards are often not as high, and these markets should not be overlooked.

d. Characteristics of Middle Eastern Markets

The Middle Eastern markets tend to be governed more by price considerations than do the European markets. Usually price is a more important factor than quality. In these countries a number of other forces are at work. Religion and politics affect consumer preferences and help establish the import patterns. While religious and political considerations are usually not so strong as to prohibit trade, there is a natural tendency on the part of the Arab-Moslem countries to prefer to do business with countries whose populations are predominately co-religionist. In this respect Ethiopia's large Moslem minority is usually considered a favorable factor. Fortunately, Ethiopia's proximity, and in some cases the superiority of its products over local ones, have helped to overcome adverse factors in trading with Moslem countries. The observance of religious customs, for example, in the slaughter of livestock is an important characteristic of the Middle East livestock and meat markets, although religious restrictions are, in fact, not always as rigid as might be expected.

For a number of social, economic, and cultural reasons the basic diet of the majority of people in the Middle East is less varied

than in Western Europe and the preparation of foods tends to depend more on the basic staples and unprocessed foodstuffs. Health standards appear to be generally less rigid than in Europe, thus creating fewer problems of processing and standardization for exporting countries.

Ethiopia has definite opportunities for increasing its exports to the Middle East and less need to adapt its products to suit consumer preferences than is required for the European markets. For those countries such as Iran, with which there is a significantly unfavorable balance of trade, Ethiopia should examine ways of correcting the balance, such as concentration on exporting products with special market development opportunities, and on developing trade promotion agreements.

3. Recommendations for Necessary Actions

Actions by the IEG and its agencies, either alone or in concert with exporters and other businessmen, are necessary to improve the export picture and help realize Ethiopia's potential.

a. Export Promotion Council

The establishment of an Export Promotion Council should be considered. Such a council would be generally responsible for the promotion of foreign trade in all Ethiopian commodities. However, for the most part, it would conduct market research and sales promotion for specific commodities. These services might include trade missions, foreign representatives, pilot programs to develop new uses and outlets, provision of information to exporters on export opportunities, and the related quality, variety, grades and standards, packaging, sales promotion, and transportation requirements of such opportunities. Information would also be provided to potential foreign importers about Ethiopian products, and appeals would be made to foreign governments over unfair and detrimental regulations and practices.

Such a Council would not engage directly in trade itself and would have no powers of compulsion. It would fulfill a promotion and advisory role only. Once established, the Council would be self-supporting from funds provided by the industry groups that it specifically represents. This support would come mainly through levies made on the export sales of these groups. The IEG should consider supporting the Council on behalf of the nontraditional export commodities. Each contributing industry group would have representatives on the Board of Directors of the Council.

The Ethiopian Grain Board, through a levy--possibly one percent of the f.o.b. price on all export sales of grains, pulses, and oilseeds from Ethiopia--should support such an Export Promotion Council in its formation and operation. At present, a levy of Eth$ 1 per ton on exports is paid to the Chamber of Commerce for the performance of similar functions. The possibility of coordinating the present relevant activities of the Chamber with those proposed for the Council should be explored by the Board.

b. International Business

The contracts currently used in world trade should be examined for their applicability and fairness to Ethiopian exporters. If necessary, consultations should also be held with producers and other groups. Exporters themselves should be encouraged to form a group for advising the IEG on the standardization and regulation policy for each commodity. From this group, members could be selected for participation in government export boards or agencies.

In the past, Ethiopian producers and trade circles have perhaps been indifferent to the reputation of Ethiopian products and individual business practices throughout the world. The world's coffee markets now are becoming increasingly patterned in their business practices. As other world markets become more sophisticated and competition increases,

it is essential that uniform, consistent, and increasingly high standards be used for Ethiopian exports in specific world markets to ensure their continued acceptability and preference by the world buyers.

c. Port Improvement

The three seaports that serve Ethiopia--Mitsiwa, Aseb, and Djibouti--all have several berths, open and covered storage, some mechanized cargo-handling equipment, and capacity to serve deep-sea vessels. With the physical and operational improvements recommended in Report No. 4,* all of which appear to be technically and economically feasible, these ports should be able to handle efficiently all types and levels of Ethiopian exports and imports during the next 25 years.

Savings from lower port operating costs--regardless of whether they are passed on to shippers in the form of reduced port tariffs, or kept for further investment--would benefit the country. Other benefits to Ethiopia that could occur from the recommended investments in the ports include lower distribution costs from lower in-transit times, better military effectiveness, and reduced effort (in the hot and humid weather of the ports) on the part of laborers.

The recommended physical improvements to the port of Mitsiwa are grouped into eleven investment packages; capital investments total about Eth$ 32 million over the period 1969 to 1988. The improvements of Aseb span the years 1969 to 1982 and are grouped into six investment packages; capital investments for these packages total about Eth$ 15 million.

Based on the rates used, expenditures exceed revenues at Mitsiwa for all years but one. The financial situation at Aseb is relatively more

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* Improvement of Ethiopian Ports.

favorable because of the higher per-ton charges. Expenditures there would exceed revenues only until 1973, after which revenues would exceed expenditures. The present rates of both ports are relatively low and could be raised sufficiently to put them in line with rates at other ports. The main increases would be on those activities not involving low value export goods, where price elasticities of demand in the world markets are comparatively high. It should be possible to revise the rate structures without significantly altering supply and demand patterns for import and export goods.

d. Other Recommendations

(1) New Bags

If exporters were to ship all of the exports in new bags there would be several benefits. It might increase consumption of local products--that is, the bags produced of local fibers. It would decrease the loss of exports caused by breakage and contamination. It would improve the appearance of the bagged products and would end the present smuggling of bags from neighboring countries.

(2) National Bank

It is suggested that the role of the National Bank in handling export trade transactions be studied to determine whether its methods of protecting Ethiopia's foreign exchange are unnecessarily discouraging to foreign trade.

(3) Export Credit

Although the lack of credit is serious for many sectors of the economy, special attention should be given to the problem of supplying credit to exporters, if foreign exchange earnings are to grow.

(4) New Laws

The possible need for additional legislation and regulations to control exports better should be studied, particularly the need for commodity grades and for compulsory fumigation. The establishment of effective regulatory services at an early date will avoid the very real danger of Ethiopia losing a substantial portion of its export trade through the carelessness and the dishonesty of a small minority of its exporters. Violations of basic regulations should be punishable in the first instance by levying of substantial fines and, in later violations, by cancellation of export licenses. It is obviously necessary for inspectors to be able to examine cargo and to make suitable tests at frequent intervals. Importers in other countries should be made aware that there will in the future be a mechanism for prompt and fair consideration of their complaints.

(5) Shipping

If infrequency and uncertainty of shipping continue to be problems, it is recommended that the IEG consider ways of encouraging the Ethiopian shipping industry to develop services to those ports within the Middle East and other nearby regions that import a substantial quantity of Ethiopia's products. The lack of regularity in calls by ships at Ethiopian ports creates difficulty in serving markets--such as Kuwait--that are extremely critical of irregularity of delivery. Within the Red Sea, coasters and dhows previously operated on regular schedules and contract voyages. Hostilities in the Middle East have reduced the willingness of these small ships to venture into some areas and have increased costs of operations. The number of idle ships of a size appropriate for runs to nearby ports is now larger than ever before, and the purchase price of used cargo ships is now relatively low.

(6) Commercial Representatives

It is recommended that the government consider assigning commercial attachés to major Ethiopian embassies, or commercial officers to cities in those countries where Ethiopia may already or in the future conduct substantial trade. The present limited number of commercial attachés or officers and the lack of an effective export promotional organization are serious weaknesses in Ethiopia's foreign trade drive.

(7) Meat Exports

Any long-term expansion of Ethiopia's meat exports will come only if certain problems are solved: (1) It is necessary to solve the disease-sanitation problem, since high-paying export markets will not accept meat from diseased animals; (2) it is necessary to upgrade the quality of Ethiopia's animals; (3) Ethiopia must be competitive with South American, Australian, and Eastern European beef; (4) since some potential markets for Ethiopian meat do not have a sound money system, some means of attaining fair value must be arranged to obtain returns from the sale of the product; (5) health and tariff embargoes now restrict movement into some major importing EEC countries and the U.K., and concessions must be negotiated before moving products to these countries.

To expand fresh or frozen beef exports to Italy, it is suggested that Ethiopia (1) contact parties now in Italy who are already importing Ethiopian meat products, (2) contact Italian veterinarian authorities to gain recognition of areas from which approved beef may be exported to Italy, (3) initiate statutory inspection for beef and canned beef that, according to importing-country officials, offers sufficient warranty to protect the public health, (4) issue health certificates by qualified inspectors stating that all meats and meat products have been handled according to the importing country's laws and

regulations. Following these steps Ethiopia might be able to secure greater acceptance and entry into Italy, and into other countries later.

(8) Oilseed Exports

In order to reduce export prices, Ethiopia could (1) increase the yield per hectare with better seeds and agronomic practices; (2) improve harvesting methods, since about one-fourth of the seeds are lost in the fields during harvest; (3) clean the seed in the fields so that the expensive transportation of impurities from production centers to handling centers would be eliminated; (4) reduce transportation costs by going to bulk transportation; (5) put storage facilities in the production areas as well as at the ports to allow bulk transportation and shipment (this would eliminate the cost of bags and the handling charges for bags).

To enable Ethiopia to export more oilcake, the following measures are suggested: (1) only cake of low impurities and low ash content should be exported; (2) the oil content for the exported cake should never be higher than 6 percent; (3) groundnut cake should be vigorously controlled against aflotoxin content; (4) an official laboratory should analyze samples before exports are authorized, and standards should be established by the government to ensure export quality; (5) port facilities for cake export in bulk should be improved; (6) bulk transportation should be established, since the price of bags is too high in relation to the price of the oilcake.

F. A Five-Year Program

First Year

Livestock

- The Technical Agency should conduct a feasibility study for location and operation of livestock buying stations in the Southern Livestock Region. (G)

Crops

- The IEG should reactivate the Ethiopian Grain Board. (G)
- The Ethiopian Grain Board should initiate the Commodity Stabilization scheme in Addis Abeba, with the field program under the supervision of the Ethiopian Grain Corporation. (G)

Exports

- The IEG should organize the Export Promotion Council, with active cooperation from Ethiopian exporters. (B)
- The IEG should begin to operate an inspection station for exports, located at Aseb. (G)
- At Mitsiwa, begin Port Investment Package III, and complete Port Investment Packages I, II, and V.* (G)
- At Aseb, complete Port Investment Package IV, and begin Port Investment Packages I and III.* (G)

Second Year

Livestock

- The Livestock and Meat Board should construct the first buying station in the Southern Region and begin its operation,† in cooperation with the Ministry of Agriculture. (G)

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* See Report No. 4, Improvement of Ethiopian Ports, Appendix A.
† Assumes that feasibility study shows project to be feasible.

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- The Technical Agency should conduct a feasibility study for the production and marketing of livestock from the settled agricultural Highland areas. (G)

Crops

- The Grain Board and the Grain Corporation should initiate the Commodity Stabilization Scheme in Asmera. (G)

- The Ministry of Agriculture, in cooperation with the Ethiopian Grain Corporation, should begin a program for cleaning grain and oilseeds at the local marketing level, using small cleaning machines.* (G)

Exports

- At Mitsiwa, continue Investment Package III. (G)

- At Aseb, begin Investment Package VI, and continue Investment Packages I and II. (G)

- The IEG should begin to operate an inspection station for exports, located at Mitsiwa. (G)

Third Year

Livestock

- The Technical Agency should conduct a feasibility study for the processing and export of livestock and livestock products from animals produced in the northern Highland areas. (G)

- The Ministry of Agriculture, in cooperation with the Livestock and Meat Board, should initiate a research and extension program for increased production and more efficient marketing of livestock from the northern Highland areas. (G)

- The Livestock and Meat Board, in cooperation with the Ministry of Agriculture, should construct a second buying station in the Southern Region and begin its operation. (G)

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* See Report No. 8, Development of the Ethiopian Oilseeds Industry, Appendix A.

Exports

- The IEG should begin to operate an inspection station for exports, located at Dire Dawa. (G)

- At Mitsiwa, continue Investment Package III, and initiate Investment Package VIII. (G)

- At Aseb, complete Investment Package VI. (G)

Fourth Year

Livestock

- The Livestock and Meat Board, in cooperation with the Ministry of Agriculture, should construct a third buying station in the Southern Region and begin its operation. (G)

- The Livestock and Meat Board, in cooperation with the Ministry of Agriculture, should initiate a research and extension program for increased processing and export of livestock and livestock products from animals produced in the northern Highland areas. (G)

Crops

- The Grain Board and the Grain Corporation should initiate the Commodity Stabilization scheme in Ethiopian urban centers of 10,000 or more population. (G)

Exports

- The IEG should begin to operate an inspection station for exports, located at Addis Abeba. (G)

- At Mitsiwa, continue Investment Packages III and VIII, and complete Investment Package IX. (G)

Fifth Year

Exports

- At Mitsiwa, continue Investment Packages III and VIII. (G)

Budget Recapitulation

Capital Costs

The capital costs to the IEG for the five-year period are calculated to be Eth$ 37,257,000.

Recurrent Costs and Income

The highest level of both recurrent costs and annual income for all projects under Program VI occurs in the fifth year; the fifth year is thus considered as providing the most useful set of figures for the overall program.

RECURRENT COSTS AND INCOME--FIFTH YEAR
(Thousands of Ethiopian Dollars)

Government		Private	
Costs*	Income†	Costs	Income
Eth$ 3772	Eth$ 8090	Eth$ 50	Eth$ 50

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* For the Commodity Stabilization scheme, storage costs were assumed to be Eth$ 35 per ton of grain handled annually.

† "Income" for ports in reality consists of the net savings in costs made possible by the improvements made under the development program.

PROGRAM VII. IMPROVING AGRICULTURAL TECHNIQUES AND TECHNOLOGY

The adoption of improved agricultural techniques and technology is progressing in Ethiopia, but the pace is slow. "Technology" as used here includes scientific discoveries that improve production (such as improved seed, fertilizer, and farm machinery), and "techniques" include the application of such technology under actual farming conditions (improved farm management and cultural practices, and utilization of expanded farm credit, for instance). Further expansion of such efforts to improve agricultural production is needed, through added manpower and funds and their proper utilization, to ensure that the increased production that is necessary will be brought about in time to meet anticipated demands. The adoption of such techniques and technology depends on (1) additions to the stock of knowledge by means of research, and (2) the application of the new techniques and technology among Ethiopian farmers, such application to be expanded through extension. These two steps in the process of adoption are discussed in the two following sections.

A. Agricultural Research

1. Essentials of a Good Program*

For agricultural productivity to expand, there must be constantly improving technology, fostered by research and extension programs. It is the recommendation of the SRI team, based not only on their own observations but that of many other experts who have worked in developing

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* See A. T. Mosher, Getting Agriculture Moving, Chapter 6, Frederick A. Praeger, New York, 1966.

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countries, that the research program in Ethiopia be heavily oriented toward "applied" or "adaptive" research, with any "basic" research added only as needed to supplement information not available from work in other countries. "Adaptive" research takes the results of basic or applied research developed in other countries over years of effort, and determines under what conditions the same results can be adapted for service in Ethiopia. Such research may require modest funds, little time, and be ready for farmer adoption very rapidly. An example would be the use of Kenya maize hybrids, selected ones of which have been determined to be well adapted to production in certain areas of Ethiopia; in this case, the basic research was done in Central America and further adaptive research was completed in Kenya.

In an applied research program it is usually desirable to pay special attention to the limiting factors that keep development from proceeding at a faster pace. The following measures may be useful as guidelines in such a program:

- Utilize all sources of new technology: (1) the best practices of other farmers in the region, (2) methods and materials developed in other regions and in other countries having similar agricultural characteristics, and (3) experimental search for new technology.

- Encourage research by all interested agencies: (1) undertake the bulk of the work at government experiment stations; (2) encourage large individual farmers and farm organizations to experiment with new crops and cultural practices, under the supervision or with the advice of experiment station specialists; (3) encourage commercial firms interested in selling farm inputs to undertake experiments and demonstrations, as the Shell Company has with farm chemicals in other countries.

- Select problems to study that will encourage adequate financial support of the research program by the public, as well as lead to rapid adoption of the findings by the farmers. This dictum is not stated as some sort of necessary compromise with principles by the dedicated researcher; instead this approach results in

more and better research being done within the context of the needs of the country. For instance, the work should be largely devoted to "cash crops" (for both the domestic and foreign markets), because innovations usually require farmer purchases that must be paid for with cash farm sales.

- Locate research facilities properly: (1) One or more comprehensive experiment stations, with adequate staff of various specialties and accompanying facilities, should be located in a place where the soils and climate are representative of a large agricultural region of high potential (Alem Maya and Debre Zeyt both fulfill these qualifications), and (2) numerous testing stations or field trials should be scattered throughout many farming localities in the region, operating in close cooperation with the major experiment station.

- Organize research tasks: (1) Tasks need to be planned so that specialists drawn from diverse technical fields are encouraged to cooperate on individual projects, and (2) each new technique being tested must be assessed from the standpoint of its effect on the whole farm business (rather than considering only whether it is satisfactory to the specialist representing one technical field).

- Plan administration of research to emphasize certain factors: (1) There must be adequate and continuing financial support for the overall program; (2) good equipment and adequate salaries are essential; (3) there must be frequent contact with researchers by farmers and extension workers; (4) there should be a training component in every research project, since more well-trained research workers are continually needed.

The Third Five-Year Plan states, in reviewing the outcome of the Second Five-Year Plan, that "departments whose effectiveness was crucial to the setting of a firm, long-term agricultural base were seriously starved for funds." The Agricultural Research Institute was initiated during the Second Five-Year Plan and most of its expenditures were for initial building of facilities; the actual research programs have only begun. Their continuation and success will be dependent on the availability of funds. It is noted that directors who are forced to plead with the Ministry of Finance on a monthly basis in order to meet current

commitments will be discouraged from planning future expansion and research, regardless of the amount of money allocated in Ministry budgets and the Third Five-Year Plan. The importance of establishing a sound research basis for agricultural development in Ethiopia cannot be overemphasized; attempts to cut costs in one year will have a retarding effect on many years of subsequent work.

Overconcern with establishing a large number of experiment stations can result in the establishment of expensive but inoperative facilities and wastage of personnel who are scattered throughout the country without support or encouragement from other fellow workers or supervisors. Having each of these functions administered separately from the national headquarters of different Ministries also fosters jurisdictional problems and jealousy.

2. Location of Research Stations

Organized research for agricultural development is being carried out in Ethiopia mainly by the Institute of Agricultural Research, which is an agency of the Ministry of Agriculture. The Institute enjoys the support of the Food and Agricultural Organization of the United Nations, which supplies a number of research experts who are assisting the development of the work at four major branches, located at Holeta, Genet, Jima, and Melka Werer. The work at these stations is coordinated informally with the research station at Debre Zeyt and the work at the College of Agriculture at Alem Maya--both under the jurisdiction of the Ministry of Education. There is also informal liaison with a provincial research program operated in Eritrea, the work at Hagere Himot and Bako, the animal husbandry section of the Ministry of Agriculture at Adamitulu and Debre Birhan, the new program at the Chilalo Agricultural Development Unit in Arusi, and seed farms of the Ministry of Agriculture located at Wawa, Gilge Abay, Meqele, and Jijiga.

Programs I and II (discussed above) have additional suggestions for research locations. The forage research work recommended in Program I can be attached to existing stations or branches, as the personnel will develop their own test plots over the regions they serve. Program II has concrete suggestions as to location and timing, as well as the intensity of effort involved, in new research programs. A facility that will probably grow into a complete research station is suggested for the Setit-Humera area in the second year of the program. There is no other station in the region, which covers a large area of the country. The commercial agriculture that could support such a research effort is well on the way to development.

Other recommendations in Program II are for less complete efforts. In the third, fourth, and fifth years, one field station is suggested for Shashemene, Harer, and Dese, respectively. Although the facilities and personnel would not be as many as in a complete station, these field station workers would be expected to work on all the important crops and problems of the area they represent.

3. Increased Experimental Work

The following discussion involves specific suggestions for additional research that will need to be merged with the other work at present stations, or in some cases will be a part of the work of a new station. Reports in which these suggestions are considered at greater length are indicated by footnotes. The results of such work are the bases on which other developments associated with increases in production are founded. For instance, it has been recommended that work on fertilizers and chemicals be expanded at the stations; this is particularly true for agricultural chemicals, on which only small amounts of work have been done previously.*

* See Report No. 1, Potential Fertilizer Demand in Ethiopia, and Report No. 3, Potential Agricultural Chemicals Demand in Ethiopia.

Test and demonstration plots devoted to the major crops and soils, with timing, methods, and rate of application varied for testing purposes, have also been recommended. It has also been suggested that an experimental crop capability be added to the livestock work in progress at the Bahir Dar station, with one of the initial tasks to be consideration of soybeans as an alternative to neug for oil production.*

Additional suggestions include increased budgets and more trained personnel for the present experiment stations; more sophisticated fertilizer trials and their extension to all provinces; an expansion of adaptive breeding programs for seed of major field crops; and expansion of the National Variety Testing programs to many more areas of the country, and to include not only grains but pulses and oilseeds, including soybeans and safflower.† Tests of production for castorbeans have been suggested in areas that could be supervised by the Melka Werer, Dese, and Setit-Humera stations.‡ Other recommendations include testing of possibly important new crops, such as rice; farm management studies of important crops in major producing regions on important soils; benefit-cost determination for crops under dryland production and with supplemental irrigation; and the continued employment of agricultural census survey teams, under Ministry of Agriculture and Central Statistical Organization supervision, because of the lack of data or the unreliability of much of the present agricultural data.

When private companies are entering agricultural development work in Ethiopia they will also need to carry on experimentation in the areas where they locate. Local experience in Ethiopia is a necessity because of the vast variety of microclimatic areas.

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* See Report No. 8, Development of the Ethiopian Oilseeds Industry.

† See Report No. 10, Production of Grains and Pulses in Ethiopia.

‡ See Report No. 11, Development of Castor Seed Production and Processing in Ethiopia.

One of the most encouraging local testing activities now underway is sponsored by the U.N. Freedom From Hunger Campaign and FAO; the fertilizer trial results are already beginning to increase the demand for fertilizers faster than had been thought possible. There is a great deal more to be done in this program, and a new program has been proposed to supplement the fertilizer tests with storage facility testing--again through the Freedom From Hunger Campaign, with help from the Tropical Stored Products Institute in Great Britain.

4. Current and Suggested Research Topics

The research topics listed below are not arranged by priorities, as it is very difficult to decide on priority until the needs for a specific research task are outlined. In general, it is suggested that studies that will yield usable results that will have noticeable impact on an important agricultural commodity be undertaken soon. Many of these are listed in the Third Five-Year Plan and in the CADU Plan of Work. The reader is reminded again that with each problem and to the extent possible, adaptive rather than basic research aspects are to be emphasized. The following are the current and suggested research topics:

- Crossbreeding of livestock to improve production of meat, milk, and wool.
- Cattle production using supplementary feeding, fencing, and sheds.
- Chemicals and fertilizer--timing and rate of application; weed control.
- Vegetable production--varieties, soils, best methods.
- Forage production and utilization--new varieties, rotations, temporary pastures, hay, and green chop.
- Continuing meteorological observations at all stations and branches.

- Continuing soil sampling in all sections of the country, in both crop and livestock areas.
- Agricultural implements and machinery--local methods, adaptation, improvement.
- Continuing vegetation survey in all sections of the country.
- Weed, pest, and crop disease surveys and studies.
- Livestock diseases and infirmities and their cures.
- Livestock reproductive patterns and better offspring production.
- Development of systems and equipment for hygienic milking and milk handling.
- Feed concentrates and additives--use for animals.
- Crop genetics--testing new varieties; maintenance of purity of strains.
- Crop cultural practices--bacteriological seed treatment, planting dates and methods, weeding, harvesting, storage, and seed cleaning.
- Malting barley--adaptation for local production of new or improved varieties.
- Rice--adaptation of varieties for local production; methods of production.
- Crops, livestock, or crop/livestock farm combinations--economics of production and marketing.
- Agricultural products--improvements in processing.
- Crops--fallowing methods, multiple cropping and interplanting, supplemental irrigation.
- Farm storage--costs and savings with improved methods.
- Trees and shrubs--varieties and improved production methods.

- Soil conservation and erosion--improved methods of control.

- Continuing data collection on stream flows and underground aquifers suitable for irrigation, in all parts of the country.

B. Agricultural Extension

1. Essentials of a Farmer Education Program*

The following are the essentials of a farmer education program:

- It must be taken to farmers on their farms and in their home villages.

- It must be designed for farmers' present interests and needs.

- It must be tailored to the adult experiences of the farmers.

- It must be fitted into times when farmers are not too busy farming.

- The unit of instruction for teaching must in most cases be a particular new or changed practice (except for short courses, which may be of broader content).

- It must be accompanied by immediate opportunities for farmers to try out the new methods taught.

- Each new or changed practice proposed must be technically sound and economically profitable.

- Farmers need encouragement (from the teacher or other farmers) in order to proceed to experiment.

2. Additional Tasks Suggested by SRI Studies

A number of the SRI reports have specific suggestions for work that could be added in some cases to present workloads, or, in other cases, that would require additional personnel placed in new locations.

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* A. T. Mosher, op. cit., Chapter 10.

The use of demonstration plots, distribution of educational materials, and the extensive use of local agricultural extension agents in carrying out an "aggressive program" by the government is advocated to get rapid adoption of fertilizer on farms.*

The establishment of demonstration plots by the Extension Service, possibly in cooperation with suppliers of farm chemicals, to provide farmers with visual evidence of the benefits of pest control, is also recommended.† Agents would also teach farmers the proper and safe use of pesticides. Demonstration plots could easily show the benefits of fertilizers and chemicals combined. In practice, the agricultural chemical companies in Ethiopia are developing some promotional plans to encourage growers of all sizes to use their products--this varies from using small packets of pesticides for seed dressing, to airplane application.

The adoption of small cleaning machines for oilseed and other seeds in local villages has been incorporated into Program VI.‡ An active Agricultural Extension program will have to accompany such a program, if the use of the machines is to take place rapidly.

