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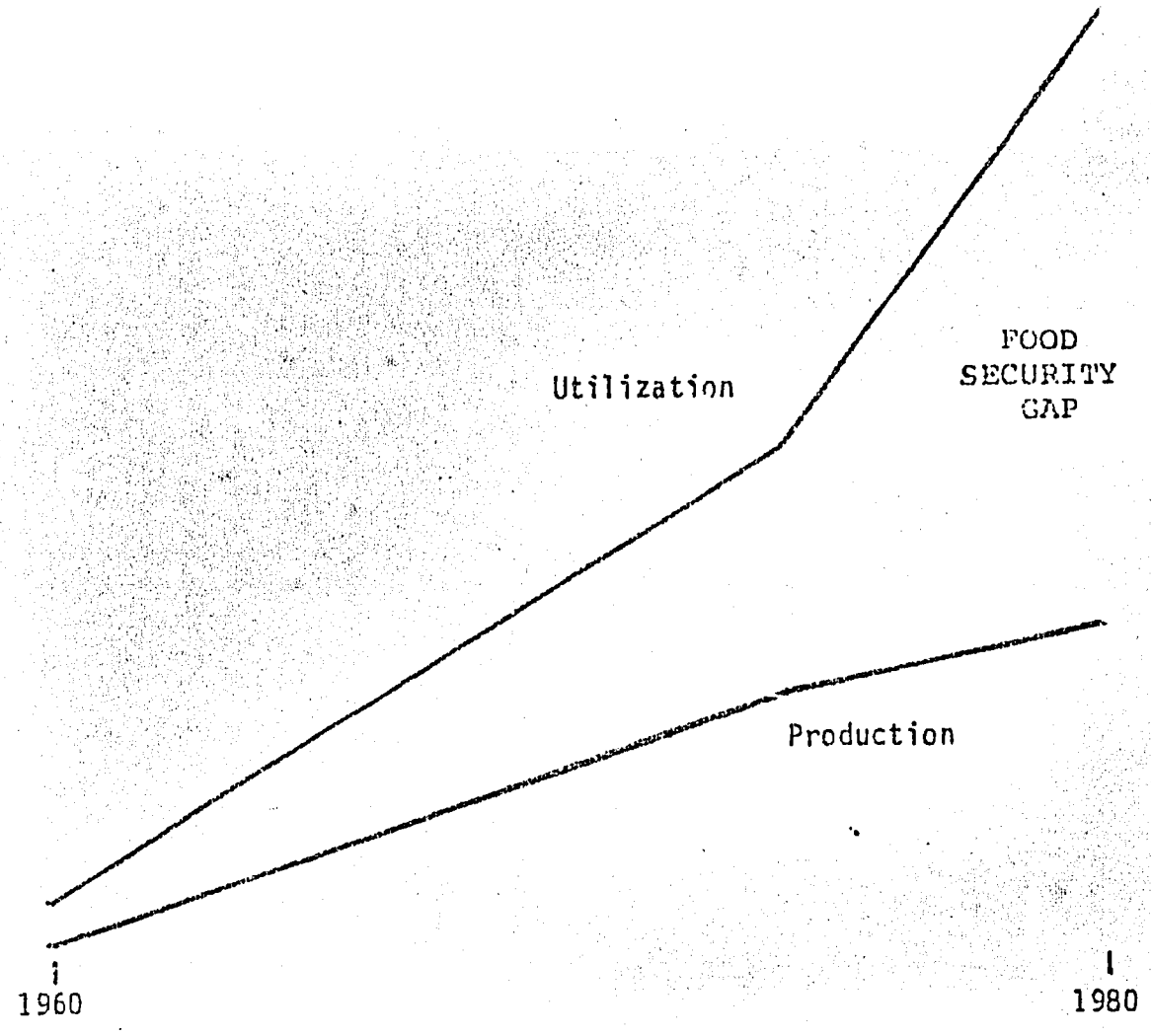
EGYPT