The use of Extension Agents as key personnel in the development of a Small Agricultural Credit Loans Program, is also recommended.§ With special training (discussed in the next section), each agent could handle up to 40 farms if the supervision of credit use on farms were his sole activity, or a smaller number if he acted on a part-time basis. It is suggested in Report No. 9 that most of the agents in the Extension Service be trained to handle credit supervision as one of their most

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* See Report No. 1, Potential Fertilizer Demand in Ethiopia.
† Report No. 3, Potential Agricultural Chemicals Demand in Ethiopia.
‡ Report No. 8, Development of the Ethiopian Oilseeds Industry.
§ Report No. 9, An Agricultural Credit Program for Ethiopia.

important tasks, in view of the crucial importance of the credit needs in improving farm production.

The establishment of a model wholesale meat distribution center, which would require some extension help, has been suggested.* Also recommended (in Appendix A of Report No. 7) is a vigorous and effective program of farmer education and extension, to bring about a proper appreciation of the grassland potential and a desire by the farmers to improve their livestock feed resources. A staff of trained extension workers is suggested, with training under forage specialists, and a program involving demonstrations and the provision of sufficient planting materials and seeds. This would have to be related to an effective livestock improvement program, which would also require additional extension activities.

In the Central Highlands, where the cropping program needs to be shifted to better rotations, more temporary pastures, and more aftermath grazing to increase weight on the cattle at an earlier age, agricultural extension effort must be added to the research if the program is to succeed.† The areas recommended there for development depend heavily on agricultural and other extension efforts, to succeed.

Use of the Extension Service to encourage the adoption of castorbean production by farmers in the area selected to supply the new processing plant has also been suggested.‡ The assignment of extension personnel to supplemental irrigation projects during the initial five years of project development would also be desirable.§

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* Report No. 7, Development of the Ethiopian Livestock Industry.

† Report No. 10, Production of Grains and Pulses in Ethiopia.

‡ Report No.11, Development of Castor Seed Production and Processing in Ethiopia.

§ Report No. 15, Supplemental Irrigation Projects on the Desset River, and Report No. 17, A Supplemental Irrigation Project in the Borkenna Valley.

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3. The Present Program

At the present time there are about 100 agricultural extension agents assigned throughout Ethiopia. They are under the direction of the National Extension Service, which has its headquarters in the Ministry of Agriculture in Addis Abeba. Most agents are attached to the provincial agricultural offices. Many are located in the provincial capitals and have their offices with the provincial agricultural officer.

The widely scattered deployment of the few agents available, the loose attachment to other agricultural programs, the lack of supervision and encouragement from administrators, the lack of supplies and transportation, and sometimes the failure even to receive their monthly pay on time have all combined to create an atmosphere of disillusionment and poor morale. The technical training of most of these agents is at the Ambo and Jima Agricultural Schools, where they received something like the equivalent of an agricultural high school course. The course includes little instruction in working with people or in the methods of extension education.

Transplanting some of the principles of extension education from areas of the world where they have been developed and tested into the Ethiopian context is a difficult task. The number of personal contacts that an agent can make is limited by time, distance, and communications problems. Mass communications are based on accessibility and literacy, neither of which is available in Ethiopian farm areas. Resourcefulness in developing extension programs under such adverse conditions is not fostered by the technical nature of the agricultural education received by the agents; in addition, their competence is often questioned by the local people when they realize that the agents have not themselves faced the rural life restrictions as the local people see them.

The results are disappointing to everyone concerned with agricultural development in Ethiopia. High hopes for effective extension seem to be dissipated. Because of discouragement and the fact that new agricultural graduates are avoiding taking extension jobs, if possible, the number of agents is actually decreasing.

By way of contrast, many of the agents of the Ministry of Community Development who have been trained at the Community Development Training Centre at Awasa are enthusiastic about their assignments, which require them to live in small towns and remote villages. Their emphasis on group organization techniques and their marshalling of local development efforts are making an impact on farmers in some areas. At the same time, their lack of technical knowledge about the improvement of farmers' incomes, through agricultural production increases, is hampering their ability to organize local development activities that require even small investments.

The two groups of agents find it difficult under present circumstances to cooperate--although there are notable exceptions. There are probably more exceptions to this at the local level than at the national level. It would appear that ways and means must be found to give the extension agents the kind of training in group activities and enthusiasm for work that has been successfully instilled into the staff of the community development program. On the other hand, the incorporation into the community development program of the technical aspects of the agricultural extension program might be extremely useful.

4. Suggestions for Program Improvement

The development of Ethiopian agriculture will depend on success in adopting new technology to make possible increased production. The introduction of improved technology and the dissemination of the new

knowledge depend on the efforts of agriculturally trained men both in private enterprise and in the government service. Hence, paramount importance must be attached to these aspects of agricultural development.

Programs of private companies operating in tandem with government programs, and directed at specific, limited objectives, can easily accomplish more than either entity acting independently. For instance, the successful hybrid maize program in Kenya was achieved in a few years by government research and extension activities operating in close harmony with private enterprise.

Education for agricultural development is essential to the diffusion and use of improved technology. This includes adult education of the farm extension type, and the design of all levels of education to encourage development of people with inquiring minds who will be the innovators and leaders of development at all levels, from tenant farmers to the highest government officials.

The recent study by Professors Winchester and Carter, entitled "Education for Action in Ethiopian Agricultural Development," has documented this set of problems and made recommendations for their being surmounted through different kinds of training at the Ambo, Jima, and Awasa Training Centers. They also propose that the agents of both programs (Agricultural Extension and Community Development) work in groups, concentrating their efforts and reinforcing mutual strengths. The task force teams that they propose would build local programs on careful studies of the areas to which they are assigned and all would be trained in the techniques of surveying, need analysis, and program building on local resources, augmented by some technical services.

This approach is similar to that used in the development of the Ada District Development Program prepared by the SRI Sector Study. In this program, 10 locality development centers are planned that have

elements of both agricultural extension and community development, combined with the provision and sales of seeds, fertilizers, and chemicals and the purchase of some of the increased produce of the area. In this program, a District Headquarters is proposed that will have training facilities for the agents. Frequent in-service training programs could be incorporated into the program.

Some of the proposals in the Ada District Program might be used in the future for planning and carrying out other package development programs. These suggestions include: (1) arranging sources of supplies and equipment to be distributed locally so that the agents will not recommend practices that local people cannot follow; (2) arranging frequent training meetings, so that agents can learn new ideas and techniques and have the opportunity to reinforce each other through discussion of their work; (3) providing agents with low-geared motor bikes for better mobility and added prestige (although horses will have to remain the main means of transportation in many areas); (4) providing radios for listening to the Ministry of Agriculture informational programs; (5) giving recognition to agents who are able to succeed with a minimum of outside assistance through the mobilization of local resources and examples, thereby stimulating resourcefulness among the agents; (6) encouraging agents to work with model farmers or selected farm leaders with a high degree of readiness to try new things--thus encouraging them in turn to show others how and what to do.

If the number of agents per farm family is used as the criterion for training goals as in a number of other developing countries (e.g., Nigeria and India), Ethiopia would have the impossible task of providing approximately 5,000 agents if they were assigned on a basis of one per 1,000 farm families; if they were assigned on the more practical ratio of one per 400, the need would be for 12,250. The impossibility of such a target, except in a very long-term sense, is obvious. This makes it

imperative that the present number of agents and the increase up to 500 projected in the Third Five-Year Plan be used to the best advantage possible. The concentration of the available manpower in the areas of highest production potential will help to create the largest effect with the smallest number of agents. Concentration will also provide improved working conditions and encourage morale among the agents.

The package programs for district development such as the CADU Project, the proposed Ada District program, the Southern Regional Livestock Project, and the World Bank proposals for the Setit-Humera and Welamo Sodo areas provide opportunities for concentration of development workers within areas of higher-than-average potential. Training facilities are included in most of these projects and would be used to train agents for new development areas when further package programs are begun. Using the model farmer approach and depending on these farm leaders to help spread information and techniques will also make efficient use of the available agents and multiply their efforts.

C. Research and Extension

The combined needs in agriculture for these two categories of service are always found to be practically unlimited, in all countries, and consequently two devices are needed to make the best use possible of the limited manpower and budgets available. Guidelines for concentrating effort on major areas of excellent pay-off are necessary, and these have been attempted in the SRI studies. At the same time, the most efficient program, in a developing country especially, is one in which research and extension programs are tied together extremely closely. An example of this is the series of test demonstration plots conducted on actual farms, in which the researcher and the extension man conduct the experiment with the farmers' cooperation. Experimental results of a very practical nature can be obtained, the farmer (and his neighbors)

can be convinced by the demonstration taking place under their very eyes, and the new practices that prove successful can be adopted by farmers in the area very rapidly.

The Third Five-Year Plan allots Eth$ 30 million for capital expenditure for supporting services and research, which is almost four times the amount spent for such services during the Second Five-Year Plan period. Eth$ 90 million are allocated during the Third Five-Year Plan for current expenditures for basic agricultural support services. A casual glance at the program outlined in this section, which would involve new and expanded activities added to present workloads, suggests that the above budget will probably not be sufficient unless it is utilized more efficiently than past history has revealed. Concentration on organizational efficiency, improved communications between field and headquarters, better support of field activities, including incentives for excellence of field programs--all are needed badly whether the numbers of trained personnel and budget planned for are provided or not. The training of personnel is discussed in the following section.

PROGRAM VIII. MANPOWER RESOURCES FOR AGRICULTURAL DEVELOPMENT

This section is primarily concerned with the need for, and the provision of, the skilled manpower needed to implement the agricultural development programs. The concern here is not with provision of jobs for future labor released from agricultural production and available for other employment, nor with provision for those presently unemployed. These are laudable goals, but they were considered outside the scope of the present discussion.

A. Skilled Manpower Needs

The subject of discussion here concerns skilled manpower--"high" level (university or secondary levels of technical education and experience), and "middle" level (one-year specialized training or equivalent experience). Semiskilled occupations are not emphasized because by definition they can be filled from the ranks of the unskilled, with a short period of training; they are important, however, in the overall program of agricultural development.

Table III identifies the manpower needed at both skilled levels, if certain goals for agricultural production are to be achieved under the Third Five-Year Plan (TFYP) using specific programs recommended by SRI and discussed in the next section. Government and private needs are not differentiated, as the same levels and kinds of skills can be used for either.

Table III

SKILLED MANPOWER NEEDS TO ACHIEVE THIRD FIVE-YEAR PLAN TARGETS*

Projects	Manpower Needed		
	High Level	Middle Level	Total Skilled
46 Projects for grain and pulse production	1242	4462	5704
7 Feedlot projects	14	35	49
21 Livestock grazing projects	420	1449	1869
3 Oilseed projects	72	255	327
Totals	1748	6201	7949

* Based on Table XIV, p. 269.

The Third Five-Year Plan admits that the most difficult aspect of the entire agricultural development plan will center around the supply of trained manpower needed to fulfill its programs. The Plan estimates that 1900 additional people are needed at the high level, plus 1100 other skilled workers (apparently including some semi-skilled occupations). Three hundred fifty extension agents and assistants, 500 agronomists and agricultural technicians, and 200 veterinarians and animal health assistants are included in the above high-level category, among others.

Sources of trained manpower (if expanded to the levels the TFYP anticipates) would include Alem Maya College (440 graduates in addition to 40 third-year students per year under the Ethiopian University Service program), the Debre Zeyt Animal Health School (125 animal health assistants for the period), the Jima and Ambo Schools of Agriculture (300 to 400 graduates estimated for the period), the Awasa Training Center (300 graduates for the period), ten planned farm training centers to be set up by 1973 at various government stations now in existence, a planned

Land Reform Administration Training and Research Institute, and a possible Center for Demonstration, Training, and Research in Agricultural Marketing.

The TFYP budget for education and training is estimated at Eth$ 6.3 million, compared with only Eth$ 600,000 for the Second Five-Year Plan period. This provides an additional Eth$ 5.7 million for training 3,000 persons. Table IV compares this budget with what is estimated to be needed to fulfill the partial production goals for agriculture outlined in the TFYP and elaborated by SRI.

Table IV

ADDITIONAL TFYP MANPOWER AND TRAINING BUDGET NEEDS COMPARED WITH SRI ESTIMATES

	TFYP		SRI Estimates	
	Manpower	Budget for Training (Eth$ 000)	Manpower	Budget for Training (Eth$ 000)
High and Middle Level	2,450*	4,655	7,950	15,105
Semi-skilled	550*	1,045	1,788	3,397
Totals	3,000	5,700	9,738	18,502

* These figures are estimates, based on a breakdown of skilled and semi-skilled labor.

The manpower needs in the future have been assessed by other groups. The following quotation is typical:

> Professional and skilled manpower needs in Ethiopia have been projected by USAID/E Agriculture Division, IBRD, and an FAO team. The needs far exceed the supply forthcoming. For example, the development authority approach being considered for the Assela area and involving

60,000 farm units will require 40 extension agents, 30 community development workers and 10 cooperative managers. The Assela project, covering only one percent of the rural population, is to be fully developed by 1972. Similar projects, or adaptations, are in the planning stage for other areas. The need for extension agents during the next five years numbers in the thousands. The situation is similar for agricultural credit personnel, cooperative managers, farm supply distributors, and other rural service personnel. An analysis of the educational pipeline shows clearly that the capacity to produce them is not available.*

B. Manpower Supply

The Third Five-Year Plan outlined above for supplying additional numbers of high- and middle-level agricultural personnel is optimistic at best, first in the large expansion in the annual training budget, then in the expectation that the institutions listed can in fact be inaugurated or expanded at the rate laid down in the Plan. Based on previous history, even if the money in the budget is forthcoming, the results will be less manpower available than planned.

A second drawback to planning on a specific number of trained persons being available is the rate of attrition, which has been noticeable in such locations, for instance, as the Agricultural Extension Service. If these trained men choose to forego government service for work in private agro-industry, they are not necessarily a loss to the development of agriculture. However, to the extent that they enter occupations where they do not use their specialized agricultural training, the government has lost an investment in agricultural development.

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* J. L. Fischer, "An Approach to an Agricultural Development Program for Ethiopia," USAID/E, February 1967, mimeo, p. C-14.

The SRI estimates in Table IV above raise the level of estimates markedly over those predicted by the TFYP, and in so doing, suggest that the government budget item must be raised accordingly, if minimum needs are to be met. However, the level of need posited in Table IV makes even worse the position of the institutions from which it was planned to draw most of the trained personnel required. Now they cannot possibly be expected to supply this many trained people, even if they are expanded at an even more rapid rate. The question then becomes one of finding the additional personnel needed by searching all possible sources. The additional sources could include: (1) expatriate personnel hired on limited-term contracts, (2) general secondary-school graduates, (3) alert local-area self-educated individuals who have keen minds and would be interested in specialized training, (4) twelfth-graders who do not pass the university entrance exams or who pass but cannot be admitted immediately, and (5) those entering employment channels, from various sources, who can be improved by in-service training. A new type of agricultural training center has also been suggested, in which extension and other personnel could be trained for rural services below the university-degree level.

Expatriate personnel have the advantage that they could be made available almost immediately, that they have the technical know-how, and that in many cases they are used to making decisions and taking responsibility in agricultural programs. There are associated disadvantages. Such people are expensive, and in most cases they are to some extent uninformed about local conditions and local people. If used properly, they do not displace an Ethiopian specialist--the specialist should be assigned as counterpart, so that he can obtain in-service training and step into the position when the expatriate completes his assignment and leaves. Expatriates are especially useful in research positions, which often require training and experience above the university-degree level,

and often need less knowledge of the local people and how to work with them to obtain rapid adoption of new technology. There appears to be no way to avoid the massive use of expatriates for the period of the Third Five-Year Plan, if Plan goals are even to be approached.

C. Type of Training

Perhaps the greatest lack in the current educational scene in Ethiopia is training for leadership and for management. Management training is progressing at the university level at the Business College and at the Center for Ethiopian Management, but these two organizations cannot hope to provide all the leaders that are needed in this field. Continual education for adults--as well as students at all levels--is needed that introduces concepts of enterprise identification, business economics, and personnel management. The dearth of training in group organization, group dynamics, and in communication theories and materials is especially evident in agricultural courses at the College of Agriculture and the Agricultural Schools at Ambo and Jima.

Advanced graduate training abroad of Ethiopian agricultural college graduates should certainly continue, especially to the extent that it can be financed by foreign national or international funds. When the decision has to be made to use Ethiopian funds, in this stage of Ethiopia's development, the decision almost has to be that more people will be trained in Ethiopia at below-university level, where they are so badly needed, rather than to use scarce funds to train fewer people, to a higher level of their speciality, abroad.

Guidance for middle-level training comes from a recent publication by Burl Winchester and L. P. Carter, entitled "Education for Action in Ethiopian Agricultural Development." They make the following recommendations:

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- Recruitment and selection of trainees is one key to success; selections should include students with a farm background, should not be based solely on school or exam grades, should consider leadership potential, and might be enhanced by student involvement.

- Clearly defined objectives for each training center includes setting the goals for both the students and the agency.

- At the same time there should be no ceiling on truly exceptional students who might continue from the lower levels into university training.

- Service after training should be expected from all trainees, perhaps on the basis of two years of service for each year of training received.

- An organizational model for development is presented based on groups of agents trained in cooperative agricultural and community development efforts. The "community improvement centers" will be supported by technical services from the next higher level. The general program of such a center would include one first year of fact-finding to determine what innovations or programs are most needed to improve the health and quality of life in the community and to decide which of the various community services should be given the highest priority. This year would also help students to become well acquainted with the community and its people.

- Curriculum development at the middle level training centers is proposed that would include more practical work with people in the surrounding villages and less academic study. By going to the villages, the students will learn how life in rural Ethiopia really operates; the instruction can be experience-centered and individualized to fit the situation that the students find there. Putting such programs into the training will depend, of course, on the teachers and their knowledge of this approach and their ability to mold the study to fit the situation.

- There is also a need for more home-centered work that includes women trainees and cooperative work with families where men and women agents work together.

- Preparation of secondary agriculture teachers needs further attention; the use of Ethiopian University Service students from the College of Agriculture for the next few years until enough teachers are trained is recommended.

- In-service training can be used to encourage and improve existing agents and to train assistants for them.

Part Three

Project Implementation

Part Three

Project Implementation

The phased programs described in Part II make up only one set of possibilities out of an array available to the IEG. In promoting agricultural and agro-industrial development in Ethiopia, a wide variety of alternative locations can be selected for investment. This is true even though farming is heavily dependent upon the physical conditions of the locations; in the case of agro-industries, some should be placed close to their sources of raw materials and others close to their markets. Flexibility of choice exists because the opportunities for studying and recommending projects far exceed the number of projects that can be implemented; flexibility of choice also exists because the country offers many suitable areas for different types of agriculture.

Flexibility of project selection and of timing also exists and has been recognized in this report. What has been outlined is only the skeleton of a development program around which many modifications may be made. Changes could be the result of new sources of financing or their disappearance, because of limited skilled manpower at a given time, or for other reasons. In many cases, one action presupposes another, a point to be considered when the suggested IEG actions are proposed in Section VI of Part III. A change in one part of the program must be accompanied by appropriate changes in other affected parts.

I THE MEANS OF AGRICULTURAL DEVELOPMENT

In planning agricultural and agro-industrial development in Ethiopia the question of the means of development arises immediately. Where does one look for the men and the money to undertake all of the programs that need to be developed?

It is clear that no one source can provide a complete answer. Private resources can be found for corporate projects and for small to medium entrepreneurial agricultural development. There are also a number of local, regional, and national agricultural development programs operating in Ethiopia. Those that are supported solely by local groups are often organized by, or as a part of, some nationally sponsored regional or national development program.

Since one approach may fit one situation better than another, no single means of implementation can always be recommended. It should be kept in mind, however, that any project or program needs maximum local participation. In addition, in Ethiopia, where areas often change dramatically within a few kilometers, care must be exercised in tailoring any development activity to fit the special needs of the particular area.

A good example of one approach is that of the Shell International group, which is beginning an agricultural development program in Wellenkome mikitl-wereda; here, an agronomist will spend about one year surveying the requirements of the area before launching a modified agricultural extension program. Both the Swedish International Development Agency and the proposed SRI Ada District package program are based on technical plus socio-economic surveys of existing conditions, with emphasis on

human and technological resources available in the area. The World Bank proposals for Welamo-Sodo and Setit-Humera also incorporate local surveys, and the Southern Regional Livestock Project followed survey work by several groups.

A. Private Agricultural Development

In this discussion of the encouragement of private development, a distinction is made between corporate development and small-to-medium entrepreneurial development. In each of these sectors, different means of encouraging private development can be used.

1. Corporate Development

Examples of present corporate development include Tendaho Plantations, Elaboret Farm, Baratello Plantations, and the HVA sugar plantations at Wonji, Shewa, and Metehara. These entities produce large quantities of sugar, cotton, fruits, vegetables, and dairy products. Large numbers of people are employed and the local economy depends on their products. Exports--especially fruits, vegetables, and cottonseed--are also produced on these large developments.

As a means of developing Ethiopia's agriculture this type of private development offers the advantage of speed of development and the efficient use of scarce managerial talent. Dramatic increases in production within the next five years will probably come from corporate development. From the Ethiopian government's point of view, this may be the lowest-cost agricultural development and its immediate short-run effect is advantageous.

To encourage corporate private development the IEG should plan:

- To actively seek out potential investors (see Report No. 2)*
- To provide assistance to potential investors, including technical information, general economic information, and choices of leases on specific government lands.
- To assist investors through participation of Ethiopian financial agencies such as the Development Bank of Ethiopia, the Ethiopian Investment Corporation, and the Commercial Bank of Ethiopia.

Specifically, it is recommended that the IEG distribute the SRI reports on "The Resources and Economy of Ethiopia" and the "Industrial Investment Climate in Ethiopia" to as many potential investors as possible. Ethiopian ambassadors in various countries should be requested to help locate interested parties. Ethiopian Airlines offices, the contacts of the Ethiopian Tourist Organization, the Ministry of Commerce and Industry, the Chamber of Commerce, and such international service groups as the Lions International, the Industrial Cooperation Office of the Food and Agriculture Organization of the United Nations, and the Agribusiness Council located in New York could all be incorporated into this distribution. Financial and business publications of various countries might also be helpful in the search. Other related materials from the Ministry of Information, the Chamber of Commerce, the National Bank of Ethiopia, and the Ethiopian Tourist Organization could be distributed to these contacts. Specific ministerial responsibility for this task should be assigned as soon as possible.

Within the Ministry of Agriculture there is need for an improved response to technical information requests, some of which come from potential corporate development agencies. Letters of inquiry should be

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* Industrial Investment Climate in Ethiopia.

answered as quickly and as completely as possible and a specific individual should be assigned to assist visiting investors in whatever way possible.

Better information about land leases for corporate development should be made available. At the moment, exact land availability is vague; although much land in many areas is known to be under government jurisdiction, complete information on land rights, jurisdiction of various levels of government, and the leasing arrangements that are available need to be assembled. The Ministry of Land Reform and Administration should be encouraged to continue their surveys of available lands and to designate some of the lands that are available for corporate commercial agriculture.

Land in districts with the best access to domestic and export markets will be in the greatest demand, followed by tracts near proposed new highways. Both irrigable and dryland farming tracts will be needed for corporate farming development. These factors should be considered in formulating new highway plans, and the plans should be reviewed periodically by the appropriate IEG agencies.

Corporate development may also include processors of agricultural products who are not directly involved in production, but who provide necessary technical inputs and money to owner-operators of large or medium-sized land holdings. Some examples of such organizations are the Ethiopian Spice Extraction Company, which is providing growers with pepper seed, fertilizers, and chemicals, as well as loans for labor payments, and the Strangers-Ford Company in Asmera, which also provides seeds and supplies to its vegetable growers. Each of these companies guarantees to purchase the product at a price that allows profits for both the growers and the processors.

This system might also be used for other crops; it is specifically suggested for the production of castor seed in SRI Report No. 11.* In the case of the cattle feedlot study in SRI Report No. 18,† an investor could also finance such related activities as cattle buying stations, feed preparations, and sales beyond the needs of the feedlot, as well as the processing and export of cattle in excess of those fed in the lot.

The Shoa Dairy is now beginning to provide improved bull service through its milk buying stations; in addition, in SRI Report No. 5,‡ the recommended system of improving preparation of hides would also spread technical information to the producers through a commercially viable operation. The proposed seed-improvement project also includes budget provisions for operating its own technical aid to both growers and buyers.

Some resistance to this method of technical improvements was met in interviews with buyers and exporters of grains, pulses, oilseeds, and eggs. Provision of technical help or financial aid to producers seems out of the question to them, although a groundnut processor in Harer, who was planning to rent tractors for plowing and harvesting, is an exception. Encouragement of this type of integrated technical and financial aid for commercial producers is difficult to organize within the IEG. It might take the form of pressure on banks to encourage their borrowers to engage in this sort of assistance and for direct invitations to some foreign and domestic firms to begin or expand their activities in this field.

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* Development of Castor Seed Production and Processing in Ethiopia.

† Analysis of the Operation of a Commercial Feedlot in Southern Ethiopia.

‡ Economic Feasibility of Dry-Salting Treatment of Cattle Hides from Malgue Wendo Abbatoir and Local Slaughter.

2. Small to Medium-Sized Entrepreneurial Development

The recent development of the Setit-Humera region has dramatically demonstrated what can be done by small businessmen in a short time. An area that attracts both capital and labor can become a major production source of food grains, fiber, and export products within three years when progress is as swift as it has been in the Setit-Humera area.

Small-to-medium-sized producers now include wheat growers in Arusi, maize growers in the Shashemene area, some coffee growers in Kefa Province, vegetable producers near Asmera and Mitsiwa, and egg producers near Debre Zeyt and Harer. Some larger operations such as Savadgian's feedlot and dairy near Debre Zeyt and Mulu Farm on the road to Fiche might also be included in this category, along with the plantation operated by Dr. Montenari in the Awash Valley.

These private growers account for much of the exported sesame, exported vegetables, and high-quality dairy and poultry sold in Addis Abeba, Asmera, and Dire Dawa. They also produce some coffee exports and all of the strawberries, plums, and avocados sold in the Addis Abeba market. In the food grain group, much of the wheat and maize that enters the larger mills and markets comes from these growers.

To encourage this private development, greater care needs to be taken in the distribution of land for small to medium operations; land-development assistance should be organized that combines management training and technical advice with provision of agricultural production credit. Specific actions that are recommended are to curtail the government land-distribution program to a degree that will give priority to requests showing promise of being able to develop the new land assignments in the near future. Although providing one gasha of land to each civil servant who spends five years in government service is very

appealing, it is fast becoming a means of perpetuating and spreading the landlord-tenant share system; furthermore, the program encourages land speculation.

Two methods of alleviating this problem are suggested:

- Increasing land taxes on unused agricultural land to force those without intent, ability, or resources for development to abandon their land or to proceed with good use of it. (This is being proposed by the Ministry of Land Reform and Administration.)

- Provision of government technical services at the time of land assignment. These services would combine land-development loans with information on what is necessary for commercial agricultural production. This requires the combined efforts of the Ministry of Agriculture's Extension Service, the Ministry of Land Reform and Administration, the Development Bank of Ethiopia, and local government officials under the jurisdiction of the Ministry of the Interior.

B. Regional and National Agricultural Development Activities

There are a variety of agricultural development activities now in progress in Ethiopia that have support from international, national, provincial, and local governments.* Each involves using IEG funds to some degree and may or may not involve private funds. In these programs, agricultural development extends into the fields of education, public health, commerce and industry, finance, transportation, and

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* These activities include programs of the College of Agriculture, the Extension Service, the Institute of Agricultural Research, the Community Development Centers and Farms, the World Bank Surveys, and autonomous agencies within certain ministries, such as the Awash Valley Authority and the Chilalo Agricultural Development Unit. Provincial and sub-provincial programs are organized in Eritrea, Tigre, Wello, Gemu Gofa, and Welamo-Sodo. Also relevant are the Water Resources Department (well drilling) and the Wabi Shebele and Blue Nile Surveys.

communications, as well as technical agricultural development and public administration.

As a means of agricultural development these programs are or should be complementary to private development. In selecting public programs on which to put emphasis, the IEG should carefully consider each specific project or proposal to determine if the project is of such a nature that private funds are not available or useful. Public funds need to be used to the best advantage only to facilitate programs that could not be accomplished through other means. Projects for expensive infrastructure development (roads, ports, etc.), for research, education, and public health, land survey and registration, and large irrigation projects all demand full payment from public funds. Among these programs the greatest potential for dissipation of scarce resources occurs, since governmental funds are limited and the needs far exceed the supply of men and money.

It is recommended that existing and proposed package development programs be emphasized in preference to unrelated production activities. Such support would include provision of operating funds for the Chilalo Agricultural Development Unit, the Southern Regional Livestock Project, the Awash Valley Authority, and the proposed Welamo-Sodo, Setit-Humera, and Ada District programs.

Efforts of the IEG for the next five years should be devoted principally to carrying out the above-mentioned programs in as successful a manner as possible. However, in order to be ready to duplicate some of these projects in the following 10 years, the survey work for such developments should be started early. Areas that lend themselves to package development proposals and on which surveys could be completed within the next five years include:

- The Wabi Shebele Basin (already being surveyed by a French group)
- The Lake Tana area (using information from the Blue Nile Basin study)

- The Eastern Escarpment Area (capitalizing on its access to Aseb)
- The Jima area (for coffee improvement and diversification)
- The Southern Highlands (to capitalize on the planned access road to Kenya).

The necessary institutions and infrastructure should first be provided in the areas selected for concentrated development. This will include agricultural research and testing, road building, basic education improvement, provision of health facilities, and improvements in land tenure where needed--e.g., cadastral surveys or taxation of under-utilized agricultural lands. New areas for roads and other infrastructure development should be selected with the possibility of their becoming package development areas in mind.

Self-help, local resources, and voluntary assistance should be capitalized on as a means of accelerating and multiplying the development made possible by concentrated governmental programs. This includes recognition and rewards for local people who initiate and carry out development activities, including local governors who show their concern through promoting development activities. Cooperation with community development activities is essential, especially where such activities already are organized and enjoy the support of local people. The use of University Service personnel, various international volunteers, military personnel, and religious organizations to provide manpower where it is lacking is also recommended.

II SOME FACTORS TO CONSIDER IN MAKING LOCATIONAL DECISIONS

If properly done, Government decisions relating to the locations of projects designed to develop the economy will be a manifestation of the Government's objectives, strategies, and policies. Formalizing these considerations into a set of criteria goes beyond the scope of this report; on the other hand, it is possible to set down some of the factors that should be taken into account when selecting both the types of projects and their locations.

A. Regional Distribution of Income

Since projects can be located in different sections of the country, the choice of location can be made on the basis of social and political grounds, as well as on economic grounds. However, the IEG should find that its interests will frequently be served better if economic considerations carry the most weight. This conclusion seems valid, at least, for the next five years.

Of course, the IEG should consider more than just economic factors; however, the current state of the Ethiopian economy is such that the most progress in attaining its social and political objectives will probably be realized if more economic progress is first made. Fortunately, some social and political objectives can be accomplished with little sacrifice in economic growth. Providing useful jobs to the unemployed is one such instance. In contrast, development in many regions of the country cannot be materially aided by the IEG until the IEG has more resources at its disposal; and the way to obtain these additional resources is through faster economic growth.

B. Export Promotion and Domestic Food Supply

One aspect of the strategy for Ethiopia's development involves the expansion and diversification of exports; another aspect is greater self-sufficiency of its food supply. Ethiopia suffers a disadvantage in competing in the overseas markets because of high transfer costs between the points of production and the ports of export at Mitsiwa, Aseb, and Djibouti. Some of these transfer costs--handling, transporting, delays, spoilage enroute, etc.--can be reduced by identifying and developing farming areas closer to the ports. Production in the Awash Valley, Kombolcha, and Eritrean areas should have considerable export advantage over that from other regions of the country.

The largest domestic market for commercial foodstuffs is in the center of the country. According to population estimates for 1966, Addis Abeba contains nearly 30 percent of the entire urban population--more people than the next eighteen largest cities. In view of the production potential of central and southwestern Ethiopia, plans to increase the domestic food supply might well be concentrated in these areas. Then, as the country develops its export programs, the areas closer to the ports could be devoted to export crops.

C. Size and Complexity of Projects

Decisions on the size and complexity of projects have a direct bearing on locational decisions as well. Projects that can be quickly implemented will most often be those whose initial investment is relatively small; whose design, construction, and operation is not overly complicated; and where complementary facilities are already present. Such projects will normally be located in areas where roads are either present or can be quickly built and where the environment is conducive to development.

Current conditions in Ethiopia suggest the economic advantage of concentrating on moderate-sized, simple, and repeatable projects, rather than on large, complex, and single investments. The reasons for this preference center on the effects of compound growth and the scarcity of well-prepared projects that the IEG can incorporate in its Five-Year Plans. If the net revenues from moderately profitable investments are reinvested in the same or other projects yielding similar net returns, the size of the overall investments can soon become large.

A larger impact will be made on the economy, in terms of the size of invested capital, by initiating a series of smaller investments early than by waiting to implement a single larger investment later. Other advantages also accrue to the first alternative: the smaller projects would normally be simpler to design, construct, and operate; on-job training is facilitated because operators of the later projects can be trained on the earlier ones; funding should be easier on the smaller projects; more flexibility of design is allowed, since the investments take place over a longer period; and risk is reduced by spreading the total investment among several projects. The greater publicity and the possibility that a foreign government might be more inclined to invest in a larger project are advantages of larger projects that would not seem to offset those of the smaller ones.

The "shelf of projects" that the IEG now has available for incorporating in the Third Five-Year Development Plan needs to be expanded rapidly, but the IEG has a limited staff with which to quickly increase the number of projects. The complexity of preparing even modest, straightforward projects--together with the advantages of obtaining quick results, and the variety of apparently unexploited opportunities--combine to suggest the course taken by the SRI team in identifying project areas. That course involved recommending projects in areas where major obstacles are not present--that is, where the transportation system is reasonably well developed, where rainfall is adequate or water for irrigation would

not be too costly to provide, where the tenancy problem is not acute or new land can be opened up easily, where disease does not inhibit economic growth, and where individual or collective initiative will support the development effort. Eventually, the IEG may want to conduct a concentrated attack on some or all of these restraints on development; however, for the present, it would be well to operate within the limits placed by these restraints. Even so, the opportunities for adding to the list of productive projects are substantial.

D. Industrial Concentrations versus Decentralization

The economic advantages from concentrating (versus decentralizing) industries is of great interest to those concerned with economic development. Unfortunately, the collection of data on which to test alternative economic theories is in the initial stages. Consequently, many basic principles of the dynamics of industrial growth are still to be formulated. Even less is known about the proper approach for Ethiopia, because study of this subject there is of recent origin.

In the face of inadequately tested theories applicable to Ethiopian conditions, a preferred near-term approach for locating industrial projects in Ethiopia would seem to be one based on the direct economic advantages of each area. Thus, the rate of polarization of industry in the larger cities should not be slowed by IEG intervention; on the other hand, if the obvious location of a plant from an economic viewpoint would seem to be in some smaller provincial city, it should be built there.

A recently completed research project on the costs of urban infrastructure provides some general support for the above recommendation. The study tested the "widely held belief that unit costs of incremental infrastructure for new industry tend to be relatively high in smaller

cities, to decrease significantly over some intermediate range of city sizes, and to rise significantly beyond some large city size."* The study found that for northern India, the hypothesis was only partially correct. Unit costs did decrease substantially as the size of cities increased from small to intermediate, but continued to decrease slightly from intermediate to large. Cities ranging in size from 36,000 to 1,070,000 inhabitants were studied. If these findings apply to Ethiopia, then a savings in urban infrastructure costs would occur by permitting the concentration of industry in the larger cities.† Since this concentration seems to be taking place of its own accord, the IEG might well let it continue without interference, for--as can be seen in the footnote--the size of Ethiopian cities falls well within the range of cities studied in India.

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* Costs of Urban Infrastructure for Industry as Related to City Size in Developing Countries: India Case Study, by Om Prakash Mathur, Richard Morse, M.C.K. Swamy, Stanford Research Institute, October 1968.

† In 1966 the sizes of Ethiopian cities were well below the one million level. Populations for the five largest cities were:

Addis Abeba	489,000
Asmera	146,000
Dire Dawa	50,000
Harer	42,000
Dese	40,000

III DEVELOPMENT OF AREAS FOR DRY-LAND FARMING

Greater output can be obtained from dry-land farming by improving the output from existing farms and by increasing the areas under cultivation. Considering the limitations in the IEG budget and the location and state of the common peasant farmer in Ethiopia, the expansion of agriculture is considered by SRI to offer the quickest and most manageable approach during the next five years, and possibly longer. Constructing penetration roads into areas where malaria has recently been brought under control seems to offer a fruitful opportunity.

A. Development in the Highland Areas

The Highland areas,* where most Ethiopians live, are relatively crowded. Arable lands have been tilled for centuries, farming practices are typically backward, plots have frequently become fragmented, and conditions of land tenure are an impediment to change. Notwithstanding these drawbacks, the predominantly subsistence farmers who occupy these lands have been able to produce enough for their basic needs without experiencing widespread or prolonged famines. Rainfall is normally dependable and soil fertility has been maintained, although not at a high level. Moreover, pockets of land are amenable to change where soils will respond to fertilizer, farmers are responsive to commerical incentives, land holdings average over 3.5 hectares, and tenancy problems are not overriding. A series of "package programs" is recommended as the most effective means for instigating change in such areas. These can be augmented by well

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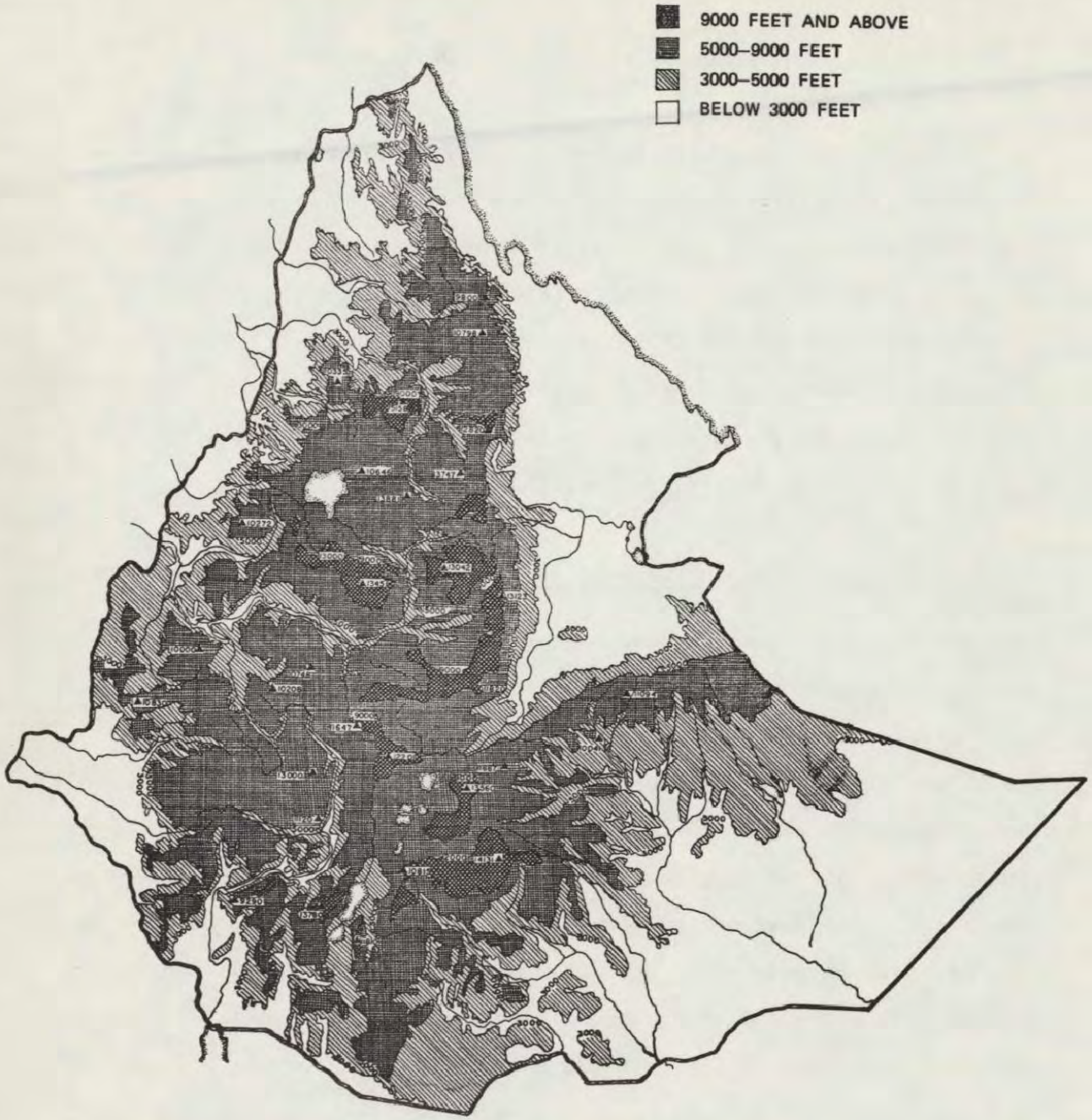
* See Figure 8.



SOURCE: Mapping and Geography Institute, May 1967.

FIGURE 8 RELIEF MAP OF ETHIOPIA

selected programs in experimentation and extension. The series of fertilizer trials sponsored by the Freedom from Hunger Campaign is a case in point.

B. Development in the Lowland Areas

Lands below approximately the 5,000-foot level* offer the major opportunity for expanding the amount of land under cultiviation. Significant amounts of these lands are located in regions where rainfall is adequate to grow one or more crops each year. Development of these lands has not taken place previously because of their isolation and the prevalence of disease, particularly malaria and sleeping sickness.

Development in the lower lands has occurred and will continue to occur as roads are built to make them accessible, as the malaria eradication program brings this disease under control, as entrepreneurs and the IEG discover the advantages of farming them, and as the marketing structure expands to serve them. New roads have made the rich coffee lands in the Jima region accessible. Less than ten years ago the valleys from Robi to Kombolcha were largely uncultivated because of malaria; now, nearly all are farmed. The most outstanding example of development in recent years is that at Setit-Humera. The driving force in the area's rapid growth has been the active participation of a few hundred Ethiopians, who have begun cultivating the broad expanses of previously unused land with tractors. A case study of this development would make an interesting and useful research project.

The malaria eradication program is a long-term project operated by the IEG with substantial support from foreign governments. Additional economic rewards would be forthcoming from this program if the country's

* See Figure 8.

road building efforts exploit new areas relieved from the danger of this disease. Those now preparing the ten-year highway program for the Imperial Highway Authority would seem to be the logical ones to consider this matter further. Part of such an investigation should include a reconnaissance of potentially productive, but unused valleys. This might begin with a close study of the aerial photographs now being assembled by the Mapping and Geography Institute.

Provided such unused tracts of land can be found at distances fairly close to all-weather roads, the profitability of investing in relatively short penetration roads and dry-land farming ought to be quite acceptable. Rough calculations of this possibility indicate that the rate of return might be on the order of 15 to 20 percent. In making these calculations, it was assumed that (1) an average of 10,000 hectares of good land for dry-land farming would become accessible by constructing 30 kilometers of penetration road, (2) the land could be fully developed within five years after building the road, (3) initial land clearing and annual preparation would be done by mechanized means, with the other operations being done mostly by hand, and (4) crops to be grown would be maize or sorghum, teff, and an oilseed such as sunflowers. Such a rate of return is attractive enough to warrant further investigations.

IV COMPARISON OF RECOMMENDED PROJECTS

Decisions as to priorities among projects may be needed, especially if they cannot all be implemented beginning in 1969. Tables V through X contain comparisons of the projects studied and recommended by SRI (Borkenna is recommended only with reservations at this time). The projects are ranked according to the factor being used for comparison in each table. It should be noted that, as would be expected, ranking changes as the comparison factor changes. The hides project is highest in Table V and lowest in Tables IX and X. The Ada project is highest in Table VI but lowest in Table VIII.

In Table V, rates of return vary from extremely high (where investment is returned in one year of operations) down to 10%, a level at which SRI would question the feasibility of the investment under Ethiopian conditions. For most of the projects, rates of return drop approximately 3% after taxes have been deducted.

In Table VI, the figures were obtained by totalling estimated value added for the life of each project, calculating present value, and then converting that figure into the annualized value in the table. The negative present value achieved by the Borkenna project, even with a positive rate of return, comes about because of the extremely high investments that must be made in its early years of life.

Table VII depends to some extent on Table VI, as income tax reflects company income. Income tax only (rather than all taxes) was used for comparison because the figure was readily available and is the most important tax. Other taxes, such as transaction tax or export tax, would be pertinent in some cases if total taxes were to be calculated.

Table V

COMPARISON OF CALCULATED INTERNAL RATES OF RETURN (BEFORE TAXES)

	Rates of Return (%)
Dry-Salting Hides*	Over 100†
Ada Development*	32
Fertilizer Plant	26
Castorseed Processing	18
Dogali Project (Desset)*	18
Oilcake Solvent Extraction	15
Feedlot	14
Borkenna Project	10

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* For added investment and increased income only. Other enterprises are all new; thus there is no basis for comparison with present investment or income.

† A specific value has not been given because rates of return of this magnitude do not lend themselves to precise calculation.

Table VI

VALUE ADDED TO GROSS DOMESTIC PRODUCT BY PROJECTS*
(Thousands of Ethiopian Dollars)

	Annualized§ Value
Ada Development†#	2,989
Castor Seed Processing	391
Dogali Project#	316
Oilcake Solvent Extraction	271
Fertilizer Plants	156Δ
Feedlot	105
Dry-Salting Hides	59
Borkenna Project‡#	Negative
TOTAL VALUE ADDED	4,287

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* All projects adjusted to a 25-year life for comparability.

† Revenues based on an assumed 100% increase in crop yields by 80% of Ada farmers in ten years.

‡ Assumes negligible current income from present land utilization.

§ 10% discount rate used.

Δ Average of two different operations budgeted in Report No. 1.

Assumes the cost of purchased goods and services = 20% of net revenue.

Table VII

ADDITIONAL GOVERNMENT INCOME TAX REVENUES FROM PROJECTS
(Thousands of Ethiopian Dollars)

	Annualized Values
Ada Development	462
Borkenna Project	400
Castor Seed Processing	219
Oilcake Solvent Extraction	148
Fertilizer Plants*	56
Feedlot	30
Dry-Salting Hides	20
Dogali Project†	10
Total	1,345

* Average of two different operations.

† Tax on present production assumed to be at 20% level.

Table VIII

DIRECT EMPLOYMENT ADDED BY PROPOSED PROJECTS

	Professional	Skilled	Total	Semi-Skilled	Unskilled	Total	Ratio Skilled/ Unskilled
Borkenna Project	4	32	36	115	4349	4464	1:124
Dogali Project (Desset)	1	7	8	9	600	609	1:76
Feedlot	2	5	7	4	37	41	1:6
Fertilizer Plant	2	4	6	4	20	24	1:4
Oilcake Solvent Extraction	3	15	18	19	18	37	1:2
Castor Seed Processing	3	15	18	19	18	37	1:2
Dry-Salting Hides	2	4	6	4	2	6	1:1
Ada Development	27	97	124	34	33	67	1:05

Table IX

ADDITIONAL FOREIGN EXCHANGE GENERATED FROM PROJECTS
(Thousands of Ethiopian Dollars)

	Net Balance		
	5th Year	10th Year	15th Year
Oilcake Solvent Extraction	2,328	2,328	2,328
Feedlot*	2,214	2,214	2,214
Ada Development	158	1,943	1,943
Borkenna Project†	(637)	1,500	1,500
Castor Seed Processing	984	984	984
Fertilizer Plants‡	180	180	180
Dogali Project	40	40	40
Dry-Salting Hides	37	37	37
Totals	5,304	9,226	9,226

* Based on gross value of output, assuming that one-half of plant production is exported.

† The parentheses () indicate a negative balance.

‡ Potential savings in exchange costs.

Table X

INVESTMENT FUNDS NEEDED
(Thousands of Ethiopian Dollars)

	Initial Investment*			Recurring Average Annual Public Expenditures
	Public	Private	Total	
Borkenna Project	9,900	12,027	21,927	134
Ada Development	10,748		10,748	1,422
Oilcake Solvent Extraction		9,230	9,230	
Castor Seed Processing		7,606	7,606	
Feedlot		2,495	2,495	
Fertilizer Plants		1,425	1,425	
Dogali Project	25	1,238	1,263	30
Dry-Salting Hides		171	171	
Totals	20,673	34,192	54,865	
TFYP estimates of capital investment needs for 1969 (agriculture and manufacturing)	67,100		112,400	

* The total amount is usually spread over several years; includes working capital.

Table VIII makes a comparison and contrast of labor needs of the projects. The needs for highly-skilled personnel, which are difficult to fill, are compared with the less-skilled labor, which is comparatively easy to hire or train. Projects are ranked according to the proportion of the more skilled labor that is needed. Table IX compares the foreign exchange that will be generated, while Table X compares the investment funds, public and private, that will be needed to implement each project.

The comparison of single projects does not usually give a true picture of the total impact of each type of project. It has been anticipated that, in most cases (not including the single solvent extraction plant), the project would be repeated in other locations, and in a number of cases the actual locations have been specified. Figure 9 outlines some of the areas recommended for consideration for agricultural production efforts in the future. It would be theoretically possible for most of these areas to be developed within the next fifteen years, although the effort needed would be great. All of these areas are discussed in Programs I and II, except for the Systems Analysis study areas that were mentioned in the Project Selection section.

Table XI includes many of these areas for agricultural production, along with the agro-industrial projects that may be repeated, and makes an estimate of the impact (in terms of value added) at the end of each of the next three five-year periods. A number of projects are far in the future and either have not yet been studied or the sites have not been chosen; these were also projected based on estimates derived from the projects already studied. Based on the large effort expended on these studies by the SRI team and the modest results in terms of repeatable projects, one can conclude that such efforts will have to continue in order to unearth a great many more feasible projects for development, even before the large amounts of money and manpower can be invested (if available) to bring about the large development impact that is desired.

FIGURE 9 AGRICULTURAL AREAS RECOMMENDED FOR FURTHER DEVELOPMENT

Table XI

VALUE ADDED BY PROJECTS AND THEIR RECOMMENDED REPLICATIONS

	Annual Value Added (Thousands of Ethiopian Dollars)		
	5th Year	10th Year	15th Year
Irrigation - Moderate Sized Projects	1,225	13,055	39,165
Emberemi, Robi-Kombolcha, Erer-Gota, Dogali, Gash, 10 Other sites*			
Oilseed Production	6,250	12,500	17,000
Tekeze River (Sesame), Harer-Jijiga (Groundnuts), Gash and Awash Valleys (Castor Seed)†			
Oilseed Processing	662	1,053	1,053
Grain and Pulse Production	5,978	17,934	29,890
Ada and nine areas (recommended in Report No. 10)			
Dry-Salting Hides	295	531	767
Addis Abeba, Asmera, Meqele, Keren, Gonder, Dire Dawa, Kombolcha, Malgue Wendo, 5 Other sites‡			
Fertilizer and Agricultural Chemicals§	317	413	563
FeedlotsΔ	105	210	320
Totals	14,832	45,696	88,758

* Added in last five years.

† Assumes 18,000 metric tons of new castor seed production annually in first 5-year period, and another 18,000 tons in second 5-year period.

‡ Report No. 5 recommends increasing the number and capacity of hide facilities. In the estimate here, capacity was stabilized at 50,000 hides per facility.

§ Assumes that estimated private demand is added to half of the estimated government demand (for locust and other control programs). Assumes that costs of chemical manufacture are 89% of gross value of products. See Report No. 3.

Δ Assumes one additional feedlot at full capacity by 1978 and an additional one by 1983.

V THE THIRD FIVE-YEAR PLAN AND SELECTED SRI PROJECTS

A pertinent question concerns the relationship of the individual "pilot" projects studied by the SRI team, and the goals for the Agricultural Subsector in the Third Five-Year Plan. While an evaluation of the Plan or of its Agricultural Sector is clearly not within the scope of this work, a few comments relating the work of the SRI team to the goals of the Plan may be in order. The primary concern here is to what extent some of the SRI projects studied could be used as a basis for reaching TFYP targets.

Table XII shows some of the targets (measured in physical units) set by the Plan for 1973, for selected major agricultural commodities. (Other major commodities with targets set by the Plan are: coffee, sugarcane, and cotton fiber; these are not included in Table XII since they were not studied in depth by SRI.) Table XIII indicates the amount of physical production for the same products, for projects studied in depth by SRI or USAID.