Strategies for Accelerating Agricultural Development

A REPORT OF THE PRESIDENTIAL MISSION ON AGRICULTURAL DEVELOPMENT IN EGYPT



Ministry of Agriculture of the Arab Republic of Egypt
and the U.S. Agency for International Development
in cooperation with
The International Agricultural Development Service
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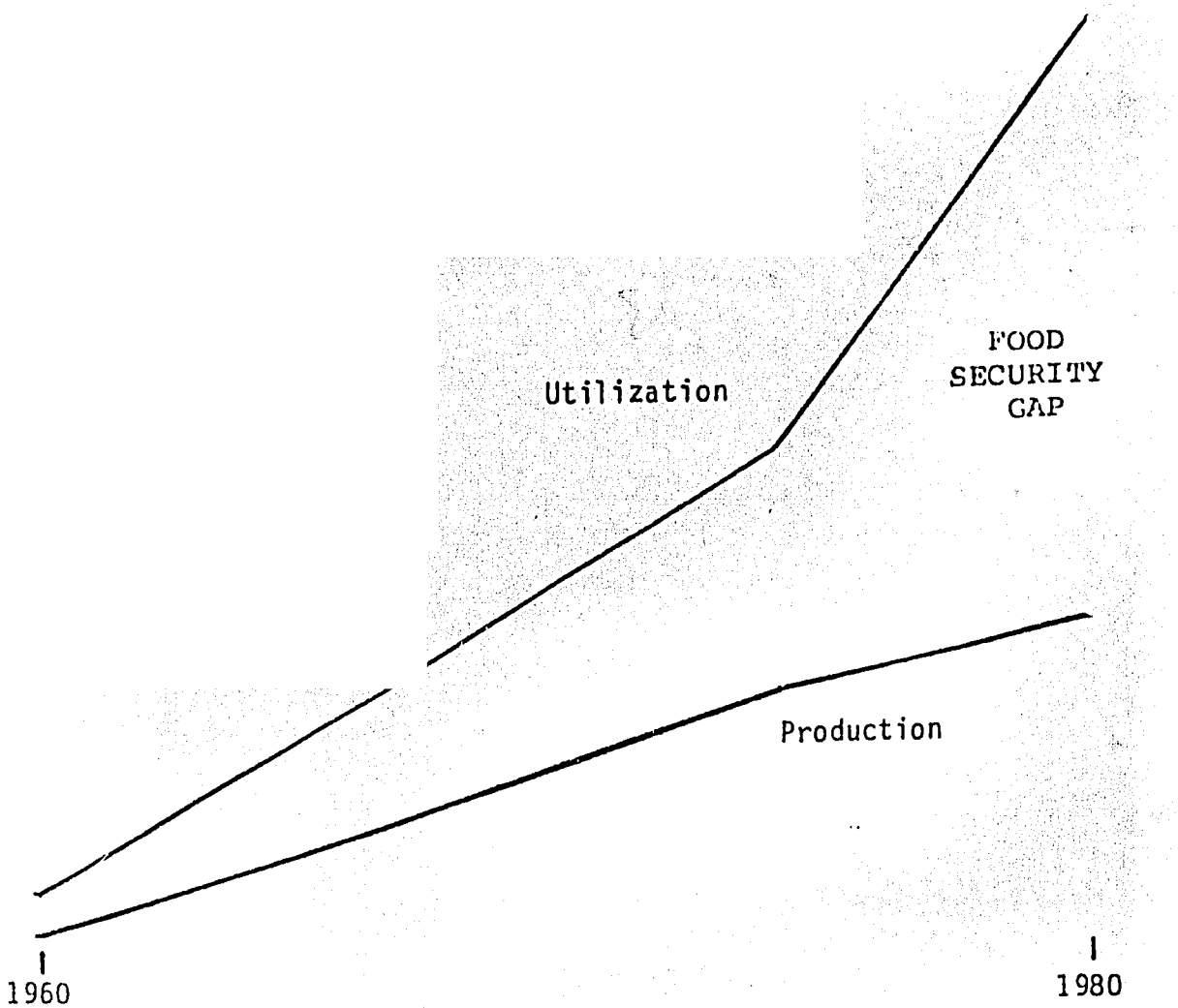