Table XII

PRODUCTION TARGETS--THIRD FIVE-YEAR PLAN:
INCREASE BY 1973 OVER 1969
(Metric Tons)

Cereals	739,000
Pulses	114,000
Oilseeds	170,000
Meat	75,000

Table XIII

ANNUAL PRODUCTION FROM PROJECTS BY 1973
(Metric Tons)

Ada Package Program	
Cereals	14,000
Pulses	4,400
Recommended Oilseed Production Projects*	58,000
Feedlot	1,600
AID Yabelo Pilot Program†	3,000

* Castor, groundnut, and sesame production, Reports No. 8 and No. 11. Feasibility studies not conducted on production of any of these.

† Range production of cattle, discussed in "The Regional Livestock Development Project in Ethiopia," ditto, March 1,1968.

Table XIV shows the number of times the SRI or USAID pilot projects would have to be repeated, in order to attain the TFYP targets by 1973. This table may be subject to misinterpretation. It does not imply that the undertaking of these projects is the only way to reach TFYP targets. There are many other methods of increasing production; a number of them are being attempted now by various foreign advisory groups, by private businessmen, and by representatives of government agencies. These projects do have the advantage of carefully estimated costs and production increases, and were some of the projects studied by SRI.

From Table XIV, it is obvious that a large number of replications of projects are necessary for both cereals and pulses, and for livestock. Oilseeds are a special case, because the feasibility studies are not yet done; however, this would appear to be a target that might be more easily met than, say, cereals.

Table XIV

NUMBER OF PROJECT REPLICATIONS NECESSARY
TO ATTAIN TFYP PRODUCTION TARGETS

Cereals and Pulses	46 "Package" production projects
Livestock	7 Feedlot projects 21 Range production projects
Oilseeds*	3 Recommended oilseed projects

* Adjustment has been made for anticipated increases in cottonseed production.

Tables XV, XVI, and XVII all concern the need for scarce funds and manpower if the SRI/USAID projects were to be replicated to the extent indicated in Table XIV. Table XVI shows the need for additional capital development funds which undoubtedly would need to be derived from external sources. Such sources would probably require completed feasibility studies before committing funds for any project. On the other hand, additional public recurring costs would need to come from the domestic budget; a small proportion would come from direct charges on the projects, but more would need to be derived from taxes that would flow from the added agricultural production. While the funds for the private operating costs would be largely self-generating, they would depend on satisfactory flow of agricultural credit, which assumes that by 1973 the credit system would be operating satisfactorily, and that "seed money" for the system would have been obtained, again undoubtedly from external sources.

Table XVII indicates that the TFYP calls for training less than one-third of the skilled personnel that would be needed if all the replicated projects were activated. This gap in needs could undoubtedly be filled in part through the importation of foreign personnel, although

Table XV

COSTS OF REPLICATED PROJECTS
TO MEET TFYP PRODUCTION TARGETS
(Thousands of Ethiopian Dollars)

Capital Development--1969-73	
Public funds	Eth$ 533,000
Private funds	14,000
	Eth$ 547,000

Annual Costs--1973	
Public recurring	Eth$ 82,200
Private operating	609,100
	Eth$ 691,300

Table XVI

COMPARISON OF TFYP BUDGET AND REPLICATED PROJECTS
TO MEET TFYP PRODUCTION TARGETS
(Thousands of Ethiopian Dollars)

Funds	TFYP Budget	Project Budget Based on Table XV	Additional Funds Needed to Meet TFYP Goals
Capital Development Program--1969-73			
Public	Eth$ 181,900	Eth$ 181,900	*
Private	80,300	80,300	*
Total domestic	262,200	262,200	0
External resources	100,600	284,800	184,200
Total Capital Development	Eth$ 362,800	Eth$ 547,000	Eth$ 184,200
Annual Program Costs--1973			
Public recurring costs	22,800	82,200	59,400
Private operating costs	†	609,100	609,100
Total Annual Costs	Eth$ 22,800	Eth$ 691,100	Eth$ 668,500

* No funds needed; project budget has been adjusted to same level as TFYP budget.

† No figure budgeted in Third Five-Year Plan.

Table XVII

COMPARISON OF PERSONNEL (PROFESSIONAL AND SKILLED)
NEEDED FOR TFYP AND REPLICATED PROJECTS,
TO MEET TFYP TARGETS

TFYP--2,450 persons scheduled for training.*

Replicated Projects--7,950 persons needed by 1973.

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* Adjustment estimated in this category for "semi-skilled."

such importation usually is expensive. An expanded training program could also be mounted to train more skilled people than are now planned for.

An overall judgment of the TFYP targets would have to consider that, at the present time, the large numbers of needed feasibility studies are not in process, adequate capital development funds and recurring budget funds have not been allocated by the IEG to the Agricultural Subsector, and the numbers of trained personnel now contemplated in the Plan will not be adequate to handle the work required. While adjustments in the Plan can be made in its Annual Revision, it is possible that the targets may need to be scaled down somewhat to correspond more closely with budget and manpower limitations that may arise.

As a final note, it should be mentioned that the five-year limit on project results has distorted to some extent the results of capital investments. Some of the projects mature over longer periods--such as ten years; in such cases, the tenth year would see production increases for the same project (with essentially the same initial investments) up by several times over the figure used in these tables for the fifth year.

VI A GUIDE FOR GOVERNMENT ACTION

Previous sections of this report, as well as the other SRI reports prepared, contain many recommendations for government action. The purpose of this section is to focus attention on the types of action suggested and to summarize a number of important recommendations so that the IEG may have a clearer understanding of their relationships one to another. The recommendations listed below have been divided into four categories: (1) specific IEG action to implement those recommendations that are based on detailed SRI studies, (2) policy decisions, some of which will probably require approval by the Council of Ministers, (3) the need for additional studies emanating from the work of the SRI team, and (4) support for projects that have been proposed by others or that are already underway.

A. Action to Implement SRI Studies

Some form of near-term action is suggested in nearly all of the SRI reports. Table XVIII summarizes some of the more pertinent aspects of these suggestions for action. The recommended duration of the action is merely suggestive. At times the government agency that would be responsible for the action is obvious from the nature of the action; however, since some of these recommendations have not been discussed with the agencies, it is anticipated that the IEG may wish to delay assigning responsibility until such discussions have taken place. Finally, the action being recommended includes, for the most part, only those steps needed to begin to implement the various projects. With a few exceptions,

Table XVIII

RECOMMENDED ACTION TO BE TAKEN BY THE IEG TO IMPLEMENT SRI PROGRAMS

Subject	Suggested Action	Duration	Government Agency
PROGRAM I			
Supply of basic seed to producers of certified seed	Produce two kinds of seed: (1) breeder seed that will be used by the IEG experiment stations to produce foundation seed, and (2) foundation seed that will be furnished to private companies for production of certified seed.	Continuous	Ministries of Agriculture and of Education, under direction of the Institute for Agricultural Research and the H.S.I.U. Experiment Stations.
Seed certification	Establish a new group to operate a central seed laboratory and to perform the "field certification" of seed. Enact National Seed law.	Continuous	The new group to be a section within the Ministry of Agriculture.
A commercial feedlot in southern Ethiopia	Approach private investors with experience in feeding cattle in Africa or other developing areas, and market connections to dispose of fed cattle.	One year	Livestock and Meat Board, and Technical Agency.
Livestock forage	Initiate a research and extension program	Continuing basis	Ministry of Agriculture: (1) research under direction of the Institute for Agricultural Research, and (2) extension work under direction of the Extension Department.
Fertilizer mixing plants at Aseb and Mitsiwa	Approach petrochemical companies with experience in agricultural that might be interested in investing in one or more mixing plants in Ethiopia.	Within six months	Action might be initiated by the Technical Agency or the Ministry of Commerce and Industry.
PROGRAM II			
A district development program for crops (grains, pulses, oilseeds)	"Package" programs for Ada, Setit-Humera, Shashemene, Harer, and Dese.	Life of each project from 10 to 25 years.	

Table XVIII (Continued)

Subject	Suggested Action	Duration	Government Agency
PROGRAM II (Continued)			
Improve agricultural research	Install full experiment station at Setit-Humera and field experiment station at Harer.	Continuous	Ministry of Agriculture (Institute of Agricultural Research) and Ministry of Education.
A program to expand commercial production of castor seed	Expand the amount of research effort being devoted to castor seed and then introduce the results to potential commercial growers; areas of concentration to be the Awash Valley and at Setit-Humera.	Initial promotion completed in five years; research to continue indefinitely	Ministry of Agriculture with cooperation of the Institute of Agricultural Research, the National Extension Service, and the Awash Valley Authority.
PROGRAM III			
A program to develop new sites for moderate-sized irrigation	Form interministerial committee to set policies. Form research group to conduct feasibility studies. Well drilling; pumping; soil tests and other tests.	Five or six years	Ministry of Agriculture to form the interministerial committee.
Implementation of irrigation projects according to schedule: Dogali, Borkenna, Emberemi, Erer-Gota, Gash, Robi-Kombolcha	Road construction and maintenance; provision of an extension agent; investigate land ownership; collect stream and underground water data; evaluate health hazards such as malaria and bilharzia.	Investigations and road construction within one year for each project; road maintenance, extension service, and collection of water data to be on a continuing basis.	Coordinating responsibility vested with the committee to be established under the aforementioned program on moderate-sized irrigation.

Table XVIII (Continued)

Subject	Suggested Action	Duration	Government Agency
PROGRAM IV			
Small agricultural loans account	The Development Bank of Ethiopia, the Commercial Bank of Ethiopia, and the Addis Ababa Bank to make production loans, ranging from Eth$ 100 to Eth$ 6,000, available to small-scale farmers.	Indefinitely	Development Bank of Ethiopia, Commercial Bank of Ethiopia, Extension Service of the Ministry of Agriculture, Ministry of Community development and Social Affairs, and the Ethiopian Grain Corporation.
PROGRAM V			
Solvent extraction of oilcake	Encourage private company or group of companies to establish solvent extraction plant for processing oilcake.	One year	Ministry of Commerce and Industry, and possibly financial participation by the Ethiopian Investment Corporation.
Castor seed processing	Encourage a private company to build a castor seed processing plant.	One year to search for, and negotiate with, potential investors	Ministry of Commerce and Industry, and Ministry of Agriculture; possible financial participation by the Ethiopian Investment Corporation.
Dry-salting treatment of cattle hides at eight designated sites according to schedule.	Locate appropriate sources of raw hide supply; especially if the reopening of the Malgue Wendo plant is delayed. Prepare for potential investors a list of licensing and other legal requirements for hide flaying and curing in Ethiopia. Cooperate with the potential investors in conducting demonstration and training programs in the proper treatment of hides.	Continuing	Livestock and Meat Board
PROGRAM VI			
Clean oilseed program	Encourage the use of small seed cleaners at local level, first by testing different types of small cleaners and then promoting the use of those that are the most effective.	Possibly ten years	Ministry of Agriculture; Ethiopian Grain Corporation

Table XVIII (Concluded)

Subject	Suggested Action	Duration	Government Agency
PROGRAM VI (Continued)			
Reactivate the Grain Board	Recommend and carry out national policies for food crops; establish a statistical department within the Grain Board; implement Commodity Stabilization scheme	Continuous	Interministerial committee to be headed by a member of the Prime Minister's Office.
Improvements at the ports of Aseb and Mitsiwa	Initiate plans to improve operations and to make recommended physical changes.	Fifteen years	Ministry of Communications
Promotion of exports	Establish an export promotion council to develop and administer a program to expand the quantity, quality, and variety of exports.	Continuous	Interministerial committee headed by member of the Ministry of Commerce and Industry.
Policing export regulations	Set up inspection stations to check on commodities to be exported.	Continuous	Ministry of Commerce and Industry.
Livestock research and extension	Program to improve production, marketing, processing, and export of livestock from northern Highlands.	Continuous	Ministry of Agriculture; Livestock and Meat Board.
Ancillary facilities for the commercial feedlot	Set up buying stations and marketing facilities to serve the potential feedlot and domestic consumption centers in southern Ethiopia.	Continuous	Livestock and Meat Board and Technical Agency

planning for actions to be taken several years hence should be left until some later date. If a particular action must be taken soon to implement a project, it may be included in the list; if a decision on that action can be delayed until some later time, it is omitted from the list.

B. Recommended Policy Changes

To facilitate the development of the Plan of Action being proposed herein, a number of policy measures need to be enacted. Some of them will no doubt require approval by the Council of Ministers.

The material found in the SRI reports should form the basis for preparing the cases of these policy recommendations; however, since some of the decisions will affect sectors beside those considered in the Agro-Industrial Sector Study, ample reference should also be made to other sources.

The more important policy measures suggested in the SRI reports fall under the headings of domestic trade, foreign trade, investment promotion, and credit. Following is a referenced summary of these suggestions.

Domestic Trade in Farm Commodities

Develop a plan for stabilizing the prices of farm commodities, improving their distribution, and stimulating greater production by:

1. Reactivating the Ethiopian Grain Board. (Reference: Report No. 16, pp. 153-61).

2. Expanding the activities of the Ethiopian Grain Corporation (Reference: Report No. 16, pp. 161-5).

3. Offering some incentive such as minimum producer prices for production of selected commodities (Reference: Report No. 16, pp. 151,2).

4. Setting up commodity standards and a grading system (Reference: Report No. 16, p. 177).

5. Policing commodity standards by means of government inspectors (Reference: Report No. 16, pp. 168,9).

6. Establishing a National Reserve Stock Scheme to store grains during times of surplus and to distribute them during times of famine (Reference: Report No. 16, pp. 158,9).

7. Establishing and policing standards for the production and marketing of improved seeds (Reference: Final Report).

Foreign Trade

Promote exports by:

8. Strengthening the quality control of exported grains, pulses, and oilseeds, which includes setting of standards, stricter inspection, and compulsory fumigation (Reference: Reports No. 6, pp. 103-5 and No. 8, pp. 24-6).

9. Exempting certain price-sensitive commodities from the export tax (Reference: Report No. 6, p. 108).

10. Requiring that new bags be used for those exports in which contamination is a problem (Reference: Report No. 6, pp. 106,7).

11. Forbidding the export of filter cake (Reference: Report No. 8, pp. 51-4).

Modify import regulations slightly by:

12. Allowing the Grain Board to regulate the inflow of those commodities that would have a major detrimental effect on domestic production and prices (Reference: Report No. 16, pp. 155-8).

Investment Promotion

Improve the investment climate by:

13. Rationalizing the Investment Proclamation to make it more comprehensive and in agreement with other government regulations (Reference: Report No. 2, pp. 93-7).

14. Reducing the minimum level at which special income tax relief is granted under the Investment Proclamation of 1966 (Reference: Report No. 2, p. 95).

15. Considering the relaxation of monetary policies in a way that will bring about greater investment and, consequently, greater economic growth (Reference: Report No. 2, pp. 101,2).

Credit

Augment the credit system by:

16. Providing an insurance program for bank deposits (Reference: Report No. 9, p. 154).

17. Permitting the use of chattel mortgages on standing crops (Reference: Report No. 9, p. 154).

C. Additional Studies Worth Making

As is true with nearly all research projects, many ideas for additional studies were generated during the course of the Agro-Industrial Sector Study. Some of these studies are closely related to programs of research now being conducted by, or on behalf of, the IEG; others are new concepts that may require careful review before deciding whether or not to proceed with the study, and if so, how it should be undertaken. The following list, garnered from the various SRI reports, contains most of the more important suggestions for additional studies; however, additional ideas will undoubtedly occur to others as they read through these reports. The suggestions concern most of the subjects discussed in this

Final Report. As in previous sections, reference is made to the particular report where the idea for suggesting the study originated.

Package Programs

1. Package programs for increasing grain and pulse production in twelve areas. (Reference: Reports No. 10, pp. 81-91 and No. 14).

Locations of Development

2. Reconnaissance of unused, dry-land areas, especially those areas where the malaria eradication program is in the attack or consolidation stages (Reference: Final Report).

Agricultural Chemicals

3. Expanded program of research in the proper use of agricultural chemicals for different regions of the country (Reference: Report No. 3, pp. 22-6).

4. A program of demonstration of agricultural chemicals (Reference: Report No. 3, pp. 22-6).

5. Encouraging private chemical companies to establish either production operations or mixing facilities in Ethiopia (Reference: Report No. 3, pp. 22-6).

6. A means for assisting small businesses in the distribution of agricultural chemicals (Reference: Report No. 3, pp. 22-6).

Oilseeds

7. Bulk storage and transportation of oilseeds (Reference: Report No. 8, pp. 21-3).

8. Middle Eastern markets for oils and oilseeds (Reference: Report No. 8, Section V).

Agricultural Credit

9. A program to develop a private rural banking system (Reference: Report No. 9, pp. 147-53).

10. A method for training credit agents (Reference: Report No. 9, pp. 90-6).

11. The practicality of a postal savings system (Reference: Report No. 9, pp. 163-5).

12. The possibility that Ekubs could form the basis of a banking system in Ethiopia (Reference: Report No. 9, pp. 165-7).

Livestock

13. Establishment of disease-free quarantine areas (Reference: Report No. 7, pp. 26-8).

14. Establishment of bull center, including crossbreeding for improved milk production (Reference: Report 7, p. 7 and pp. 23-6).

15. Credit needs of livestock dealers (Reference: Report 7, pp. 9-10 and p. 49).

16. Provision of feed, water, and health inspection for cattle trails (Reference: Report No. 7, p. 9).

17. Improvement of municipal abattoirs (Reference: Report No. 7, p. 11).

18. Potential export market for chilled and frozen beef carcasses of good quality (Reference: Report No. 7, pp. 98-108).

Marketing of Grains and Pulses

19. Requirements of an improved marketing system (References: Report No. 16, pp. 11-24).

20. The role of the cooperative movement among farmers specializing in the production of grains, pulses, and oilseeds (References: Report No. 16, pp. 166-8).

21. Improved grain storage for the private sector (Reference: Report No. 16, pp. 172-4).

22. Establishment of bonded public grain warehouses (Reference: Report No. 16, pp. 197-8).

23. Feasibility of a plant for splitting chickpeas (Reference: Report No. 6, pp. 68, 9).

Port of Aseb

24. Feasibility of a petroleum products pipeline from Aseb to Addis Abeba (Reference: Report No. 4, pp. 119-21).

Exports

25. Credit needs of exporters and means of supplying these needs (Reference: Report No. 6, p. 109).

26. Role of the National Bank of Ethiopia in regulating export trade (Reference: Report 6, pp. 108,9).

27. Encouragement of the Ethiopian shipping lines to introduce services to those ports in the Middle East and nearby regions that import substantial quantities of Ethiopian products (Reference: Report 6, pp. 110-11).

28. Assignment of commercial attachés or officers to cities where Ethiopian trade is substantial (Reference: Report 6, pp. 111-12).

29. Examination of contracts commonly written for international trade (Reference: Report 6, pp. 103-5).

D. Activities Currently Underway

In a number of instances, SRI team members have lent their support to projects already started or to concepts that had gained acceptance by the IEG. Some of the more important of these are listed below according to the organization having primary responsibility for initiating the project or for exploring the concept.

Ministry of Agriculture/Department of Water Resources/USAID

1. Development of the Southern Regional Livestock program and expansion into other areas (Reference: Report No. 7, pp. 41-4).

Ministry of Agriculture/United Nations Special Fund

2. Livestock disease problems (Reference: Report No. 7, pp. 26-8).

3. Proposed United Nations project to provide training and demonstration in various aspects of livestock marketing (Reference: Report No. 7, p. 9).

Ministries of Agriculture, and Planning and Development/USAID/ Michigan State University

4. Research on agricultural machinery (Reference: Report No. 10, p. 68).

Ministry of Agriculture/USAID/Winchester-Carter Team

5. Diffusion of better agricultural practices through improved training (Reference: Education for Action, by Burl Winchester and L. P. Carter).

Ministry of Agriculture/Freedom from Hunger Campaign

6. Continued work on the testing of commercial fertilizers (Reference: Report No. 1, pp. 36-8).

Ministry of Agriculture/Freedom from Hunger Campaign/Tropical Stored Products Institute

7. Proposed grain storage program for Debre Zeyt area (Reference: Report No. 14).

Ministry of Agriculture/Haile Selassie I University

8. Expanded research program of the various experiment stations and research groups (Reference: Report No. 10, Section IV) including experiments on oilseeds such as castor beans, soybeans, safflower, and peanuts (Reference: Report No. 8, pp. 14-21).

Ministry of Agriculture/SIDA/IBRD/USAID

9. Continuation of the package approach to development in various areas (Reference: Report No. 9, Section XI).

Ministry of Finance

10. Reorganization of the Development Bank of Ethiopia and the Ethiopian Investment Corporation (Reference: Report No. 9, Section VIII, and Report No. 2, pp. 100,1).

Ministry of Commerce and Industry

11. Establishment of an investment center (Reference: Report No. 2, pp. 98,9).

Ministry of Land Reform and Administration

12. Cadastral survey and a program of land registration (Reference: Report No. 9, p. 33).

13. Increased taxes on unused lands (Reference: Final Report).

Department of Water Resources

14. Water rights legislation for the country as a whole (Reference: Report No. 15, p. 57, and Report No. 17, p. 67).

Awash Valley Authority

15. Development of lands in the Middle Awash for irrigation (Reference: Systems Analysis Methods for Ethiopian Agriculture, SRI, Volume 1, Section VII).

Imperial Highway Authority

16. Expansion of the feeder road program (Reference: Report No. 16, pp. 177,8).

17. Construction of a bridge over the Tekeze river and improvement of the road system in the region of Setit-Humera with the intent that this area might prove suitable for producing castor beans, as well as traditional crops.. (Reference: Report No. 11, p. 51).

Livestock and Meat Board

18. Construction of central laboratory for evaluating the various chemical products available for treating hides and skins (Reference: Report No. 5, pp. 30-1).

Livestock and Meat Board/Chamber of Commerce

19. An export marketing association to improve the profitability of exporting dry-salted hides (Reference: Report No. 5, p. 30).

Ethiopian Grain Corporation

20. Expansion of Ethiopian Grain Corporation's program of grain storage and marketing (Reference: Report No. 16, pp. 181-197).

BIBLIOGRAPHY

Following is a partial list of the materials that were available to the SRI team during the course of the Agro-Industrial Sector Study. Mimeographed and typed reports are intermingled with bulletins, books, and articles. The list is grouped alphabetically by title under major categories such as "Marketing and Trade," "Government Activities," etc. Although the sources of many of the items are missing or incomplete, entries are listed to indicate to the reader the wealth of materials available to the SRI team.

Marketing and Trade

Messing, Simon D., "The Abyssinian Market Town," Markets in Africa, Northwestern University Press, 1962, pp. 386-408.

"The Accelerated Third Highway Program," Imperial Highway Authority.

deYoung, Maurice, "An African Emporium: The Addis Merkato," Journal of Ethiopian Studies, vol. V, No. 2, 1967.

"Cattle and Meat Industry in Ethiopia," National Bank of Ethiopia.

"A Comparative Study of Ethiopia's Trade With Selected Countries," Ethiopian Economic Review, No. 1, December 1959.

"A Credit Study of Alemaya Farmers Co-op Society," Oklahoma State University.

"The Design and Construction of a 20 Metric Ton Capacity Corrugated Metal Grain Storage Bin," Oklahoma State University.

"Ethiopia Agricultural Trade Report, 1966," U.S. Department of State American Embassy, Addis Abeba, August 4, 1967.

"Ethiopia Alters Tariff Items: Revises Baggage Allowances," U.S. Department of Commerce, Reprint from Foreign Commerce Weekly, November 20, 1961.

"The Ethiopian Grain Corporation: An Analysis of Past and Present Operations With Recommendations for Future Operations," Experience Incorporated, June-July 1966, Addis Abeba, Ethiopia.

"Ethiopian Trade and Production," Ethiopia Observer, vol. II, No. 7, August, 1958.

"Ethiopian Trade Patterns," U.S. Department of State, American Embassy, Addis Abeba, May 17, 1966.

"Ethiopia's External Trade," Summary Report by the Central Statistical Office, 1953-1963.

"Ethiopia's External Trade in the Year 1951," Ethiopian Economic Review, No. 2, June 1960.

"Ethiopia's External Trade and Western Europe," November 1967.

"Ethiopia's Imports and Exports in Commodity Detail, 1962," Central Statistical Office.

"Fenugreek in the World Market," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. V, No. 6, June 1967.

"Foreign Trade and Balance of Payments," Ethiopian Government (Planning Board).

De Young, Maurice, "The Grain Marketing System in Ethiopia: An Exercise in Market Oriented Central Planning," College of Business Administration, Haile Selassie I University, Addis Abeba, no date.

"Grain Storage," Ethiopian Government (Planning Board).

"Highways in Ethiopia," Ethiopia Economic Review.

"History of Trade in Ethiopia," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. V, No. 7, July 1967.

"Imperial Highway Authority Development Programme," Ethiopian Economic Review, No. 8, April 1964.

"Import Tariff System in Ethiopia," U.S. Department of Commerce, World Trade Information Service, Part 2, No. 62-4, Operations Reports, January, 1962.

"Introducing Some Ethiopian Export Commodities," Ethiopia Economic Review, No. 3, November 1960.

Kluchkhohn, Richard, "The Konso Economy of Southern Ethiopia," Markets in Africa, Northwestern University Press, 1962, pp. 409-430.

"Leather and Shoe Industry," State Bank of Ethiopia, Quarterly Bulletin, No. 59, December, 1963.

"Local Prices in 1966," National Bank of Ethiopia.

"Meat Packing Industry," State Bank of Ethiopia, Quarterly Bulletin, September 1961.

"Memorandum on the Slaughter House and Meat Canning Plant," Ethiopian Government (Planning Board).

"Metahara Sugar Estate Project," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. V, No. 7, July 1967.

"National Meat Corporation of Ethiopia Share Company," Report for the Year Ended October 31, 1966.

"Observations on the Report 'The Construction of Grain Storage Facilities in Ethiopia and Eritria,'" Ethiopian Government (Planning Board).

"Oil Mills and Vegetable Ghee Factory," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. III, No. 3, March 1966.

"Organization and Methods of Road Maintenance in Ethiopia," Ethiopian Government (Planning Board).

"Organization and Operation of a Marketing Cooperative in Ethiopia," Oklahoma State University.

"Preliminary Report on the Awash and Wabi Shebelli Roads," Ethiopian Government (Planning Board).

"Preliminary Report on the Meat Canning Plant," Ethiopian Government (Planning Board).

"Problems and Prospects of the International Coffee Agreement," Ethiopian Economic Review, No. 9, May 1966.

"Production and Processing of Tobacco in Ethiopia," National Bank of Ethiopia, June 1965.

Bethke, S., "Production, Consumption and Marketing of Staples in Ethiopia," Food and Agriculture Organization, May 1964.

"Progress in Highway Transport," Imperial Highway Authority.

"Prospects for Coffee Exports,"State Bank of Ethiopia, Quarterly Report.

"Report on the Construction of Feeder Roads in Ethiopia," Ethiopian Government (Planning Board).

Lukin, P. H., "Report on the Production of Hides and Skins; Trade, Export, Import," June 1966.

Miner, Thomas H. et al., "Report on Production, Processing, and Marketing of Meat in Ethiopia," prepared for the Government of Ethiopia, Chicago, December, 1964.

Brodner, M., "Report on Proposed Meat Inspection Program in Ethiopia," USAID, Agriculture Division, Addis Abeba, November 1965.

Korten, D., "Selected Notes on Marketing and Distribution in Ethiopia," Doctoral Program, Graduate School of Business, Stanford University, February, 1967.

"Sidamo Tobacco," Ethiopia Mirror, vol. 5-6, No. 4-1, April 1967.

"Statistical Classification for Goods Imported, Exported or Re-Exported," IEG Ministry of Finance, 1963.

"Statistics on External Trade," Ethiopian Economic Review, No. 2, June 1960.

_____, Ethiopian Economic Review, No. 3, November 1960.

"Statistics on Prices," Ethiopian Economic Review, No. 2, June 1960.

_____, Ethiopian Economic Review, No. 3, November 1960.

"Statistics on Transport and Communications," Ethiopian Economic Review, No. 2, June 1960.

"Statistics on Transport and Communications," Ethiopian Economic Review, No. 3, November 1960.

"Summary Report on Ethiopia's External Trade, 1953-63," IEG Central Statistical Office, December 1963.

"Survey of the Market for Ethiopian Citrus Fruits," IEG and Awash Valley Authority, Addis Abeba, July 1967.

Pankhurst, Richard, "The Trade of Central Ethiopia in the Nineteenth and Early Twentieth Centuries," Journal of Ethiopian Studies, vol. II, No. 2, 1964.

"Trade Directory of the Empire of Ethiopia," Diplomatic Press and Publishing Company.

"Trade Directory and Guide Book to Ethiopia," Chamber of Commerce.

Pankhurst, Richard, "The Trade of the Gulf of Aden Ports of Africa in the Nineteenth and Early Twentieth Centuries," Journal of Ethiopian Studies, vol. III, No. 1, 1965.

Pankhurst, Richard, "The Trade of Northern Ethiopia in the Nineteenth and Early Twentieth Centuries," Journal of Ethiopian Studies, vol. II, No. 1, 1964.

Pankhurst, Richard, "The Trade of Southern and Western Ethiopia and the Indian Ocean Ports in the Nineteenth and Early Twentieth Centuries," Journal of Ethiopian Studies, vol. III, No. 2, 1965.

"Tradition and Economy," Ethiopian Business Journal, Vol. III, No. 1, April 1966.

"World Coffee Situation and Ethiopia's Exports of Coffee," Ethiopian Economic Review, No. 1, December 1959.

Social Background and Manpower

Walker, C. H., "The Abyssinian at Home," The Sheldon Press, London, 1933.

"The Addis Abeba Sample Survey in Private Household Consumption and Expenditure," Ethiopian Economic Review, No. 6, April 1963.

"The African Laborer and His Role in Economic Development," Ethiopian Business Journal, vol. III, No. 1, April 1966.

Korten, David C., "The Analysis of Ethiopian Folk Tales as a Source of Information on Cultural Values and Expectations in the Traditional Ethiopian Society," Working draft, Stanford University, July 21, 1965.

Jager, Otto, "Antiquities of North Ethiopia," Kegan Paul, Trench, Trubner and Company., London, 1965, pp. 1-129.

Abraha, Alemayehu, "A Case Study of the Relationship of Innovation, Health, and Economy in a Traditional Society," pp. 1-5.

Alexander, Larne, "The Changing Rural Society in Arussiland," CADU, Asella, March 1968.

"The Children's Nutrition Unit," SIDA, Addis Abeba, October, 1966.

Evans, Gordon, "Community Development in Ethiopia," Contemporary Review, May 1960, pp. 249-252.

Levine, Donald N., "The Concept of Masculinity in Ethiopian Culture," reprinted from The International Journal of Social Psychiatry, vol. XII, No. 1, 1966.

"Cultural Patterns in Ethiopia," Department of State, Agency for International Development.

"Education Report: Analysis of Developments in Recent Years (Ethiopia)," Ethiopian Observer, vol. V, No. 1, 1961.

Trevaskis, G.K.N., Eritrea: A Colony in Transition, 1941-52, Oxford University Press, London, New York, Toronto, 1960, pp. 1-17.

Workneh, Yilma, "An Essay on Community Life (in Ethiopia)," Addis Abeba University, College Ethnological Soc. Bulletin, July-December, 1961, pp. 83-89.

Lipsky, George A., Ethiopia, Human Relations Area File Press, 1962.

Pankhurst, Richard, "Ethiopia and the African Personality," Ethiopia Observer, vol. 3, No. 3, February 1959, pp. 70-72.

Baylor, James B., "Ethiopia: A List of Works in English."

Castagno, A. A., "Ethiopia: Reshaping an Autocracy," Africa Report, vol. 8, October 1963, pp. 3-7.

Luther, Ernest W., Ethiopia Today, 1958, Stanford University Press.

Zack, Arnold M., "Ethiopia's High Level Manpower," Survey conducted by Haile Selassie I University, May 1, 1964.

Korten, D. C. and F. F. Korten, "Ethiopia's Use of National University Students in a Year of Rural Service," Comparative Education Review, October 1966, pp. 482-492.

Wright, Stephan,"Ethiopian Literature," Encyclopedia Britannica (1961 ed.) vol. 8, pp. 779-80.

"Ethiopian Schools," Ethiopia Observer, vol. III, No. 7 August, 1959.

Jesman, Czeslaw, The Ethiopian Paradox, Oxford University Press, London, 1963, pp. 1-82.

Ullendorfe, E., The Ethiopians: An Introduction to Country and Peoples, Oxford University Press, 1965.

"Foreign Influence of 'Educated' Adolescents of Ethiopia," Ethiopian Business Journal, vol. III, No. 1, April 1966.

Shack, William A., The Gurage: A People of the Ensete Culture, Oxford University Press, London, 1966, pp. 29-82.

Mosley, Leonard, Haile Selassie, The Conquering Lion, 1964, Hillary.

Messing, S. D. and J. S. Prince, "Health Practices in Ethiopian Pre-Urban Communities," Paper based on experience in 1961-1965, pp. 1-8.

"Heating Water with Solar Energy for Household Use in Ethiopia," Oklahoma State University.

Haile, Tessemie, "Income and Expenditures of Three Ehtiopian Families," January 1967.

"Labour Department, Addis Abeba, Employment Office," National Bank of Ethiopia, Quarterly Bulletin, No. 15, September 1967.

Graf von Baudissin, Georg, "Labour Policy in Ethiopia," International Labour Review, June 1967, pp. 551-569.

Kaula, Edna Mason, The Land and People of Ethiopia, J. B. Lippincott Company, Philadelphia and New York, 1965.

"Land Tenure and Social Mobility Among the Damot Amhara."

Simoons, Frederick, J., Northwest Ethiopia, Peoples and Economy, 1960, University of Wisconsin Press.

Leslau, Wolf and S. Chojnacki, "On Mule-Back Through Gurage in Ethiopia," Canadian Geographical Journal, vol. 58, No. 3, March 1959, pp. 90-99.

"Organization Handbook," IEG Ministry of Education and Fine Arts, 1965.

"Participant Directory: Ethiopia," U.S. Agency for International Development, December 1967.

Cerulli, Ernesta, "Peoples of Southwest Ethiopia and its Borderland," International African Institute, London, 1956, pp. 1-128.

"Population Growth: Its Structural Changes and Economic Development," Imperial Ethiopian Government, Planning Board.

Mullner, F. A., "Possibilities of Manufacturing Protein-Rich Food Mixtures for Infants and Children in Ethiopia," Rome, 1965.

"Post Report, Ethiopia 1965," U.S. Embassy, Addis Abeba.

Yohannes, Mebratu, "The Problem of Juvenile Delinquency in Ethiopia," Source unknown.

"Recent Developments in Ethiopian Education," IEG, Ministry of Education and Fine Arts.

"Recent Trends in the Public Health Service," IEG, Ministry of Public Health.

Shack, William A., "Religious Ideas and Social Action in Gurage Bond Friendship," Africa, vol. 33, No. 3, July, 1963, pp. 198-208.

"Results of a Family Budget Study of 106 Households in Addis Abeba," Ethiopia Economic Review, No. 3, November 1960.

"Review of Social Development Trends and Policies of Ethiopia," Ethiopian Economic Review, No. 8, April 1964.

Brooke, Clarke, "The Rural Village in the Ethiopian Highlands," Geographical Review, January 1959, pp. 58-75.

"School Census for Ethiopia," 1964-1965, IEG, Ministry of Education.

"Selected Data on Population of Ethiopia," Central Statistical Office.

Pankhurst, Richard, "Some Factors Influencing the Health of Traditional Ethiopia," Journal of Ethiopia, pp. 31-71.

Pankhurst, Richard, Travellers in Ethiopia, Oxford University Press.

Buxton, David, Travels in Ethiopia, Lindsay Drummond Limited, London, 1949, pp. 56-59.

Adugna, Shimelis, "Urban Community Development," Ethiopia Observer, vol. IX, No. 4.

"U.S. Army/Area Handbook for Ethiopia," October 1960, Second Edition, June 24, 1964.

"Views of Management, Union on Current Labour Problems," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. V, No. 8, August 1967.

Levine, Donald, Wax and Gold, 1965, University of Chicago Press.

Finance, Private Enterprise, Business, Agro-Industry

"Agricultural Development Possibilities of the Awash River Valley," Ethiopian Government (Planning Board).

Lalevich, Dr. Dushan and Ing. Iva Lalevich, "Agricultural Possibilities of the Awash River Valley," Ethiopia Observer, vol. II, No. 10, November, 1958.

"Agricultural Survey Projects," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. III, No. 3, March 1966.

"Agriculture (Implementation of the Planned Investment in 1955)," Ethiopian Government (Planning Board).

"The Agriculture of Ethiopia," U.S. Operations Mission to Ethiopia, Point 4, vol. 7, January 1960, vol. 11, 1964, and vol. 12, January, 1965.

Fischer, John L., "An Approach to an Agricultural Development Program For Ethiopia," February 1967.

"Background Notes on Ethiopia," U.S. Department of State, 1966.

"Chilalo Agricultural Development Unit: Planning and Evaluation Section, Appendix II," CADU Evaluation Programme, July, 1968.

De Young, Maurice, "Considerations for a 'Market-Oriented' Approach to Central Planning in Ethiopia," pp. 1-4.

"Description of Agricultural Demonstrations 1968," Chilalo Agricultural Development Unit.

"Diebold Report: Quotes from the Diebold Report Concerning USAID Mission to Ethiopia," Food and Agriculture Organization of the U.N., Rome, 1965.

Melady, Thomas P., "The Economic Future of Ethiopia," Duquesne Review, vol. 4, No. 1, Fall, 1958, pp. 12-20.

"Essential Economic-Technical Data on Selected Development Projects," Ethiopian Government (Planning Board).

"Establishment and Constitution of the Agricultural Development Agency," Ethiopian Government (Planning Board).

"Establishment of a Regional Development Project in Ethiopia (Parts I, II, and III)," Sida Project Preparation Team.

"Ethiopia: Agricultural Development."

Margold, Stella, "Ethiopia Strives for Economic Growth," International Trade Review, vol. 39, July 1965, pp. 22-24.

"Ethiopia's Second Five-Year Development Plan: An Outline," Ethiopia Observer, vol. VII, No. 3, 1964.

Barnett, Vincent M., Jr. and Paul G. Clark, "Evaluation of USAID Program in Ethiopia," February 1, 1965.

Lawrence, J.C.D. and H. S. Mann, "FAO Land Policy Project (Ethiopia)," Ethiopia Observer, vol. IX, No. 4, 1966.

"Farm Data Summary (Blue Nile Basin 1960)," USAID and IEG, Addis Abeba, July 1961.

"Farm Data Summary (Blue Nile Basin, 1961)," AID, Addis Abeba, January 1963.

"Guidelines for the Coordination of National Budgets with National Development Plans," U.N. Economic Commission for Africa, June, 1966.

"Hydroelectric Power Potential of the Blue Nile Basin," Water Resources Department, Ministry of Public Works.

Krishnaswamy, J., "Leading Issues in Regional Development in Ethiopia," March 27, 1967.

Gryziewicz, S., "Main Determinants of Ethiopian Economic Development Policy," Ethiopia Observer, vol. VII, No. 3, 1964.

"Memorandum Concerning USOM Staff Comments on Development Projects," Ethiopian Government (Planning Board).

Toti, Luigi, "Nel Pieno Sviluppo Dell'Agricoltura Etiopica Una Promessa de Generale Benessere Economico," Sestante, vol. II, No. 1, 1966.

"A New Approach--A Report on Ethiopian-American Cooperative Development Projects," U.S. Embassy, Ethiopia.

Eichberger, W. G., "Planning for Agricultural Development," March 28, 1967.

Moller, John F. and Siira, Eino, "Preliminary Report on Kebri Dehar Agricultural Development Project."

"Projet d'amelioration du domaine agricole "Hirna" a tchertcher," Ethiopian Government (Planning Board).

"Proposed Third Five Year Plan for Manufacturing, Industry, and Foreign Trade," IEG, Ministry of Commerce and Industry, November 1967.

"Re-evaluation of Available Resources and Their Utilization in View of Maximizing the Economic Growth," Ethiopian Government (Planning Board).

"Regional Aspects of National Planning in Ethiopia," Imperial Ethiopian Government, Ministry of Planning and Development, 1959 (E.C.).

"The Regional Livestock Development Project in Ethiopia," USAID, March 1, 1968.

"Report of the Exploratory Mission to Ethiopia in Connection with a Possible Agricultural Economic Survey," Diebold Report, UN/FAO, 1965.

"Report on the Organization of the Agricultural Project for Zula," Ethiopian Government (Planning Board).

Bethke, S., "Report to the World Food Program on Grain Policy in Ethiopia and WFP Project 244," July 1966.

"Second Five Year Development Plan, 1963-1967," Imperial Ethiopian Government.

"Second Five Year Plan Investment Projects," Ethiopian Government (Planning Board).

"Some Questions Concerning the Organization of the Agricultural Farm Near Assella," Ethiopian Government (Planning Board).

"Sur Les possibilites Agriculturelles Dans la Region de L'Aouache Dans le Cadre de la Question des Concessions Estrangers," Ethiopian Government (Planning Board).

"USAID/Ethiopia Activities During 1966."

Batstone, R. K., "The Utilization of the Nile Waters," International and Comparative Law Quarterly, vol. 8, No. 3, July, 1959, pp. 523-558.

"Zula Dam and Irrigation System," Ethiopia Observer, vol. III, No. 8, September 1959.

Government Activities

"Agricultural Extension Service in Ethiopia," National Bank of Ethiopia, Quarterly Bulletin, July 1963.

"Agricultural Surveying for Soil and Water Conservation," Haile Selassie I University Agricultural College.

Schmidt, Wilson, "An Analysis of Tariff Protection for Industry in Ethiopia," USAID/Ethiopia, July 27.

"Balance of Payments Prospects--1951-1953 (E.C.)," Ethiopian Government Planning Board.

"Charter of the Ethiopian Grain Corporation," Ethiopian Economic Review, No. 3, November 1960.

"Civil Code of the Empire of Ethiopia of 1960," Imperial Ethiopian Government.

"Commercial Code of the Empire of Ethiopia, Proclamation No. 166 of 1960," Imperial Ethiopian Government.

"The Cooperative Societies Proclamation, 1965," Imperial Ethiopian Government.

"Detailed Explanation of the Transport and Communications Draft Investment Plan for the 1956 B.Y.," Ethiopian Government (Planning Board).

"Development Bank of Ethiopia: Activities in 1966," National Bank of Ethiopia, Quarterly Bulletin, No. 15, September 1967.

"Development Bank and its Activities," Ethiopian Economic Review, No. 8, April, 1964.

"Draft Report on the Development of Statistical Services in Ethiopia," UN Economic Commission for Africa, June 1961.

Stauffer, Robert, B., and M. J. Colebrook, "Economic Assistance and Ethiopia's Foreign Policy," Orbis, Fall, 1961, pp. 320-341.

Greenfield, Richard, Ethiopia: A New Political History, Praeger, 1965.

"Ethiopia Establishes Higher Income Taxes," U.S. Department of Commerce, Reprint from Foreign Commerce Weekly, July 31, 1961.

Silberman, Leo, "Ethiopia: Power of Moderation," The Middle East Journal, vol. 14, No. 2, Spring 1960, pp. 141-52.

"Ethiopian Government Budget, 1967-68;" National Bank of Ethiopia, Quarterly Bulletin, No. 15, September 1967.

Hess, Robert L., and G. Loewenberg, "Ethiopian No-Party State: A Note on the Functions of Political Parties in Developing States," American Political Science Review, vol. 58, December 1964, pp. 947-50.

Zartman, I. William, "Ethiopia," Government and Politics in Northern Africa, Fred Praeger, New York, 1963, pp. 144-60.

Oliver, H.B.B., "External Financial Resources Available for Capital Investment (Ethiopia)," Paper prepared for External Financial Resources; preparatory work for Third Five Year Plan.

"Final Proposal (Investment Draft Law)," Ethiopian Government (Planning Board).

Perham, Margery, The Government of Ethiopia, Faber and Faber Limited, London, 1948.

"Imperial Ethiopian Government External Debt Statistics," IEG, Ministry of Finance, June 1967.

"The International Coffee Agreement of 1962 and the Special Case of Ethiopia," Ethiopian Economic Review, No. 8, April 1964.

"The Koka Dam," Ethiopia Observer, vol. II, No. 10, November 1958.

"Koka Dam in Operation," Ethiopia Observer, vol. IV, No. 8, September 1960.

Ahooja, Krishna, "Law and Development in Ethiopia," Ethiopia Observer, vol. X, No. 2, 1966.

"Maritime Code of the Empire of Ethiopia of 1960," Imperial Ethiopian Government.

"Minimum Labour Conditions Regulations (Extracts From)," National Bank of Ethiopia Quarterly Bulletin, June 1965.

"Organization and Tasks of the Ministry of Agriculture," Ethiopian Government (Planning Board).

"Organization of the Agricultural Field Service by Means of Agricultural Offices," Ethiopian Government (Planning Board).

"Our Ethiopian Adventure," Oklahoma State University.

Siira, Eino M., "Present Status and Problems of the Agricultural Extension Department and Recommendations," January 1965.

Asrat Felleke (Dr.) and Perovitch Radomir, "Programme of an Agricultural Station in Setit-Homera," 1959 (E.C.).

"Progress Report for the Period February 1966 to March 1968," Institute of Agricultural Research, Melka Werer Research Station.

"A Proposal for Studying the Possibilities for Increasing the Tax Revenue Through the Improvement of Tax Assessing and Collecting Methods," Ethiopian Government (Planning Board).

Phoenix, David A., "Proposed Water Supply Investigations, Sidamo Province, Ethiopia," February 1966, USAID.

"Revised Constitution of Ethiopia (4 November 1966)," Imperial Ethiopian Government.

"Report of the Directors (Hamle 57 to Sene 58)," Ethiopian Investment Corporation.

"Report of the Survey Mission on the Agricultural Development of Setit Humera Area," Institute of Agricultural Research, Addis Abeba, December, 1967.

"Report on Cartographic Activity in Ethiopia," United Nations/ECA, June, 1963.

Brodner, M., "Report on Proposed Meat Inspection Program in Ethiopia," Addis Abeba, November 12, 1965.

Karsten, Detlev, "The Role of Government in Promoting Economic Development," Haile Selassie I University Department of Economics, Addis Abeba, December, 1966.

Pereira, H. C., "Soil Erosion in Ethiopia and Proposals for Remedial Action," Institute of Agricultural Research, March 1968.

"Statistics of Public Finance," Ethiopian Economic Review, No. 2, June, 1960 and No. 3, November 1960.

"Statistical Services in Ethiopia," Ethiopian Economic Review, No. 1, December, 1959.

"Useful Plants of Ethiopia," Oklahoma State University and Haile Selassie I University, College of Agriculture.

Yakobson, Sergius, "The U.S.S.R. and Ethiopia: A Case of Traditional Behavior," edited by Kurt London, New Nations in a Divided World, Frederick A. Praeger, New York, London, pp. 180-92.

The Ethiopia Economy

"The Agriculture of Ethiopia, 1960, 1964, and 1965," U.S. Operations Mission to Ethiopia, Point 4.

"The Agricultural Economy of Ethiopia," U.S. Department of Agriculture, Foreign Agricultural Service, November 1956.

"Annual Report of Agriculture in Eritrea, July 1966 to June 1967," Source unknown.

"Assab," Ethiopia Observer, vol. III, No. 8, September 1959.

"Basic Data on the Economy of Ethiopia," U.S. Department of Commerce, Overseas Business Reports, August 1963.

"Better Statistics in Ethiopia," Ethiopian Business Journal, vol. III, No. 1, April, 1966.

"Cattle and Meat Industry in Ethiopia," National Bank of Ethiopia, Quarterly Bulletin, June 1964.

Lexander, Arne, "The Changing Rural Society in Arussiland: Some Findings from a Field Study, 1966-67," March, 1968.

"Coffee," National Bank of Ethiopia, Quarterly Bulletin, July 1963.

"Coffee in the Ethiopian Economy," Journal of Ethiopian Studies, vol. 1, No. 1, 1963.

"Coffee," Ethiopian Economic Review, No. 6, April 1963.

Abebe, Ato, "Commerce in Ethiopia," Addis Abeba Chamber of Commerce Monthly Bulletin, vol. III, No. 12, December 1966, vol. IV, No. 1, January 1967.

Jaenen, C. J., "Contemporary Ethiopia," Journal of Geography, vol. 57, No. 1, January 1958, pp. 31-39.

"Current Information on Coffee (Ethiopia)," Ethiopian Economic Review, No. 2, June 1960.

"Economic Development in Ethiopia in 1960," U.S. Department of Commerce, Bureau of Foreign Commerce, Economic Reports, Part I, No. 61-54.

"Economic Summary of Ethiopia, July-December 1964," U.S. Department of State, American Embassy, Addis Abeba, Ethiopia, 12 p.

"Economic Summary of Ethiopia, March-October, 1963," American Embassy, Addis Abeba, Ethiopia.

"Economic Summary of Ethiopia: May 1962-February 1963, January-June 1964, and January-June 1965," American Embassy, Addis Abeba.

"Economic Trends," State Bank of Ethiopia, Quarterly Bulletin, September 1961.

Stanley, Dr. S., "Ensete in the Ethiopian Economy," Ethiopian Geographical Journal, vol. 4, No. 1, June 1966.

"Estimates of Production of Important Crops in the Period 1961-1963," Imperial Ethiopian Government, Ministry of Agriculture.

Alemayehou, Haddis, "Ethiopia," New Africa Ethiopia Supplement, No. 2, February, 1965.

"Ethiopia: Agricultural Situation," U.S. Department of Agriculture, Foreign Agricultural Service, Addis Abeba, October 9, 1963.

"Ethiopia: Coffee," U.S. Department of Agriculture, Foreign Agricultural Service, October 24, 1963, Addis Abeba. Unpublished.

"Ethiopia: Cotton Report," U.S. Department of Agriculture, Foreign Agricultural Service, Addis Abeba, March 29, 1963. Unpublished.

"Ethiopia: Dairy Report," U.S. Department of Agriculture, Foreign Agricultural Service, Addis Abeba, August 27, 1963. Unpublished.

"Ethiopia: Economic Background Highlights, Basic Data," Agency for International Development, November 1966. Unpublished.

"Ethiopia: Fats and Oils," U.S. Department of Agriculture, Foreign Agricultural Service, Addis Abeba, November 29, 1963. Unpublished.

"Ethiopia: Livestock," U.S. Department of Agricultural Service, Addis Abeba, June 10, 1963. Unpublished.

Mariam, Mesfin Wolde, "Ethiopia, Maps and Figures."

Lewis, William H., "Ethiopia: The Quickening Pulse," Current History, vol. 54, No. 318, pp. 78-82. February 1968.

Pike, Clarence E., "Ethiopia's Expanding Agriculture," Foreign Agriculture, vol. 20, No. 4, April, 1956, pp. 14-16.

"Ethiopia: Statistical Abstract, 1964," Central Statistical Office.

"Ethiopia: Trade and Economic Review, 1965/1966," Addis Abeba Chamber of Commerce.

Pankhurst, Sylvia, "Ethiopian Agriculture in Retrospect and Prospect," Ethiopia Observer, vol. 1, No. 9, October 1957, pp. 278-282.

Sylvain, Pierre G., "Ethiopian Coffee--Its Significance to World Coffee Problems," Economic Botany, No. 12, 1958.

"Ethiopian Economy Boosted by Good Crops and Record Export Earnings," Reprint from Foreign Commerce Weekly, September 25, 1961.

Urvater, Ronald, "The Ethiopian Economy: Some Statistical Aspects," July, 1967, College of Business Administration, Haile Selassie I University, Addis Abeba.

Warren, Cline J., "Ethiopians Work to Develop Their Livestock Industry," Foreign Regional Analysis Division, Foreign Agriculture, September 27, 1965.

Barton, Eugenia, "Ethiopia Work Book," International Marketing Institute, September 1, 1966.

Eichberger, W. G., "Food Production and Consumption in Ethiopia," no date.

"A General Summary of Information Regarding Export Commodities and Local Manufacturers of the Empire of Ethiopia," Ministry of Commerce and Industry.

Last, G. C., "The Geography of Ethiopia," Ethiopia Observer, No. 2, 1962, pp. 82-134

" A Guide Book of Ethiopia," Chamber of Commerce, Addis Abeba, 1954.

"Guide to Industry in Addis Abeba and Suburbs," Addis Abeba Chamber of Commerce.

Pankhurst, Richard, An Introduction to the Economic History of Ethiopia, Lalibela House, London, 1961.

"Land Distribution and Farm Financing (Ethiopia)," Ethiopia Observer, vol. IV, No. 12, January 1961.

"Land Ownership in Hararge Province," Oklahoma State University.

Balambaras Mahteme Selassie Wolde Maskal, "The Land System of Ethiopia," Ethiopia Observer, vol. 1, No. 9, October 1957, pp. 283-285.