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PRESIDENTIAL MISSION ON STRATEGIES FOR ACCELERATING AGRICULTURAL PRODUCTION IN EGYPT

FOREWORD

The Special Mission concerned with Strategies for Accelerating Agricultural Development (SAAD) grew out of the recognition by Egyptian officials that the agricultural sector was failing to make needed contributions to the Egyptian economy and to national food security goals. Although Egyptian officials and representatives of United States Agency for International Development had considered the need and plans for such an effort, agreement on specific details was only reached when President Mubarak visited President Reagan in Washington early in February 1982.

The importance of the effort and the extent of U.S. commitment are underscored by the fact that the group of U.S. specialists chosen to focus on these problems were designated by President Reagan a "Presidential Mission."

Although staff work began several weeks earlier, the Mission arrived in Cairo on March 1 and departed around April 15. The primary objectives were first to provide a comprehensive assessment of the potential for accelerating the development of the agricultural sector and second to carefully review the constraints that would limit the realization of this potential. Recommendations for addressing these constraints are included as are some suggested strategies for achieving desired goals.

The effort has been both exciting and challenging--exciting because the Mission believes it is realistic to expect that the current stagnation in agricultural output can be overcome if certain actions are taken; it has been challenging because projections of population and per capita consumption indicate that the gap between production and consumption could remain substantial even with significant growth in agricultural output.

Problems relating to population were considered to be outside the purview of this Mission, despite their obvious relevance to the need for agricultural output. Governmental organization and policies affecting agriculture were the central focus of the Mission, as were research and extension programs for overcoming constraints. Consequently considerable attention has been directed toward these concerns as they are very important in determining the application of technology and the increase in farm output.

Since a study of agricultural constraints was made in 1976, this Mission concentrated on subsequent developments. The importance of this study and the seriousness of the situation are demonstrated by the fact that self-sufficiency in food production fell from 94.5 percent in 1960 to 53.6 percent in 1980.

In conducting this study the Mission interacted with representatives from many governmental agencies and related institutions, in addition to the Ministry of Agriculture. The Ministries of Supply, Irrigation, Reconstruction and Land Reclamation, Planning, and Industry were all directly involved with food production and distribution; likewise, the Ministries of Economy, Finance, and Transportation were mandated to play significant roles in agricultural development. Therefore, during March and early April 1982 Mission members contacted these and other units of government and visited governorates, villages and many of the field components of the various government agencies. Trips were also

made to several processing plants and import and export facilities. Private as well as government firms were involved.

New and old lands were inspected as selected members of the Mission traveled throughout much of Egypt. Of special interest were agricultural production projects being carried on by the Ministry of Agriculture and Food Security with assistance from United States Agency for International Development and other foreign donors. Experts associated with these projects communicated their assessment of what might be realistic potentials for significantly increasing production and the ability of the country, under specified conditions, to overcome many of the problems currently constraining production.

Dr. Youssef Wally's excellent report entitled "Strategies for Agricultural Development in the Eighties" was published at the same time that the Mission began its study and sets forth very clearly many of the problems limiting the development of agriculture in Egypt. Strategies for dealing with these problems are suggested, and Minister Wally's discussion of these issues was most helpful to our Mission and, we believe, provides a sound basis for future action.

The Mission is deeply indebted to Dr. Youssef Wally, Minister of Agriculture and Food Security, for his personal interest in this project and for the exceptional support and assistance provided to the Mission by the Ministry. The Mission is also very cognizant of the excellent collaboration of Dr. Mohamed Kamel Hindy, who served as the Leader of the Egyptian counterpart team, and to the Egyptian members.

Deep appreciation is extended to Dr. Mohamed Mahmoud Dessouki and the staff of the International Relations Department for arranging travel and accompanying Mission members on their many visits and trips.

The team is also very grateful to Dr. Raymond Fort and his colleagues in USAID Cairo for their splendid cooperation and support.