"Land Tenure and Taxation from Modern Times," Ethiopia Observer, vol. 1, No. 9, October 1967.

"Land Tenure in Bale," Oklahoma State University.

"Land Tenure Survey of Wollege Province," IEG, Department of Land Tenure, Ministry of Land Reform and Administration, October 1967.

"Limu Sample Survey, 1961-62 (Coffee Growing Regions of Ethiopia)," Ethiopian Economic Review, No. 6, April, 1963.

"Market Profile, Ethiopia," U.S. Department of Commerce Overseas Business Reports, June 1966.

Tatu, Kebede, "Rainfall in Ethiopia," Ethiopian Geographical Journal, vol. 2, No. 2, December, 1964.

"Real Estate and Building in Addis Abeba," State Bank of Ethiopia, Quarterly Bulletin, No. 50, May 1961.

"Report on Land Tenure Survey of Gemu Gofa Province," Imperial Ethiopian Government, Ministry of Land Reform and Administration, February 1968.

"Report on a Preliminary Study of Land Tenure in Setit-Humera," Land Tenure Department, Ministry of Land Reform and Administration.

"Report on a Survey of Desse, Gondar, Gojam, Wello, Tigre, Soddo, Jimma, Harar, Arussi, Wollega, Assab, Adwa, Bahir Dar, Gemu Gofa, Begemdir Province, Wollega Province, Gemu Goffa Province, Wello Province, IEG, Central Statistical Office, 1967.

Mann, H. S., "Report on Visit to Governorates General of Tigre, Begemdir, Gojjam (on land tenure)," May 9-29, 1967, FAO, Addis Abeba.

"Review of Economic Conditions in Ethiopia," Ethiopian Economic Review, No. 1, December 1959.

"Sagure: A Market Village in Ethiopia," Chilalo Agricultural Development Unit.

"Short Review of Economic Conditions in Ethiopia," Ethiopian Economic Review, No. 2, June 1960, No. 3, November 1960.

Poulsen, Gunnar, "Some Reflexions on Water Erosion in Chilalo Awraja," Forestry Advisor, Chilalo Agricultural Development Unit.

"'Soon' is the Watchword in Ethiopia," U.S. Department of Commerce, International Commerce, December 20, 1965.

"Spurred by Heavy Coffee Exports, Ethiopian Economy in Sharp Upturn," U.S. Department of Commerce, Bureau of Foreign Commerce, Reprint from Foreign Commerce Weekly, July 17, 1961.

"Statistical Abstract, 1966, 1964," Central Statistical Office.

"Statistical Digest," Addis Abeba Chamber of Commerce, vol. 1, No. 2, March, 1968.

"Statistics on Agriculture," Ethiopian Economic Review, No. 2, June 1960.

"Statistics on Banking, Currency, Foreign Exchange and Balance of Payments," Ethiopian Economic Review, No. 2, June 1960, and No. 3, November 1960.

"Statistics on Ethiopia, 1958," Ministry of Commerce and Industry, IEG.

"Statistics on Ethiopia," State Bank of Ethiopia, Quarterly Bulletin, December 1963.

Sabatini, Omero and Samual, Louise N., "A Survey of Agriculture in Ethiopia," USDA, Economic Research Service.

Eichberger, W., "Total Food Demand in Ethiopia in 1972," September 22, 1966.

Development and Planning

"Annual Report: 1964, 1965, and 1966," Commercial Bank of Ethiopia.

"Banking Changes in Ethiopia," Ethiopian Economic Development, No. 8, April, 1964.

"Business Firms, Ethiopia," U.S. Department of Commerce, October, 1964.

"Case Studies of Two Traditional Cottage Industries in Ethiopia," Ethiopian Business Journal, vol. III, No. 1, April, 1966.

"Caustic Soda and its Problems in the Ethiopian Economy," Ethiopian Government (Planning Board).

"Census of Industrial Production Results for 1958 and Incomplete Data for 1959 (Ethiopia)," Ethiopian Economic Review, No. 2, June 1960.

"Cotton and Cotton Goods Production," National Bank of Ethiopia, Quarterly Bulletin, July, 1963.

"Development Bank Annual Report for 1965," Ethiopian Government (Planning Board).

"Development of Manufacturing Industry," Ethiopian Economic Review, No. 9, May 1966.

"The Developing System of Industrial Relations in Ethiopia," Ethiopian Business Journal, vol. III, No. 1, April, 1966.

"Elasticity of Food Consumption," Economic Research Service, U.S. Department of Agriculture.

"Electric Energy in Ethiopia," State Bank of Ethiopia, September 1963.

"Electricity, Mining, and Manufacturing Industry," Ethiopian Government (Planning Board)

"Establishing a Business in Ethiopia," U.S. Department of Commerce, Overseas Business Reports, 62-42, December, 1962.

Gibson-Smith, W., "Ethiopia," Canadian Department of Trade and Commerce, vol. 121, February 22, 1964, pp. 29-30.

Armstrong, W., "Ethiopia," (On indigenous enterprise development).

Park, Susan F., "Ethiopia (Industrial Sector)," International Commerce, January 9, 1967.

"The Ethiopian Investment Corporation," Ethiopia Observer, vol. X, No. 1, 1966.

"Ethiopian Private Enterprise Development," USAID Program Office, Ethiopia, October 20, 1964.

"Ethiopian, Somali, Sudanese Businessmen Send U.S. Mission Home with 39 Investment Offers," U.S. Department of Commerce, Investment Opportunities, International Commerce, December 20, 1965.

"Existing Situation and Current Developments in Ethiopian Manufacturing Industry," Ethiopian Economic Review, No. 2, June 1960.

"Fertilizer in Ethiopia," Technical Agency for IEG, August 1965.

Stanley, S. and D. Karsten, "The Industrial Development of Ethiopia," A report prepared for the United Nations, New York, Addis Abeba, August 1965.

"Industrial (Manufacturing) Development in the Second Five Year Plan," Ethiopian Economic Review, No. 6, April 1963.

"Industrialization and Its Likely Impact on Ethiopia's Foreign Trade," Ethiopian Economic Review, No. 8, April 1964.

"Industries in Dire Dawa," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. V, No. 5, May 1967.

"Interest Rate Changes by Commercial Bank of Ethiopia," National Bank of Ethiopia, Quarterly Bulletin, June 1965.

"Investment Guide to Ethiopia, 1967," Chamber of Commerce.

"Investment Possibilities," Ethiopia Economic Review, No. 1, December 1959, No. 2, June 1960.

"Investment Possibilities in Metal Processing Industries in Ethiopia," IEG, Technical Agency.

"Licensing and Exchange Controls in Ethiopia," U.S. Department of Commerce, World Trade Information Service, Part 2, No. 60.

"List of Businesses in the Empire of Ethiopia," Central Statistical Office.

Korten, David, "Management Staffing Problems of Major Business Firms in Ethiopia: A Field Investigation," Doctoral Program, Graduate School of Business, Stanford University, Stanford, California. November 10, 1966.

Jovanovic, R., "Manufacturing Industry Implementation Report for 1956 E.C.," Unofficial report from Ethiopia Ministry of Commerce and Industry, May 7, 1965.

"Manufacturing Industry in Ethiopia 1957-60," State Bank of Ethiopia, Quarterly Report, No. 53.

"Manufacturing Industry of Ethiopia 1957-E.C.," IEG, Ministry of Commerce and Industry.

"Memorandum of the Electrolysis and Chloride of Lime Factory," Ethiopian Government (Planning Board).

"Mineral Occurrences of Ethiopia," Ministry of Mines.

"Mortgage Company of Ethiopia S.C., Annual Report: 1965 and 1966,"

"A New Hand Craft Industry Developed," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. IV, No. 2, February 1967.

"On the Scope for Private Enterprise in the Development of Agriculture and Allied Activities in Ethiopia," IEG, Ministry of Finance, Addis Abeba, February 9, 1967.

"Petroleum Products and Lubricants Excise Tax," National Bank of Ethiopia, Quarterly Bulletin, No. 15, September 1967.

"Preliminary Estimates of a Caustic Soda Factory Operating for Exports," Ethiopian Government (Planning Board).

"Private Investment and Economic Development in Ethiopia," U.S. Department of State, Addis Abeba, February 28, 1964.

"Problem of Plastics Factory in Ethiopia, Information Report," Ethiopian Government (Planning Board).

Karsten, Detlev, "Problems of Industrialization in Ethiopia," Haile Selassie I University, Faculty of Arts, December 1966.

"Project Proposal for Native Sulphur and Other Sulphur Minerals Survey in Ethiopia," IEG, Ministry of Planning and Development Technical Agency, December 1967.

"Prospects for the Export of Potash," State Bank of Ethiopia, Quarterly Bulletin, March 1964.

Sussman, M. V., "Report From Tufts University to USAID" (on feasibility of small-scale industry), April 27, 1965.

Korten, David, "Report on Investigation of the TAIDL Corporation in Mekele." Unpublished.

"Report to the Government of Ethiopia on Handicrafts and Small-Scale Industries," International Labour Office.

"Review Report for an Oil Mill and Vegetable Ghee Plant for the Ministry of Finance," Austin Company.

"Second Five Year Plan: Implementation Report for 1956 (E.C.) Manufacturing Industry," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. II, Nos. 8-9, October - November 1965.

"Some Interesting and Profitable Fields for Private Capital Investment," Ethiopian Economic Review, No. 3, November, 1960.

"Some Recent Developments in the Mining Industry," Ethiopian Economic Review, No. 5, February 1962.

"Statistical Study of Independent Business-Man Registered with Ministry of Commerce and Industry in Addis Abeba, Ethiopia," Ethiopian Economic Review, No. 9, May 1966.

"Statistics on Industry (Ethiopia)," Ethiopian Economic Review, No. 2, June 1960, No. 3, November 1960.

"Studies on Needs and Consumption on Building Material," Ethiopian Government (Planning Board).

"Summary Report on Ethiopia's Manufacturing Industry, 1955-62," Central Statistical Office.

"A Survey of the Bag Manufacturing Industry," IEG, Awash Valley Authority, Addis Abeba, May 1967.

Agricultural Production

Reviglio, Paolo, "Acque E. Boschi (Water and Forests)," Sestante, vol. II, No. 2, 1966.

Simoons, Frederick J., "The Agricultural Implements and Cutting Tools of Begemder and Semyen, Ethiopia," Journal of Anthropology, vol. 14, Winter 1958, pp. 386-406.

"Agriculture in Ethiopia," compiled by H. P. Huffnagel for the Food and Agriculture Organization of the U.N., Rome, 1961.

"Artificial Insemination of Ethiopian Livestock," Oklahoma State University.

Vuerich, Gaetano, "L'Avvenire in Etiopia Dell'Ortofruitticoltura (The Future of Hortifruitculture in Ethopia)," Sestante, vol. I, No. I, 1965.

de Ponti, Giacomo, "La Bananicoltura in Eritrea (Banana Cultivation in Eritrea)," Sestante, vol. I, No. 2, 1965.

Wagaw, Berhanu, "Beef Fattening Research Project, January 1967," Agricultural Experiment Station, Dept. of Animal Sciences, Haile Selassie I University, Debre Zeyt, January 3, 1967.

Tadele, Tesfaye, "Capital Requirements to Establish a Small Size Commercial Farm in the Awash Valley," Haile Selassie I University, College of Agriculture, June 1967.

"The Care and Management of the Native Chickens of Ethiopia," Oklahoma State University.

"Celery and Celeriac," Oklahoma State University.

"Commercial Poultry Production in Ethiopia," Oklahoma State University.

"Construction Details and Suggested Patterns of Usage in Brooding Chicks with Electric Infrared Heat Lamps," Oklahoma State University.

"Construction Guide for Intermediate Size Grain Storage Structures on Ethiopian Farms," Haile Selassie I University, College of Agriculture.

"Cotton and Cotton Goods Production," National Bank of Ethiopia, Quarterly Bulletin, July 1963.

"Cotton Growing Scheme," State Bank of Ethiopia, Quarterly Bulletin, No. 49, February 1961.

"Crop Sampling in the Chilalo Awraja, Arussi Province," Regional Development Project, Plant Production Department, 1966.

"Crop Sampling in the Chilalo Awraja, Arussi Province, 1967," June 1968.

"Cultivation Practices and the Weed, Pest, and Disease Situation in Some Parts of the Chilalo Awraja," CADU, March 1968.

"Debre Berhan Wool Sheep Farm," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. V, No. 5, May 1967.

"Development of a Castor Bean Sheller for the Ethiopian Farmer," Oklahoma State University.

Mengesha, Melak H., and A. T. Guard, "Development of the Embryo Sac and Embryo of Teff, Eragrostis Tef," reprinted form Canadian Journal of Botany.

Brooke, Clarke, "The Curra Complex in the Central Highlands of Ethiopia, 1958," Economic Botany, vol. 12, No. 2, April to June 1958, pp. 192-204

Warren, Cline J., "Ethiopians Work to Develop Their Livestock Industry," Foreign Agriculture, September 27, 1965.

"Expansion of Oilseed Production," IEG, Awash Valley Authority, Addis Abeba, September 1967.

"Farm Organization of Terre and Galmo Villages," Oklahoma State University.

Allbaugh, L. G., and R. M. Arbuckle, "Feasibility Report on Development of Irrigated Agriculture and Hydroelectric Power in the Awash River Basin, Ethiopia, Appendix III," in report on Survey of the Awash River Basin, General Report vol. 1, FAO/UN Special Fund, Rome 1965, pp. 139-174.

"Fenugreek, its Relationships, Geography and Economic Importance," Oklahoma State University.

"Fertilizer Demonstration Field Note Book," Imperial Ethiopian Government, Ministry of Agriculture.

Wagaw, Berhanu, "Few Highlights to Include in the Amharic Poultry Report," April 1958.

"Field Trials and Observations 1968/69," CADU, Crop Production Department.

"Flax Fibre Plantations," Ethiopian Government (Planning Board).

"Forests and Forestry in the Ethiopian Empire," Ethiopia Economic Review, No. 3, November 1960.

"Forestry and the Forestry Problem as Seen by Some Travellers in Ethiopia," Journal of Ethiopian Studies, vol. 1, No. 1 (January 1963).

Poulsen, Gunnar, "Forestry Nursery and Planting Techniques," Forestry Adviser, Swedish Regional Development Project.

"The Grass Cover of Africa," Food and Agriculture Organization of the United Nations.

"How to Protect Stored Grain from Insects," Oklahoma State University.

"How to Organize Fertilizer Demonstrations," FAO Fertilizer Program, 1967/1968, IEG Ministry of Agriculture.

"An Introduction to T'ef," Oklahoma State University.

"Introductory Agro Botanical Investigations in Grazed Areas in the Chilalo Awraja," Chilalo Agriculture Development Unit, 1968.

"Land and Water Resources of the Blue Nile Basin," Appendix VI, State Department of Interior.

"Livestock Operation Enterprise on Four Ethiopian Farms," Oklahoma State University.

"Livestock Production," Report to the Government of Ethiopia, FAO.

Eichberger, W., "Livestock Production in Ethiopia."

Tessema, Tesfaye, "1966 Field Crops Experimental Results," Agricultural Experiment Station, College of Agriculture, HSIU, Debre Zeyt.

Tessema, Tesfaye, "1964 and 1965 Field Crops Experimental Results," Agriculture Experiment Station, College of Agriculture, HSIU, Debre Zeyt.

"The 1961-62 Livestock Survey in Southern Ethiopia," ECA/FAO, Ethiopia Economic Review, No. 5, February 1962, pp. 65-85.

"Notice to Producers of Oil Seeds," Addis Abeba Chamber of Commerce, Monthly Bulletin, vol. III, No. 7, July 1966.

"Patterns for Livestock Improvement in Ethiopia," Oklahoma State University.

"Plant Diseases of Economic Importance in Ethiopia," HSIU College of Agriculture Experiment Station Bulletin 50, May 1967.

Bray, James, "The Possibility of a Beef Industry in Ethiopia."

"Poultry Development Program for 5 Provinces in Ethiopia," Oklahoma State University.

"A Preliminary List of the Insect Reference Collections," Oklahoma State University.

"A Preliminary Survey of the Insects on Trees and Shrubs," Oklahoma State University.

"A Preliminary Survey of the Insects on Ornamental Plants (Harar Province)," Oklahoma State University.

"Programme in Experimentation 1967/68 in the Chilalo Awraja, Arussi Province," Crop Production Department of the Regional Development Project.

"Production and Processing of Tobacco in Ethiopia," National Bank of Ethiopia, Quarterly Bulletin, June 1965.

"Progress Report on Cereal and Oil Seed Research," Oklahoma State University.

"Progress Report on Vegetable Variety Trials," Oklahoma State University.

"Prospects for the Development of Irrigated Agriculture in the Awash Valley," State Bank of Ethiopia, Quarterly Bulletin, December 1964.

"Pulses," Progress Report (of the Regional Pulse Improvement Project) by U.S. Department of Agriculture and AID.

Church, B. M., H.H.W. Poppe, and R.H.D. Sandford, "Report to the Government of Ethiopia on a Livestock Survey in Borena," November 1957.

"Report on Livestock (Cattle) Survey in Southern Ethiopia, 1961-62," Imperial Ethiopian Government, Ministry of Agriculture, December 1962.

Kebede, Selashe, "Report on Poultry and Livestock Work at Debre Zeyt," Agricultural Experiment Station, HSIU, Debre Zeyt, August 25, 1965.

"A Report on Spice Development in Ethiopia," Oklahoma State University.

"Results of Trials and Observations on Field and Forage Crops at Kulumsa Farm and in Asella 1967-68," CADU, June 1968.

Murphy, H.F., "The Soils of Ethiopia," (Analytical Data and Notes 1956-58), vol. I.

Murphy, H.F., "Soils of Ethiopia," (Fertility and Other Data on Some Ethiopian Soils).

"Some Common Agricultural Insects of Ethiopia and their Control," Oklahoma State University.

"A Study of Agricultural Mechanization in Selected Countries of Africa," Quarterly Reports of the Michigan State University/USAID Contract Team, 1967-69.

"Study of Livestock Farms," Ethiopian Government (Planning Board).

"Study on Oil-Seed and Cotton Farms," Ethiopian Government (Planning Board).

Poulsen, Gunnar, "The Taungya Afforestation Method," Chilalo Agricultural Development Unit, November, 1967.

"Techniques for Restraint and Castration of Cattle," Oklahoma State University.

"Tendaho Cotton Plantation," Ethiopia Mirror, vol. 5-6, No. 4-1, April 1967.

"Trials and Demonstration Plots at Seed Improvement Station, Kulumsa and at the Swedish Mission, Asella in Arussi Province, 1966/67," Regional Development Project in 1967.

"Trials of Indigenous and Exotic Trees in Harar Province," Oklahoma State University.

"Useful Plants of Ethiopia," Oklahoma State University.

Pankhurst, Richard, "Wild Life and Forests in Ethiopia," Ethiopia Observer, vol. VII, No. 3, pp. 241-55.

Appendix A

BRIEF SUMMARIES OF REPORTS PUBLISHED UNDER SRI's AGRO-INDUSTRIAL SECTOR STUDY

Appendix A

REPORT SUMMARIES

Phase I Report, Development of Agriculture and Agro-Industry in Ethiopia: A Proposed Program of Research and Planning Studies, by Clarence J. Miller, William L. K. Schwarz, Willis W. Shaner, and Kifle-Mariam Zerom, October 1967; 75 pages, 7 tables, 1 appendix.

This report--which presents the conclusions of the Phase I research conducted during the initial 90 days of SRI's work in Ethiopia--gives a general description of the Ethiopian economy, of its agriculture and agricultural industries, and of the IEG's recent progress in national planning. The report then considers the goals of Ethiopia and of the Agro-Industrial Survey and proposes both a tentative strategy and the specific means for developing agriculture and agro-industry. Next, criteria are set out for evaluating project proposals and for selecting promising projects, followed by a description of the projects that have already been tentatively selected. The report closes with a discussion of the scheduling and implementation of the selected projects and of other aspects of SRI's proposed work.

Report No. 1, Potential Fertilizer Demand in Ethiopia, by H. M. Benedict and S. A. Cogswell, April 1968; 76 pages, 11 tables.

An attempt is made to quantify the opportunity for fertilizer consumption during the next 15 years, to determine how to meet the need for fertilizer, and to suggest programs that might be followed to facilitate fertilizer marketing and to encourage grower purchase. Since deposits of phosphate rock and sulfur are not commercially available in Ethiopia, and since the magnitude of demand for nitrogenous fertilizers is unlikely

to be sufficiently large to justify local production of ammonia for many years, the production of mixed fertilizers from imported raw materials offers the sole opportunity for local industrial activity with these products during the years immediately ahead. Two relatively simple physical blending and bagging plants are recommended for installation near Mitsiwa and Aseb. The investment required, the rate of return, and the impact of the plants on the economy are given. Suggestions are made for marketing fertilizers and for establishing programs to promote the increased use of fertilizers.

Systems Analysis Methods for Ethiopian Agriculture, by Carl F. Miller, James D. Sartor, James L. Mackin, and Peter O. Strom, April 1968; 348 pages, 43 illustrations, 122 tables, 2 appendixes.

This report describes the manner in which systems analysis methods were applied in a systematic development of resource allocation models for application to the agricultural sector of Ethiopia. Specific application of the methodology was restricted to three areas of about 2,000 square kilometers each having different climate, soils, and land usage; the study areas consisted of one located in the Debre Zeyt region, one in the Middle Awash, and one in the Humera-Setit region.

In the study, four phases of work were serially carried out; these were: (1) a field survey, (2) the organization of the data and preparation of a resources data base, (3) the development of income-cost and crop yield models, and (4) the preparation of a computer program computation of illustrative outputs.

The relative magnitudes of both the gross and the incremental benefit-cost ratios show that significant potential economic gains could be achieved by improved farming practices in all three study areas. Except for a very few crop-soil combinations where losses are indicated for improved practices, economic advantages of the institution of modern

improved practices are clearly indicated by the model outputs. A second general conclusion for the three study areas is that, at current costs, no significant additional economic gains would be achieved initially through application of fertilizers. For a few crops, moderate additional gains are indicated for the addition of phosphate fertilizers. Finally, it was found that the Middle Awash would offer the highest returns from improved development, followed by Debre Zeyt, and then Setit-Humera.

Report No. 2, Industrial Investment Climate in Ethiopia, by William L. K. Schwarz, Paulos Abraham, and Kifle-Mariam Zerom, July 1968; 116 pages, 5 tables, 1 appendix.

This report attempts to analyze the various aspects of the investment climate and of investment implementation in Ethiopia, and suggests changes in policy, legislation, and organization that may be of assistance to the IEG. Investment climate is defined as the governmental, legal, institutional, economic, and social conditions under which a business venture must operate. Investment implementation is defined as the efforts undertaken to increase capital investment.

In general, the investment climate of Ethiopia may be viewed as favorable in terms of those conditions of importance to potential investors. The country's political stability, its policy of stimulating investment, the exchange rate stability, the convertibility and repatriation of profits, and other factors all contribute to this favorable climate. At the same time, there are certain major problems, mostly related to legislation and to the implementing institutions. For example, there is a lack of consistency and internal coherence in approach that stems from a number of factors discussed in the report. Among these factors are: the practice of enacting new legislation without repealing existing laws dealing with similar rules and regulations; conflicts in authority and responsibility between separate organizations established by law; and a tendency

for unnecessary delays before making a decision on investment. A number of recommendations are given for alleviating these problems.

Report No. 3, Potential Agricultural Chemicals Demand in Ethiopia, by H. M. Benedict, September 1968; 31 pages, 5 tables.

The various crops grown in Ethiopia that could almost certainly benefit from agricultural chemicals for the control of pests--such as weeds, insects, and fungal diseases--are listed, and the rates of application of chemicals are given for seed dressing, for control of pests during crop growth, and for control of storage pests. The total area of the various crops and the amounts of land in Ethiopia that seem likely to receive agricultural chemicals after 5, 10, and 15 years are tabulated, and--from this--the estimated agricultural chemicals demand for the next 15 years is derived. Three basic approaches for implementing the use of agricultural chemicals are outlined.

Report No. 4, Improvement of Ethiopian Ports, by Phillip L. Adams and Benjamin V. Andrews, December 1968; 228 pages, 6 illustrations, 51 tables, 5 appendixes.

SRI's Agro-Industrial Survey team required an immediate analysis of the seaports serving Ethiopia to determine their adequacy for handling present and future exports and imports. For example, the Agro-Industrial survey recommends, among other things, that certain bulk chemicals be imported for mixing into fertilizers. The ports should be able to handle bulk commodities efficiently and at reasonable cost.

This report is not, and does not fill the need for, a detailed master development plan for the two ports of Ethiopia. Rather, the present study contains data and recommendations that would be useful in such master development planning.

Projections are made in the report through the year 1993, a forecast period of 25 years using 1968 as the base. For efficient handling of the present and the projected most probable levels of port traffic, about 50 individual capital improvements projects are recommended for the port of Mitsiwa; these include both improvements to existing facilities and new additions. About 28 individual projects are recommended for the port of Aseb. For purposes of determing economic feasibility, the individual projects that are interrelated are grouped into investment packages. Thus, eleven investment packages are recommended for Mitsiwa and six for Aseb. The timing and amount of capital investment required for port improvements in the next 25 years are given.

In addition to physical improvements, several operational improvements for the two ports are recommended to be carried out as soon as possible. It is believed that these operational improvements could be just as important as the physical improvements.

Report No. 5, Economic Feasibility of Dry-Salting Treatment of Cattle Hides from Malgue Wendo Abattoir and Local Slaughter, by Gerald E. Marousek and Charles A. Martin, December 1968; 71 pages, 2 illustrations, 13 tables, 1 appendix.

Although Ethiopian cattle hides are an important earner of foreign exchange, their full value is not now being realized, owing in large part to the poor handling of hides after slaughter. For example, "unbathed Addis Abebas" (caravan hides)--which make up 90 percent of Ethiopia's cattle hide exports--were recently quoted on the London Market at 50 to 55 percent of the price of "suspension dry East African" hides of the same grade. It can thus be seen that the theoretical potential for quality improvement and economic gain is large.

This report describes a proposed 50,000 hide annual volume dry-salting project located at Malgue Wendo. Calculations show that the

project should return more than 100 percent annually on the capital invested. Investment requirements are low, the technology is simple, and existing resource inputs and marketing facilities can be used. Furthermore, with minor modifications, the project can be replicated at a number of other Ethiopian sites.

It is estimated that the annual net increase in foreign exchange earnings from the project will be Eth$ 275,000 within 5 years and Eth$ 550,000 within 10 to 15 years.

Report No. 6, Ethiopia's Export Trade in Major Agricultural Commodities, by William L. K. Schwarz, January 1969; 168 pages, 2 illustrations, 24 tables, 6 appendixes.

This report is directed toward analyzing Ethiopia's present and prospective position in world trade for its major export products; identifying general problems in exporting that Ethiopia should attempt to alleviate or overcome; and recommending solutions to the exporting problems.

Ethiopia's exports increased from Eth$ 63 million in 1945 to approximately Eth$ 278 million in 1966, or by well over 300 percent. During this period, imports rose from Eth$ 67 million to Eth$ 404 million, or by more than 500 percent. Imports have exceeded exports in all but three years since 1945.

Coffee exports to all countries since World War II have accounted for one-half to two-thirds of Ethiopia's exports, and have recently gained extra potential for expansion because of an increase in Ethiopia's quota under the International Coffee Agreement and also because of an upward trend in coffee demand. However, these quotas limit, in theory if not yet in fact, the overall expansion of Ethiopia's export coffee market unless exports to nonquota countries can be expanded.

Certain current regulations of the IEG and its agencies appear to be acting in constraint rather than encouragement of exporting. A review of these regulations by the IEG is recommended.

The most common complaint made by the importers interviewed for this study was the undependability of the quality of Ethiopian exports. For example, shipments of oilseeds were reported to contain as much as 15 percent impurities, although accompanied by the required certification of a maximum of 3 percent impurities. It is urgently recommended that the IEG and its agencies develop and enforce standards of quality and purity that will meet the needs of increasingly sophisticated and competitive world markets.

Another very common complaint of importers was the poor quality of the bags used for shipping coffee, oilseeds, pulses, and other exports. It is recommended that Ethiopian exporters be required to use strong, new bags.

Report No. 7, Development of the Ethiopian Livestock Industry, by Gerald E. Marousek, Charles W. Vrooman, Louis I. Thompson, and Emer E. Broadbent, January 1969; 165 pages, 9 illustrations, 27 tables, 4 appendixes.

This report deals with livestock production, cattle marketing, livestock and meat processing, and meat marketing.

At present, most of the existing livestock in Ethiopia are not receiving adequate nutrition, as indicated in the growth and condition of the animals, in the overgrazed condition of pasture lands, by the small calf drop and the high death loss of young stock, and by the reduced cattle resistance to disease and parasites. The report recommends a number of programs for improving nutrition, upgrading of cattle through crossbreeding, and control of cattle diseases.

The shortage of transportation and communications are major obstacles in developing cattle marketing. Trucking cattle to markets could achieve substantial savings; in areas with inadequate highways, the IEG should undertake to improve feed and water service and to provide veterinary inspection along the trails. A credit system to suit the needs of livestock dealers is also needed, and price information should be collected and made available at market centers.

Meat plants producing for the export market are operating at less than 50 percent of capacity; with little additional equipment, fruit and vegetable canning could be carried out in these plants if studies prove such a program feasible.

Ethiopia's meat export program is hampered by problems of disease and unreliable supply, and an inadequacy of marketing agencies and firms. The country's largest existing markets--Italy for fresh and canned beef, and Israel for canned beef--should be developed further. Markets in the countries of Eastern Europe, the Middle East, West Africa, and the Far East should be investigated for potential sales of fresh and processed meat.

Report No. 8, Development of the Ethiopian Oilseeds Industry, by Wifredo DeRafols, Harris Benedict, and Raymond E. Borton; 156 pages, 14 illustrations, 35 tables, 4 appendixes.

The production, consumption, markets, marketing, and processing of Ethiopian oilseeds are examined in this report.

Production of oilseeds in Ethiopia is characterized by small-scale production of low-yielding crops. A number of research programs designed to increase production are recommended; these include variety testing, development of a certified seed industry, improvement of cultural practices, and increasing the number of experiment stations and broadening their scope.

Export and domestic markets are examined to determine which oilseeds seem to offer the best possibilities for future Ethiopian production and sale. Improvement in the current marketing system is recommended as being mandatory to future oilseed production and sales. Impurities in oilseeds must be removed from oilseeds to remain competitive in world markets; in addition, it will be increasingly difficult to export at world prices unless bulk transportation of oilseeds in trucks and bulk handling of oilseeds and oilcake at the port are introduced. Suggestions are also made for the improvement of oilseed processing.

Report No. 9, An Agricultural Credit Program for Ethiopia, by Harry J. Robinson and Ato Mammo Bahta, January 1969; 253 pages, 18 tables, 22 appendixes.

This report surveys the credit requirements for four classes of farmers in Ethiopia, and discusses the problems and the effectiveness of previous credit programs. The financial institutions that are of major interest are discussed, and sources of loanable funds are reviewed. A number of recommendations are made. These recommendations include: reorganization of the Development Bank of Ethiopia (DBE) and the Ethiopian Investment Corporation (EIC); two plans to assist subsistence farmers; the establishment of a Small Loans Account in the DBE; banking legislation to permit the establishment of private rural banks; augmentation of the proposed agricultural cooperative program in the Third Five-Year Development Plan (TFYP); placing of greater emphasis on development of the credit union movement during the period of the TFYP; establishment of a postal savings system; study of Ekubs to determine whether a rural banking system could be developed similar to the Japanese Mutual Loans and Savings Bank; establishing a uniform 5 percent interest rate on deposits; consideration of a deposit insurance system; and consideration of passing legislation permitting chattel mortgages on standing crops.

Report No. 10, Production of Grains and Pulses in Ethiopia, by Clarence J. Miller, Howard W. Ream, Frank V. Beck, and Alemayehu Wodejeneh, January 1969; 148 pages, 9 illustrations, 35 tables, 4 appendixes.

Ethiopia has been barely self-sufficient in cereal grains since the mid-1950's. There is a serious question whether or not the country can continue to meet the grain requirements of an expanding population during the next decade and later unless production is materially increased. Normally, there is a surplus of pulses available for export, but increased production of pulses at low cost would be highly desirable, since pulses offer one of the best opportunities for increasing foreign exchange earnings through increased exports.

This report recommends a "package program" to increase grain and pulse production that includes the following: using new and improved seed varieties; employing chemical and biological seed treatment; adding fertilizers where economically feasible; using better seeding techniques; improving weed and pest control; trying better crop rotations and more double cropping; employing improved harvesting and threshing techniques.

Net returns to the farmer are projected to be substantial if he were to adopt the package of improved techniques, even not including mechanization and the use of fertilizer. Gains in net income per hectare have been estimated at Eth$ 82 to Eth$ 187 for three pulse crops, and at Eth$ 99 to Eth$ 491 for five grain crops. On large commercial farms, in the examples budgeted, use of package improvements results in estimated rates of return to investment in the farm enterprise of from 9 to 56 percent.

It is estimated that 25 percent of the large amount of land now in fallow could be added to the land planted to crops each year, if a recommended program of land and pasture improvement were followed. Improvements in both livestock and crop farming would result.

The use of package programs is recommended for increased production in 12 areas of Ethiopia; there are undoubtedly many other areas that could also use such programs.

Report No. 11, Development of Castor Seed Production and Processing in Ethiopia, by Raymond E. Borton, Wifredo DeRafols, and Willis W. Shaner, February 1969; 94 pages, 6 illustrations, 22 tables, 2 appendixes.

An analysis of world market trends for castor seed and oil shows that the future possibilities for increased sales of these products are good--especially in relation to other vegetable oils, for which the world market trend is downward. The results of the analysis in this report show the profitability of processing castor seed in Ethiopia--under the condition that production can be expanded to meet the needs of a modern solvent extraction plant for oil and meal production.

Possible places for expansion of castor seed production on a commercial farming basis include the Setit-Humera area, the Awash Valley, and an area near Kombolcha. Estimated costs of production and returns are estimated for these areas; returns are extremely good under high yields and excellent even under moderate yields.

The oil extraction plan proposed for Mitsiwa, and the costs of its establishment and operation, are estimated. Based on a 25-year project life, the internal rate of return for the proposed plan is 18 percent before income taxes and 15 percent after taxes. Suggestions are made for achieving the needed combination of investment funds, managerial interest, and government encouragement.

Report No. 12, Solvent-Extraction of Ethiopian Oilcake, by Raymond E. Borton, Wifredo DeRafols, and Willis W. Shaner, February 1969; 68 pages, 8 illustrations, 4 tables, 3 appendixes.

A solvent-extraction processing plant for oilcake is proposed to retrieve the extra oil now exported in the cake--for which no compensation is received--and to make the oilcake industry of Ethiopia more competitive and profitable. The report presents a review of the major markets for oilcake and gives estimates of the cost of equipment and operating expenses of a suitable solvent-extraction plant. An economic analysis of the plant is given, with varying prices being paid for crude oilcake and varying prices being received for the finished product.

It is recommended that the proposed plant, with a capacity of 100 tons per day, be located in the Addis Abeba area, with an initial fixed capital cost of Eth$ 6.2 million, and an annual operating cost of Eth$ 2.6 million. The internal rate of return, over a 25-year project life, is calculated at 15 percent before income taxes and 12 percent after income taxes. To finance the investment and to ensure the supply of oilcake for the plant, it is proposed that a cooperative arrangement be made among existing oil millers.

General diagrams and schedules for the layout and construction of the proposed plant are given in an Appendix.

Report No. 13, The Resources and Economy of Ethiopia, by Kifle-Mariam Zerom, February 1969; 164 pages, 49 illustrations, 27 tables, 2 appendixes.

This report, which is directed primarily toward the prospective foreign investor in Ethiopia, attempts to provide the most recent data on the resources and economy of Ethiopia in one relatively brief volume.

The following subjects are covered, among others: the Government of Ethiopia; geography, soils, climate, population; the gross domestic product; agriculture and agricultural products; industry, fuel and power,

mining, tourism, communication and transportation; education and manpower, public health, community development; finance and banking, foreign trade, development planning; incentives for investors, types of business organization, labor supply and costs; costs of land, building materials, water, power, fuel, freight; interest rates, taxes, and customs duties.

The report also lists other sources of information on investment opportunities.

Report No. 14, A Development Program for the Ada District, Based on a Socio-Economic Survey, by Raymond E. Borton, Mammo Bahta, Almaz Wondimu, and John Asfaw, March 1969; 208 pages, 5 illustrations, 33 tables, 1 appendix.

An earlier SRI report on Systems Analysis Methods for Ethiopian Agriculture presented data on the climate, soils, existing land use, and existing cropping practices in the Debre Zeyt/Nazret area, and showed possible improvements that could be made in production through improving existing practices and extending land use. However, agricultural development is a complex process, and there is a growing awareness that an area development program combining social, economic, and technical progress is likely to succeed where single-factor development programs may fail. Consequently, the authors of this report, who use some of the technical data from the Systems Analysis study, aimed at collecting information on subjects relevant to the removal of those institutional policies and infrastructural bottlenecks that retard agricultural development, and used this information in the design and planning of an area development program for the Ada District (which approximates the Debre Zeyt/Nazret area studied in the earlier report).

The results of the socio-economic study of the Ada District make up a large part of this report; a comprehensive district development program is then outlined and the national implications of such a program are discussed.

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The development program includes the organization and management of ten multifunctional locality development centers, with five development agents assigned to each center. The program's annual operating cost is calculated at Eth$ 1.46 million, and the initial fixed investment is estimated at Eth$ 4.74 million. Revenues from the project are calculated on the assumption that, over a ten-year period, 80 percent of the farmers in the area could achieve an increase of 100 percent in their crop yields. The increased incomes made possible by the program are estimated to amount to Eth$ 10.6 million by the tenth year, and to continue at this level. Under these conditions, the estimated rate of return is 32 percent. Two other sets of assumptions are also made, with the rate of return calculated for each; a sensitivity analysis is also given for each set of assumptions.

Report No. 15, Supplemental Irrigation Projects on the Desset River, by Robert L. Nevin, Howard W. Ream, John Asfaw, Neely H. Bostick, and W. W. Shaner, March 1969; 114 pages, 4 illustrations, 9 tables, 4 appendixes.

There are several advantages in providing supplemental irrigation water to areas where farming has already begun: the size of investment can be moderate; programs can be divided into small units; financial returns can be obtained quickly; and local groups or private investors can often carry out the work with a minimum of public assistance. After a reconnaissance team had investigated seven possible sites in Ethiopia for supplemental irrigation, two were chosen for feasibility studies: one along the Desset River near Mitsiwa (the subject of this report), and another along the Borkenna River south of Kombolcha (the subject of a second report).

Near the town of Dogali, the study team identified 450 hectares of land deemed suitable for intensive irrigation farming. Another area, near Emberemi, contains approximately 3,200 hectares of land that could

be irrigated if the underground water supply is adequate. The plan of development suggested for the Dogali project would take place over a four-year period. Of the variety of crops that might be grown in the area, cotton, chilies, and sorghum were selected because they lend themselves to double cropping and because they can be marketed with little difficulty. Calculations for the Dogali project show that the private rate of return, after taxes, would be 16 percent.

For the Emberemi project, the characteristics of the underground water must be tested at the outset; drilling three wells, followed by pumping tests, should be sufficient for this purpose. If these tests are successful, a pilot farm of about 50 hectares should be established. The purpose would be to experiment with different crops and irrigation practices and to demonstrate them to the surrounding farmers. If a water shortage becomes apparent, the supply might be augmented by constructing storage reservoirs above Dogali.

Report No. 16, Marketing of Grains and Pulses in Ethiopia, by Alan R. Thodey, April 1969; 272 pages, 8 illustrations, 73 tables, 7 appendixes.

Conservative projections of the market-dependent population indicate that Ethiopia's domestic demand for grains will increase from an estimated 0.6 million tons in 1966 to at least 1.0 million by 1980. The existing marketing system, although it has been relatively effective in getting grains and pulses from the farmers to the consumers, has generally failed consistently to offer high enough prices to producers to provide an incentive for expanding production, particularly of those varieties preferred by consumers, while requiring high prices from consumers later in the crop season. Storage facilities have been inadequate for holding over supplies within and between crop seasons and thus smoothing out fluctuations in available quantities and prices of commodities; many of the other services needed by the marketing system have also been inadequate.

Among several recommendations the report makes are: (1) revitalization of the Ethiopian Grain Board, including its regulatory and licensing powers; (2) large scale expansion, possibly through a commodity stabilization scheme, of the Ethiopian Grain Corporation's trading and storage operations to stabilize the flow and prices of commodities and improve the integration of the different markets in the system; (3) liquidation of the Ceres Company, which--like the Corporation--is a government-backed trading organization; and (4) long-term improvements in many of the services used by the marketing system--in particular, physical improvements in the larger markets, better feeder roads to move commodities from the farm to market, better diffusion of relevant information about prices and supplies throughout the marketing system, and a commodity grading scheme that will eventually allow commodities to be bought and sold by description.

Depending on the availability of capital and on other improvements in the marketing system's organization and services, three conditional programs are suggested: the commodity stabilization scheme for grains, a system of bonded public grain warehouses, and development of formal grain commodity exchanges in the terminal markets of Addis Abeba and Asmera.

Report No. 17, A Supplemental Irrigation Project in the Borkenna Valley, by Robert L. Nevin, Howard W. Ream, John Asfaw, Neely H. Bostick, and Willis W. Shaner, April 1969; 120 pages, 8 illustrations, 15 tables, 3 appendixes.

About 60 kilometers from Kombolcha, there is a permanent swamp of about 7,000 hectares and overflow lands of about 5,000 hectares just before the Borkenna River enters a narrow canyon to the Awash Plain. By lowering the hard rock sill at the entrance to the canyon and building levees and floodways to cope with winter flows, the proposed project would reclaim about 8,600 hectares for farming and provide about

3,000 hectares of excellent pasture during most of the year within the 3,400 hectares required for the floodway system; of the farmland, about 2,000 hectares would be irrigated from surface water supplies for rice growing during the spring season. The remaining 6,000 hectares would be dry-farmed.

The initial design of the project, described in this report, has been based on conservative assumptions to compensate for the limitations in the available data. A large peak flood flow has been assumed, little allowance has been made for possible upstream storage, and no allowance has been made for groundwater that may be available for irrigation. Estimates of crop production and revenues are modest.

The project as proposed in this study would require an investment of nearly Eth$ 10 million in public works and an initial investment of about Eth$ 7 million to develop and equip farms and begin operations. On this basis, the internal rate of return over a 40-year period is estimated at 10 percent before income taxes and 7 percent after. The project as currently designed should probably not be implemented, although it offers good potential for increasing food production and employment in an area that needs both. There is also a good possibility that a much more financially favorable project could be designed after further study.

Report No. 18, Analysis of the Operation of a Commercial Feedlot in Southern Ethiopia, by Harold C. Love, Charles W. Vrooman, and Jean S. Smith, August 1969; 55 pages, 3 illustrations, 5 tables, 3 appendixes.

The successful operation of a commercial feedlot in Ethiopia depends upon: (1) personnel trained in agricultural technology, (2) facilities for buyers located at selected sites throughout the cattle producing areas, (3) farmland on which to produce a part of the rations, (4) adequate physical plant for the feedlot, (5) market outlets serving domestic

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demand, meat processors, and the export trade, and (6) sufficient capital to plan, build, and operate the business.

The program for cattle feeding is based on a 60-day feeding period. Cattle for the feedlot would be moved by truck-trailer from the points of purchase over highways already constructed or planned in the near future.

Capital investment for a feedlot with a capacity of 6,000 head at a time would be about Eth$ 1,250,000, excluding the cost of the land, giving a fixed plant investment of approximately Eth$ 200 per head. With utilization of the facilities at 80 percent, and a turnover of cattle six times per year, the feedlot would handle 28,000 head annually. The most likely internal rate of return is 14 percent before taxes, and 12 percent after taxes.

Appendix B

SEED IMPROVEMENT THROUGH USE OF CERTIFIED SEED COMPANIES

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A. Proposed Project

One of the projects proposed by the SRI team is a private seed company, organized to produce improved varieties of field crop seeds and to process and distribute them to farmers. The potential demand at the end of a ten-year period for improved seed is based on estimating the use of improved seeds on 90 percent of the commercial cotton hectares, 10 percent of the commercial maize hectares, and 5 percent of the hectares of other crops included in the program. By the end of the first five-year period, it is estimated that the company would be producing 5,000 metric tons of improved seeds; by the end of ten years, the company would be producing 16,000 tons of improved seeds.

The company would probably need two locations for the production of seeds and for the processing, handling, bagging, and storage of seed in the same locations. It is anticipated that one location would be in an irrigated area in the lowlands; the second area, which might not be irrigated, would be in the highlands.

B. Other Seed Projects

An active seed project is now sponsored by the Chilalo Agricultural Development Unit (CADU) under the Swedish Aid Program. This is a project for seed control and production. It involves the pretesting and supervision of cleaning of wheat and barley seed which was multiplied and which is distributed to farmers for the 1968-69 planting season. About 2,500 quintals of wheat and barley were cleaned during 1968.

CADU's plans also include choosing varieties of oilseeds and legumes to be grown under CADU supervision; studies on different germination tests for grass species are also planned. Innovations to be demonstrated by CADU include better crop varieties--for example, hybrid maize, wheat, barley, flax, and forage crops. The CADU seed production and distribution program ultimately calls for the development of a commercial seed production and distribution system that will be operated either through a cooperative or a private seed company. There is no conflict between the CADU program and the project recommended by SRI.

C. Phasing of Projects and Studies

To make the programs of seed increase multiplication and distribution successful, several actions will need to be initiated by the Ethiopian government.

1. A section of seed certification and testing should be established, probably to be located in the Crop Production and Protection Department of the Ministry of Agriculture.

2. A Central Seed Laboratory should be established, to certify the quality and viability of all seed sold in Ethiopia. Estimated costs are:

To build the plant: Eth$ 50,000
Annual costs at end of 10 years:

Chief of section:	Eth$ 20,000
Seed technologist	12,000
Seed analysts	60,000
Maintenance, office, materials	50,000
Total annual cost	Eth$ 142,000

It should be noted that the IEG, if it chooses, may recoup most of the costs of operating the Laboratory by charging for certification services on a fixed fee (per quintal) basis. The charge would be the same

whether a specific lot of seed is certified or is disqualified for certification.

3. Seed certification services must include the use of Field Inspectors who will evaluate the seed crop while it is growing in the fields. Estimated annual costs at the end of ten years are:

Full-time field inspectors	Eth$ 60,000
Part-time field inspectors	9,000
Total annual cost	Eth$ 69,000

It should be noted here also that the IEG may recoup most of the costs of operating the field services by charging on a fixed fee (per hectare) basis, whether a specific field is certified or disqualified.

4. To provide the basic improved and adapted seed that the private companies will use to produce and increase their certified seed, the IEG should start to produce foundation seed of those crops that will initially go into certified seed production. Direction of this operation could be located in the Institute of Agricultural Research, which could use the seed farms of the Ministry of Agriculture to produce foundation seed.

Estimated costs for the foundation seed operations are:

Initial construction of two foundation seed processing plants (one immediately; one in second five-year period):	Eth$ 360,000
Annual costs (by end of ten years)	
Technical personnel	43,000
Seed production	300,000
Total annual cost	Eth$ 343,000

If the IEG chooses, it could recoup most of these costs by charging the private seed companies a relatively high price per quintal for the foundation seed they buy to use in their production programs.

5. Early in the development of the seed program (within the first five years), legislation should be enacted that will establish seed standards, provide the necessary regulatory measures for seed production and marketing, and regulate the commerce in seed. A sample seed law, which should be adaptable to Ethiopia, is available from SRI.

6. The IEG experiment stations would need to expand their activities to include more developmental work on new and adapted varieties of seeds, with the aim of eventually providing breeder seed for the foundation seed program. Only limited work has been done on the seed of a number of economically important field crops. It is essential that such government support be given the stations on a sustained basis, and not fluctuate markedly from year to year.

D. Impact on the Economy

Improved seed not only affects the crops where it is used, it also affects package programs, regional development, marketing, and exports.

1. Effect on Crop Production

Improved seed has the genetic potential for increased yield, which in turn should result in larger volumes of crops produced. Potentially, such seed may have the potential to increase yields twice, three or four times, or more. In practice, it has been found that it is usually wasteful of good resources to adopt improved seed in isolation. If it is used in combination with a package of improved practices--fertilizer, pesticides, irrigation, and improved farm management, for example--each innovation supports the other; the result is a much higher yield attributable to all the factors in combination than could be attained by each factor used in isolation.

The general adoption of improved seed and other better production practices on farms of commercially oriented producers will tend to

direct the increased yield to market channels. Over the next 15 years--or sooner in regional areas if one or two crops become popular and the improved seed is in great demand--increased marketing will result in lower market prices. Such lower prices will be reflected in lower farm prices (but not lower farm incomes if farm production costs are reduced through better management), lower consumer prices, and--in at least some cases--more competitive pricing of domestically produced crops in the world market.

2. Other Impacts

Based on assumptions that a small percentage of hectares planted would use improved seed (5 percent), with the principal exception being cotton (90 percent), at the end of ten years, 15,000 metric tons of improved seed would be needed--approximately the amount projected for the private seed company--and over 25,000 would be needed by the end of 15 years. To take care of increasing demand, either another company would have to become active (such as that planned by CADU), or the original company would have to expand. It is not assumed, however, that farmer adoption of improved seed would be automatic. To obtain rapid adoption of improved seed and other improved practices, the company--toward the end of the ten-year period--would have in their employ 70 field agents, responsible for plot demonstrations and advisory service to farmers.

At the end of the first ten-year period, the certified seed company would have invested Eth$ 5,000,000 in plant and land, would have annual operating costs of Eth$ 20,000,000, would produce Eth$ 2,500,000 annually in income taxes, and would have an annual net income after taxes approaching Eth$ 4,000,000.

Appendix C

PROCESSING OF VARIOUS AGRICULTURAL PRODUCTS

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In the following descriptions are a wide variety of processors of agricultural products that are now or that could become important to Ethiopia's development. It will be noticed that in a number of cases the entrepreneurial initiative has already been taken or could be taken either by private investors or by the IEG. In only a few cases, where the product is completely new to Ethiopia or it needs a great deal of testing and study, it may be necessary to rely on public rather than private development.

The most obvious conclusion from the following survey is that where production is increasing and investment is not discouraged, the processing will be organized by local businessmen who are eager to take advantage of the situation. The problem in most cases is that of increasing production and how to organize to finance it. The most successful agro-industrial ventures are the ones that have found ways to incorporate all the production and processing into one management of some sort, whether by direct ownership, agreement with growers, contracts to supply inputs, or price guarantees. Hence, the existing agricultural processors and the interested parties thinking of beginning agricultural processing in Ethiopia will be wise to consider the possibility of providing some kind of assistance to ensure production of the necessary raw material.

A. Sugar Refining

At the present time, HVA* has an integrated operation of sugar production, refining, and distribution in Ethiopia and is providing the local needs in all but the most highly refined types. This operation is the most complete example of integration of all the factors of production, processing, and distribution; its success is assured through its exclusive contract, efficient operations, and its mastery of the distribution system throughout the country of a product that perhaps more people in Ethiopia buy than any other except salt. Even in the remote village markets, the few extra cents earned through sale of local products is likely to be spent for sugar, and the taste for sweets is increasing throughout a wide section of the population in Ethiopia. One drawback to the large-scale production of many products is the lack of a sizable domestic market, a problem that HVA has overcome through producing a widely desired product and distributing it throughout the country in small quantities.

B. Beer Brewing

Another product that is also getting wide distribution is beer. The taste for beer is expanding and its production is increasing. The problem at present is that barley of suitable quality for malting and brewing is not available in Ethiopia, even though Ethiopia seems to be one of the original homes of barley and it is one of the staple crops of the Ethiopian Highlands. Although there is considerable interest in the processing of barley for beer, there is very little interest in organizing the production of high quality malting barley. The ready availability on the world market of excellent quality barley at attractive prices keeps the industry geared to importations of this product that might be produced in Ethiopia.

* Handels-Vereenigum Amsterdam.

C. Cotton Ginning, Spinning, and Weaving

Traditionally an industry that is among the first to develop in agricultural areas throughout the world, the cotton industry in Ethiopia has followed the usual pattern but with a number of variations. All degrees of operational integration exist in Ethiopia, from Baratello's large cotton growing operations in the Gash River Valley, combined with cotton ginning, spinning, and weaving factories in Asmera, to the traditional system of growing small amounts of cotton combined with home spinning and weaving into the national dress of Ethiopia. In between is the establishment of both large plantations and small growers in the Awash Valley, the production of which is sold to textile factories that also make synthetic fabrics for local consumption. There is a small amount of cotton exported--but only a particular medium length that is in demand in the world market and that is in surplus in Ethiopia at the present time. Cotton, yarn, and fabrics of cotton are being imported into Ethiopia at a substantial rate.