The following report, although sometimes critical, is submitted with a feeling of confidence that the potential for the further development of Egyptian agriculture is indeed great, and that, in the hands of the well-trained and capable Egyptians who were encountered throughout the study, much progress can be made toward realizing this potential in the years ahead.

Several members of the Mission have prepared separate papers which deal with specific issues covered in this report. These papers are published in an Annex to the Mission Report.

The views and interpretations expressed in the report are those of Mission members and should not be attributed to the United States Agency for International Development.

Members of the Mission were greatly saddened by the sudden death by heart attack on April 7th of Dr. Raymond Dennison, an able and highly respected colleague. In view of our admiration and respect for Dr. Dennison and of his significant contributions to the work of the Mission, we dedicate this report to his memory.

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SUMMARY

OVERVIEW

Egypt is facing a critical situation in that its consumption of major food commodities significantly exceeds domestic supply, resulting in a sharp decline in self-sufficiency levels and necessitating the import of large quantities of food and feed commodities.

The potential for expanding the Egyptian agricultural sector is great, and the rapidly widening gap between the production and utilization of food commodities can be reduced.

This potential relates to the well-documented capacity for significantly increasing agricultural productivity on arable lands presently available and for improving the efficiency of animal production (vertical expansion). In addition, there is a potential for expansion of agricultural output through land reclamation efforts (horizontal expansion) and for increasing returns by expanding export markets in those commodities for which the country enjoys a comparative advantage. The greatest immediate potential lies in the area of vertical expansion.

Many problems or constraints currently prevent Egypt from realizing its agricultural development potential. These constraints may be grouped into four broad categories: policy, technological, resource, and institutional.

The Mission's Report, summarized in the following section, provides specific recommendations for addressing and, insofar as is possible, removing these constraints.

There is a great need for the Government of Egypt to implement the strategies set forth herein for accelerating the development of its agricultural sector. Failure to act promptly to implement programs aimed at reducing the rapidly widening food gap or deficit could have critical economic consequences and could seriously jeopardize Egypt's ability to achieve its food security and economic development objectives.

AGRICULTURE AND THE EGYPTIAN ECONOMY

Historically the agricultural sector has been a major contributor to the Egyptian economy and constituted one of the most significant sources of government revenue and foreign exchange. By the early 1970's, however, the relative contribution of agriculture to government revenues and foreign exchange earnings was declining. Indeed, since the October War of 1973, Egypt's economic situation has changed dramatically. Petroleum, remittances from workers' abroad and tourism have become the major foreign-exchange earners. Compared to other sectors, agriculture has shown the slowest growth, increasing by an average of only 2 percent annually between 1975 and 1980, while growth in the services sector averaged more than 8 percent and petroleum 30 percent.

Investment in the agricultural sector has not been optimal. Land reclamation, which received 40 percent of available funds, has given low returns. Other funds have been used mainly for infrastructural improvements, including the Aswan Dam, irrigation canals and drainage facilities. At the farm level relatively little investment in new technology has occurred. Farmers have not been encouraged to save or invest because administered prices and other controls have limited the profitability of farming.

Likewise, growth in the supply of food and agricultural products in Egypt has been slow. A 25 percent gain in value-weighted agricultural output was experienced between 1970 and 1981. Over the same period crop output value expanded 16 percent, while animal product value grew 42 percent. Growth in output of crops was 1.5 percent annually, while growth in animal products was 3.8 percent. Production of traditional field crops such as cotton, rice, wheat and sorghum showed little increase, but output of berseem clover, maize, fruits, vegetables and animal products expanded. These production shifts were related to government policies, farmer response to prices, consumer demand, and technical constraints, among other factors.

The Ministry of Agriculture oversees farm production and influences farm output through crop quotas, fixed crop rotations, administered prices, input allocations, and technical assistance. Government intervention in agriculture has been characterized by mixed goals: earning a surplus from the farm sector through low producer prices; acquiring cheap food for urban distribution; insuring production of profitable export crops; protecting farmers against world price fluctuations; encouraging economies of scale; and encouraging adoption of new technology.