The textile industry in Ethiopia includes 18 factories involved in spinning, weaving, and finishing and 23 factories that produce knitted goods and wearing apparel. This includes woolen goods and synthetics as well as cotton. Even with this development of the industry there is importation of fabrics and clothing; some 2,000 tons of cotton goods were imported in 1967.

D. Wool Processing

The operation of the woolen mill in Debre Birhan with imported woolen scraps as raw materials is a classic example of the production problems not being met before the processing is ready. Wools from local sheep are generally too coarse for most of the materials being produced and the wool from imported breeds of sheep is often too fine. A program for cross breeding and distribution is underway, but will take many years

to be effective, since it has not received sufficient money nor the attention that it might warrant.

A second woolen factory recently established in Addis Abeba also illustrates the problems created when market research is not adequate. This plant is producing worsted woolen fabrics of a type that is not popular among Ethiopian men buying worsted suits at the present time. Changing both the kinds of fabrics produced and the taste of the suit-buying public in Ethiopia will take time and money that a newly established factory is not prepared to provide.

The problems of the depth of the market for high quality woolen goods is ever present in Ethiopia, with most of the products having to be sold only in the capital city.

An outlet for Ethiopian wool that might be better exploited is handmade carpets for the export trade. The Handicraft School and the Rehabilitation Center are both working on this to a degree, but little effort has been put into selling overseas; it is only to the resident foreign population and to a few tourists who happen to see the products that sales have been made in the past. The Rehabilitation Center is now working on its first overseas orders, but it is poorly prepared to handle the size of business and the problems of shipping and foreign market entry.

E. Fiber Processing

A new mill for the processing of fiber is in the process of being constructed and a bag manufacturing mill is also getting underway. The fiber of the ensette plant and the dum palm may be used for these purposes. Both of these are indigenous to Ethiopia and are being harvested as a cash crop at the present time. There is some planting of sisal near Mojo and at the Awasa Farm of the Ministry of Community Development and Social Affairs. This fiber has not proven profitable in recent years and faces a discouraging world market situation. Fibers for bags will

be in continued demand in Ethiopia, since coffee, oilseeds, and oilcake are exported in bags. Grains and pulses are also transported only in bags.

Other fibers that might be investigated in the future include linen, kenaf, and ramie. The preparation of linen from flax requires growing special varieties and considerable hand work in the harvesting and retting process. Quantities of water are also necessary for retting and washing. Because flax already grows well in Ethiopia, it is predictable that the special varieties needed for fiber would also grow well. Directing the harvesting and retting would require some technical help from present flax producers, probably from Holland, Belgium, Ireland, or Poland, where much of the world's production originates at the present time.

Kenaf is tropical in its growth requirements and also requires water for retting. The fiber is excellent for bag making and hand harvest is still the most practical method of harvesting in most places. There is also the possibility that chopped kenaf might be useful for the paper industry, but this subject requires further exploration. The use of castor stalks for paper has also been mentioned. In addition, poor quality linen flax fiber is useful in the making of high quality papers and cigarette papers. Grass linen made from ramie fiber is a specialty item for tropical fabrics and might warrant investigation.

F. Oilseed Processing and Products

The SRI study of Oilseeds Development in Ethiopia found that existing mills are operating from one-third to one-half of capacity, largely owing to the lack of oilseeds being produced. This again illustrates the production problems, which are more crucial to the growth of the industry than processing expansion.

A wide market prevails throughout Ethiopia for vegetable oils, which are a basic ingredient for preparing the national dish called "wat." There is also an increasing demand for soap and for vegetable margarine. The newly established National Oil and Soap Industries Share Company is already building a soap factory and plans to establish a 7,000-ton-per-year margarine plant as soon as the soap factory is well underway. These plants may have to operate on imported fats and oils if production of these products is not increased. At the present time, tallow is cheaper to import than to buy from local meat processing factories. The same may also prove to be true for the manufacture of margarine, which can use any one of several vegetable oils. Prices of vegetable oils on the world market have been steady to lower, and the increasing amounts of soybean oil and sunflower oil that are available from the U.S. and the USSR are not liable to allow the price to rise in the next few years.

The same situation exists in linseed oil for mixing in paints. The paint factories are now able to import linseed oil from Europe at a lower cost than they would have to pay for it in Ethiopia. The imported oil is refined and boiled and has a guaranteed quality that no oil processing in Ethiopia will provide at the present time. Quantities are not large as yet and the demand for vegetable oil of lower quality for human consumption keeps ahead of production; thus there is little incentive for local producers and millers to provide higher quality oil at lower prices for the paint industry.

G. Canning and Preserving Fruits, Vegetables, and Vegetable-Meat Combinations

Although more study needs to be given to the subject, it would appear that the local market for canned and preserved foods that could be produced in Ethiopia remains rather small, and it has little possibility of expanding to become large enough to support an efficient industry for

this purpose alone. The export market for these products is extremely competitive and Ethiopia has no advantage in terms of distance to the main markets of the world. For instance, the production of orange and tomato products in Israel, North Africa, Portugal, and Spain has reached an almost surplus situation and the production of low-cost canned pineapples in Kenya, Thailand, Malaya, and Taiwan has been keeping competition in this product extremely high.

Canning operations can be an excellent addition to the production and sale of fresh products, or as an addition to meat processing, which allows fuller use of equipment. There are excellent examples of this already in Ethiopia, where the Elaboret Farm is processing tomato products from the fruit that it has in excess of its need for fresh shipments to Europe; in addition, several meat processing plants are operating canning operations in the seasons when meat products are less available.

Further expansion of the canning and preserving operations in Ethiopia will probably need to be in conjunction with expanded shipment of fresh products, when the air or sea shipment availability problem can be solved, and also in conjunction with meat processing. The high cost of local sugar and the freight surcharge going around the Cape while the Suez Canal is closed will be further barriers to processing fruits and vegetables in Ethiopia in the near future.

Discussions with Ethiopian nationals about the possibility of canning and selling the national dish "wat" were discouraging. Until the time when labor costs are much higher and household help is not available, the people who might be able to afford such a product or who might need it as a time-saving device will always prefer to have the product prepared fresh at home. Carry-out restaurants are probably the next step in this food sales line; some of these are already operating to good advantage in Addis Abeba.

H. Meat Processing

The SRI Livestock Study shows that excess capacity exists in the meat processing industry at the present time. Again, the problems of production are paramount to increasing the processing industry. The possibilities of marketing irradiated meats, meats preserved by smoking and drying, frozen top quality cuts, and canning in combinations with vegetables need to be continually watched and capitalized upon when it appears that production has been encouraged and the procurement problems have been surmounted. Quarantine restrictions of the European market, and the expanding Middle Eastern and West African markets should be followed with interest in Ethiopia, since the domestic potential for increased livestock production seems great.

I. Grain Milling

Grain milling facilities are expanding to meet the increased demand for wheat flour in Ethiopia at the present time. The opening of a new large mill in Debre Zeyt soon will substantially add to the capacity of the milling industry, and other millers also have plans for expansion. Grain milling is expanding in the small villages of the countryside where small engine-powered mills are taking over the process that formerly was done in the home. Some millers are expanding to include baking of bread, biscuits, and cookies in their operation.

J. Corn Products

Because of the potentially large increase in maize production, especially near the Shashemene area, an interest is developing in the processing of maize into corn starch, corn oil, glucose, and by-products. A study of this is being carried out within the Technical Agency, with the

cooperation of German consultants, and should be available soon. Also, a study in the Awasa area by French consultants has recently been completed.

K. Spice Extraction

The Ethiopian Spice Extraction Co., which is connected with the Kalamazoo Spice Co. of the United States, is building new facilities for the extraction of food color ingredients from peppers grown in Ethiopia. They are also investigating the possibilities of growing and processing other spice products. Further investigation on the part of the IEG may be warranted. Current experiments in the growth of black pepper and annato are encouraging, and ginger is already a widely known home-grown spice in Ethiopia. These and other tropical spices may become commercially important in the future.

L. Coffee Processing

Perhaps the most important agricultural product processing industry in Ethiopia is the preparation of coffee for export. New facilities for coffee grading and cleaning for export are being installed in Addis Abeba at the present time. The possibilities of producing powdered soluble coffee in Ethiopia are poor because the type of coffee grown in Ethiopia is not well suited to this product. The Institute of Agricultural Research has recently obtained the advice of experts on coffee production and processing through the Food and Agricultural Organization of the United Nations.

M. Tobacco Manufacturing

In Ethiopia the Tobacco Monopoly has been established to organize the production and processing of tobacco and tobacco products. The work has been proceeding well.

N. Dairy Product Processing

A field that warrants considerable further study in Ethiopia is the production and processing of dairy products. In the general livestock study, some information about the present state of dairy production is presented; further work is being carried out by the Battelle-Frankfort group in the Technical Agency. The Shoa Dairy in Addis Abeba, which is government controlled, is building new processing facilities that may be in operation in 1969. The dairy is also attempting to limit all dairy producers in the Addis Area to sales through their facilities, which would provide control over the hygiene of the production and sales of dairy products in the capital city. Observation of the market situation would indicate that there is great room for expansion of fluid milk sales in Addis Abeba and that expanded production would be quite profitable.

O. Egg Processing

Following up on the fact that one-half million dollars worth of processed eggs have been exported from Ethiopia in recent years it was learned by SRI that two companies in Asmera had previously been collecting eggs from throughout the northern part of the country. After separation of yolks and whites the eggs are dried or preserved and shipped in barrels. These egg products were sold in Holland and Italy; however, one company was already out of business and the other was in the process of going out largely for lack of eggs. The increased consumption of eggs in the countryside and the low price offered by these companies combined to curtail their supplies. Since the managers were planning to return to Italy, and since they had no interest in expanding into egg production, it appears that this export business will soon be out of operation.

A check on egg production costs by producers selling in the higher quality markets of Ethiopia indicates that as yet the production costs are too high for the production of eggs for processing. However, this

subject could use further study. The information that a large producer of poultry products attempted recently to set up business in Ethiopia would indicate that possibilities exist for larger scale operation than has been attempted in the past. If egg production costs can be lowered enough it might be possible to rejuvenate this industry, which already has the equipment and some market outlets established.

P. Tea Production and Processing

Tea growing, which is being investigated by private growers in Ethiopia, might be used as a diversification from coffee in some regions. Roads into the best potential tea growing areas of southwest Ethiopia are needed and sufficient technical knowledge of the crop is not available in Ethiopia at the present time. The world tea market and the outcome of experiments now in progress should be studied carefully.

Q. Leather Goods

Leather goods production is progressing at the moment in Ethiopia, and a large proportion of local shoes are produced by Ethiopian factories. A new factory for the tanning of crocodile hides is being set up, and there is a Czech proposal for a large expansion of the leather tanning business with their help. The real problem in the hide and skin industry is the improvement of the quality of preparation that the hides receive before they reach the tanneries.

This is one industry that might be able to expand into exportable products if the quality of the leather is improved and the tanning in Ethiopia is expanded. One of the first Indian consumer products to be distributed widely in the U.S. market was children's sandals. The present international shoe industry is dominated by Italy, but Spain is gaining

at Italy's expense and it is possible that in future years other developing countries will be able to meet the mass production and low cost requirements that it takes to compete with shoes now being sold by Spain and Italy to Europe and the United States.

Specialty items such as the calfskin, kidskin, and leopardskin products now being produced in small quantities in Asmera could become larger export items if the quantities could be increased without reducing the quality. The few shops making these items at the present time are not prepared technically to increase production enough for the export trade, but it could become important enough to warrant further efforts; however, the total market for these high priced goods is probably rather restricted.

R. Prepared Foods

In addition to those foods mentioned under canning and preserving there are other food processes that might be considered part of the agro-industrial sector. Potato chips are an example of a small industry that can be developed with extremely limited capital. Other examples that are seen in Addis Abeba now are factory-made injera, many small bakeries, and increasing numbers of take-out restaurants.

The preparation of "tej" and "tella" throughout the country is becoming more of a specialized undertaking and less a homemade product. This process of specialization will probably continue in the coming years.

Other local foods that might become more commercialized in this manner include roasted cereals and prepared mixtures of spices.

S. Wattle Production and Extraction

If a heavy leather tanning industry develops in the country, there will be an increased need for vegetable tanning materials, such as the tannin extract produced by the black wattle tree. Although there is at present a world-wide overproduction of wattle extract, conditions may change in the future. In any case, a feasibility study could be undertaken in Ethiopia, since local conditions may well justify such an industry. Certain areas of the country appear to have the physical characteristics to produce wattle; in addition, wattle timber should be equal or superior for all the uses to which the popular eucalyptus is presently devoted.

Appendix D

REVIEW OF OTHER IRRIGATION STUDIES AND RECONNAISSANCE OF POTENTIAL SITES

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A. Development of Large-Scale Facilities for Irrigation

In line with the general discussion presented earlier, the SRI team concluded that it would not undertake any major study involving irrigation that depended upon constructing additional large-scale facilities.* In the course of its other investigations, however, the team had occasion to review some of the large irrigation and power schemes being considered by the IEG. The review included the Awash, Blue Nile, Erer-Gota/Dire Dawa, Anseba, and Billate areas. From these reviews and from the general experience of the team, it was concluded that the IEG should be hesitant to invest in such large-scale projects; exceptions are the projects to be located in the Awash Valley and possibly irrigation below the Finchaa dam.

1. Middle Awash Valley

The results of the RAM studies showed high returns from further developing irrigated agriculture in the Middle Awash Valley. This study included locations in the general vicinity of Awara Melca, Melca Sodi, and Amibara. The high returns stem from the natural fertility of the

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* "Large scale," as used here, means multi-million dollar investments, such as proposed in the Blue Nile report, in which the costs of constructing the irrigation and power facilities for twenty projects ranged from Eth$ 10 million to Eth$ 470 million, and averaged Eth$ 148 million. See Land and Water Resources of the Blue Nile Basin: Ethiopia, Appendix VI--Agriculture and Economics, United States Bureau of Reclamation, 1964.

soil, the variety of crops that can be grown throughout the year, the abundance of water, the expanses of level and unused land, the proximity of the area to markets, and the fact that dams that can regulate the water flow have already been built.

The significance of this last factor cannot be determined without additional study; however, it could play an important part in the anticipated profitability of the Middle Awash projects. This is true because the high initial investment in large dams and low utilization during the early years of the project's life weigh heavily against the possibility of obtaining high rates of return. The practical importance of this is that irrigation projects in the Middle Awash will undoubtedly be profitable largely because they will be taking advantage of facilities already constructed. Making use of surplus capacity (by not considering the cost of previous investments) is a correct evaluation technique when considering investments from the national point of view.*

2. Blue Nile Basin

Of the many power and irrigation projects outlined in the Blue Nile report, only a few seem worth considering for development during the near future. One of these is the Finchaa project, on which construction is just now beginning. At the outset it will be operated solely to produce electrical power. Now that the decision has been made to build the dam, it might be worthwhile to reconsider the incremental costs of altering its use to include provision of dependable water for downstream irrigation.

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* Following this principle, however, does not imply that those who receive benefits from previous investments should not pay service charges for the use of the facilities.

The Angar and Didesa are other areas in the Blue Nile basin that might be developed; however, this would preferably be for dry-land farming, rather than irrigated farming as proposed in the Blue Nile report.

Of the twenty projects analyzed in the Blue Nile report, only four had exceptional benefit-cost ratios, and these are misleading because they are overstated. Inflated ratios have resulted because (1) the value of farm output has been used in calculating the benefits of irrigation, but the costs of farm inputs (except water) have been omitted; (2) no time lag is allowed for the gradual development of the farming areas; (3) social overhead and other ancillary costs of the projects are omitted; and (4) a discounting rate of only five percent was used, rather than a more generally accepted value of ten or more percent. The SRI team calculated a revised set of returns for each of the projects, in which assumptions were made to correct for the foregoing factors; except for the Finchaa project, all of the revised rates of return were below ten percent. As noted, the decision to build the Finchaa project as a single-purpose power project has already been made.

3. Other Power Sites

The possibility of tying irrigation projects to other needed hydropower sites does not offer much opportunity during the near future. The next expansion of hydropower will most likely be an addition to the Finchaa project, which is expected to meet the requirements of the area served by the Addis Abeba/Dire Dawa grid until the mid-1980's. Power requirements in other parts of the country are not considered large enough to justify the construction of large dams. Eventually, Eritrea might be served more by hydro than by thermal power, but this does not seem to be economically justified during the next ten to fifteen years.

Thus, large dams on the Anseba and Tekeze rivers are currently of doubtful economic merit, for--unless the power demand is high--the profits from irrigated agriculture are unlikely to be large enough.

4. The Erer-Gota/Dire Dawa Project

At the time of this writing it appears that the IEG will engage a consultant to make a comprehensive study of the potential of a 300,000 hectare area in the vicinity of Erer Gota and Dire Dawa. The study as originally requested by the IEG would cost several hundred thousand Ethiopian dollars and would most likely commit the IEG to large-scale investments in the area. Meetings between the IEG and SRI team members permitted the latter to suggest a staged approach to the investigation. This approach would concentrate initially on an investigation of low-cost water resources. If these are found, the second stage could be devoted to a study of a few selected areas. In this way, the investigation could be carried forward on a modest scale, but involving a concentrated effort. The most favorable possibility for development is irrigation by tube wells of the broad, level plains about 20 kilometers north of Erer. Damming the streams in the foothills and conveying the water to these lands would be considerably more expensive. This latter alternative should not be investigated unless the potential from wells proves unsatisfactory, and then only if a relatively inexpensive means can be found for storing, conveying, and utilizing the water.

5. The Bilate Project

The Bilate project would entail constructing an aquaduct from Lake Awasa to the Bilate River Valley. A quick review of the project was sufficient to indicate that it should rank low among the projects to be studied by the IEG and its consultants. Total investment could approach

Eth$ 100 million; furthermore, the physical characteristics of the valley are not exceptionally attractive.

6. Other River Basin Studies

In the light of the unexploited potential of the Awash Valley and the opportunities for investing in other types of projects, the SRI team feels that no more than minor effort should be devoted by the IEG to studying and promoting the development of other major river basins. Thus, investigations of the Blue Nile, Baro, Tekeze, and similar basins should be limited to reconnaissance surveys and the establishment of data collection devices such as rain and stream gauges.

B. Survey of Twelve Locations for Moderate-Sized Supplemental Irrigation

An SRI field team--composed of a geologist, a water resources engineer, an agronomist, and an economist--made a reconnaissance tour of twelve locations. The twelve are fairly well dispersed: two each are in eastern and western Eritrea, Shewa, and Sidamo provinces; and one each in Welega, Gojam, Harer, and along the Begemdir-Eritrean border. The type of projects considered for most of the areas would be the provision of irrigation water to supplement existing production, thereby increasing crop yields, allowing one or more additional crops to be produced each year, or both. Two of the projects would supply water to areas that were not previously being farmed. Finally, three projects would require the drainage of swamps; two of the drained areas would then be irrigated and the other would--initially, at least--be farmed without irrigation.

The choice of these locations was based on a general review of the pertinent literature and on discussions with the IEG and with other appropriate individuals. Flights were first made over each of the areas, followed by investigations on land of the most promising areas.

1. Results of the Reconnaissance Survey

The general conclusion resulting from the survey was that a variety of opportunities existed throughout the country for investing in moderate-sized irrigation projects. Were more time devoted to the systematic coverage of the country, additional and perhaps even better sites could be found. However, some of the schemes currently being considered by the IEG were not especially attractive and should therefore be dropped from the list of candidate projects until the more favorable opportunities have been investigated.

Four areas were judged as offering good opportunities for investment. They are the series of valleys from Robi to Kombolcha, the plains north of Erer, and stretches along the Desset River near Mitsiwa and the Gash River close to Teseney. The Borkenna (between Robi and Kombolcha) and the Desset areas were chosen for further study. Abundant water resources anticipated at the other two areas could be used to bring sizable amounts of new land under cultivation.

Four other areas appear suitable for finding and applying supplemental water to lands already being farmed in varying degrees of intensity. They are the Gullui plain, the Hasamo plain, an area from Bure to Jiga, and the vicinity of Debre Zeyt. However, the availability of water and the increases to be expected from irrigation are somewhat less certain than for the other four areas.

The last four areas are not especially attractive; further investigation of them should await study of the other areas, unless more encouraging information about them is brought to light. They are stretches along the Tekeze and Bilate rivers, where supplemental irrigation has been suggested, and the Scala and Chomen swamps, which have been proposed for drainage. Additional information on these and the eight other areas are summarized in Table D-I.

Table D-I

RESULTS OF THE RECONNAISSANCE TRIPS TO SEARCH FOR
SUITABLE AREAS FOR MODEST INVESTMENTS IN IRRIGATION FACILITIES

Area	Location	Characteristics	Recommendations
Most Favorable			
Robi-Kombolcha	From 180 to 370 kilometers north of Addis Abeba along the highway to Dese.	A series of fertile valleys of moderate to narrow width through which streams flow, some of which are perennial; elevation is about 5,000 feet and mean annual rainfall is on the order of 900 millimeters	From this area the Borkenna project was selected for a feasibility study. After draining the area, a portion would be irrigated by pumping water directly from the Borkenna River. In addition to the Borkenna project, the area lends itself to the possibilities of supplemental irrigation from tube wells.
Desset River	25 kilometers west of Mitsiwa.	The area is an alluvial plain where islands and banks along the Desset are suitable for irrigation from shallow, hand-dug wells; elevation is near sea level and mean annual rainfall is about 200 millimeters.	The Dogali project was selected from this area. Testing for underground water for supplemental irrigation should also be done in the Emberemi area.
Gash River	Eastward from Teseney along the Gash River for at least sixty kilometers.	Substantial amounts of flat, unused land along the borders of the shallow-banked Gash River; surface flow in the river during a few months of the year, but evidence that subsurface water is easily tapped; elevation is from 2,000 to 2,500 feet and mean annual rainfall is about 350 millimeters.	Early attention should be given to this area by testing the soils, drilling for underground water, and considering other means of improving the water supply.

Table D-I (continued)

Area	Location	Characteristics	Recommendations
Dire Dawa	A rectangular area of about 300,000 hectares lying between Dire Dawa and Erer-Gota and both north and south of the railroad.	Several sizable streams--mostly seasonal--flowing from the escarpment down to the Awash Valley plains. Probably numerous sites for dams; however, suitable sites for irrigation farming are often a considerable distance from the dam sites and crossed by gullies; best farmland appears to be the large expanses of unused land at the northern edge of the study area; elevation of these flat lands is about 3,000 feet; mean annual rainfall is about 700 millimeters.	Begin investigation of this area by exploring for underground water in the flat lands about 20 kilometers north of Erer.
Favorable			
Gullui Plain	50 kilometers south of Teseney.	Level plains receive seasonal runoff from the higher land to the east; elevation is about 2,500 feet; mean annual rainfall of 400 millimeters seriously limits current crop production.	Some testing for underground water appears desirable; before establishing the priority of these tests, a reconnaissance survey of other areas should first be made.
Debre Zeyt	General vicinity of Debre Zeyt, about 50 kilometers south of Addis Abeba.	Intensively farmed gently rolling lands at 6,000 to 7,000 feet elevation, on which irrigation water has not yet been used to any significant extent; mean annual rainfall is approximately 900 millimeters.	Some testing for underground water seems desirable, more intensive testing should await results from this and other areas.
Hasamo Plain	80 kilometers south of Asmera and about midway between Adi Ugri to the west and Adi Keyih to the east.	Depressed plain at about 5,000 feet elevation in low rainfall area of 400 to 500 millimeters annually; lightly farmed as a result.	Should be considered as a possible site for underground water testing should such a program be initiated.

Table D-I (continued)

Area	Location	Characteristics	Recommendations
Bure-Jiga	160 kilometers south of Bahir Dar along the highway to Addis Abeba.	Highland grain area (6,000 to 7,000 feet elevation) with abundant rainfall (mean annual amount is over 1,600 millimeters). Some irrigation now being practiced by small farmers during the dry season.	Good farming area, but some question about the additional benefits to be derived from irrigation in an area where rainfall is already high. Firmer conclusions would take additional study.
Least Favorable			
Tekeze River	Eastward from Humera-Setit along the Tekeze River for about 60 kilometers.	The river course often lies well below the adjacent lands, which are often rough and crossed by gullies leading to the river. Elevation is about 2,000 feet and mean annual rainfall is about 400 to 500 millimeters.	This area does not lend itself to moderate-sized investments in irrigation. Plans to irrigate lands some distance north and south of the river would probably have to be combined with a power project further upstream if the scheme were to become practicable; this is not recommended at this time.
Chomen Swamp	Near the site for the Finchaa Dam, about 200 kilometers west of Addis Abeba.	Surrounded by highland farming on small plots of land; elevation of swamp is slightly over 7,000 feet; rainfall averages about 1,000 millimeters per year.	The site has been proposed as a drainage project for dryland farming, but with possibilities for irrigation at a later date. It is possible that irrigated agriculture at this altitude and climate will not be much more profitable than dry-land agriculture; it is also doubtful if benefits from dry-land farming justifies the costs of swamp drainage. Therefore, delay consideration of this project until more is learned about alternative investment possibilities.

Table D-I (concluded)

Area	Location	Characteristics	Recommendations
Scala Swamp	Along the east side of the main highway across from the town of Awasa.	Fertile area at about 5,000 feet elevation with a rainfall of around 1,000 millimeters annually.	Possibly a good site for a combined drainage and irrigation project; however, farm production in the immediate vicinity of the swamp has not been profitable. Delay decision until (1) reasons for unprofitability of existing production are known; (2) opportunities for expansion of dry-land farming nearby are investigated, and (3) actual experience from the Borkenna drainage project is gained.
Bilate River	From the mouth of the river at Lake Abaya upstream for about 50 kilometers.	Some irrigated farming in the valley, of which the recently established French concession is the largest; top soil often thin in spots and substantial erosion; amount of good land in the valley appears to be limited; elevation between 4,000 and 5,000 feet and located in the mean annual rainfall zone of 1,400 millimeters.	A proposed scheme to drain part of the water from Lake Awasa into the Bilate River basin appears to be too costly, considering the limited potential of the area. Other possibilities for development there, besides those currently being pursued by private investors, do not seem especially attractive at present.