Agricultural land area is limited mainly to the Nile Valley and Delta, with a few oases and some arable land in Sinai. The cultivated area is 5.8 million feddans, 3 percent of the total land area. The entire crop area is irrigated except for some rain-fed areas on the Mediterranean coast. Over the last three decades, land reclamation of 900,000 feddans has been offset by land lost to urbanization of approximately 700,000 feddans. Land holdings are fragmented, with the average size of operating farm units being 2.5 feddans. Land tenure is divided among legal owners, renters, and share-croppers in order of magnitude.

The government maintains fixed producer prices for a number of crops. These prices are low relative to market prices in Egypt and to international prices. Because of distortions resulting from price regulations, farmers have often preferred to cultivate less-regulated crops, including vegetables, fruit and berseem clover.

Per capita consumption of many agricultural commodities has increased significantly, especially since 1974. In fact, in the six-year period from 1974 to 1980, per capita utilization of wheat advanced 38 percent, sugar 69 percent, maize 24 percent, red meat 38 percent, white meat 67 percent, dairy products 41 percent and fish 76 percent. This rapid increase in demand for food is due to a number of factors including a high rate of population growth, a

shift in population from rural to urban areas, increasing income, and substantial government subsidies for food.

Egypt is becoming increasingly reliant upon food imports to meet its food demands and upon foreign assistance to finance them. In 1974 the value of agricultural imports exceeded exports for the first time. The figures rose quickly, and by 1981 Egypt was importing some 48 percent of its staple food commodities. In 1981 the value of agricultural imports exceeded exports by some three billion dollars.

While the value of Egypt's agicultural imports is growing, agricultural exports are falling. In fact, the volume of the three most lucrative exports--cotton, rice and oranges--declined over the last decade.

The rapid growth in domestic demand for agricultural commodities and the decline in their production for export has prompted Egyptian authorities to seek ways to revitalize the agricultural sector and to undertake efforts to increase agricultural productivity and output. This study is concerned with developing strategies to achieve this objective.

AGRICULTURAL DEVELOPMENT POTENTIALS

DEMAND

The principal requirement for growth in any economic sector is that there be sufficient demand for the sector's products at adequate price levels. In the case of agriculture in Egypt, overwhelming evidence demonstrates a strong domestic demand with indications of potentially strong international demands as well.

In view of the current food deficit in the country (in terms of domestic production), the rapidly increasing *per capita* consumption

of food and the rapid increase in the number of consumers of food, the question is not whether there will be sufficient demand for food to sustain a more rapidly developing agricultural sector. The real question is can the country sufficiently marshal its resources in the agricultural sector to meet its food security needs during the next decade?

Domestic demand for Egypt's agricultural produce is likely to be so formidable one might question whether there is the capacity to accommodate the demand of a substantial export market. However, the goal should not necessarily be that of achieving a state of food self-sufficiency. Rather the goal of food security embraces or, in our opinion, should embrace the concept of giving priority to the production of those commodities for which Egypt holds comparative advantage--with the possibility of exporting at least enough agricultural commodities to pay for those which must be imported.

With this in mind, the issue of Egypt's comparative advantage in agriculture should be carefully studied, and efforts should be made to encourage the further development of the country's agriculture to fully exploit whatever advantage may exist. Despite the absence of a formal study, it appeared to the members of the Mission that Egypt has the potential to develop significant export markets, especially for horticultural crops. This matter warrants careful exploration.

EGYPT'S UNIQUE RESOURCES

Prior assessments of Egyptian agriculture have often emphasized Egypt's unusually favorable land, water and climatic resources, along with the relatively high levels of agricultural productivity which these resources have enabled the country to achieve. Such assessments show yields of most Egyptian crops to be substantially above average world yields, and, in fact, to compare very favorably with those of more developed regions of the world such as North America and Europe.

Many have assumed from such comparisons that opportunities for further increasing productivity per unit of land must be limited. Such views have been reinforced by crop yields during the past decade which, with few exceptions, have tended to level off or, in several instances, to decline.

However, ample and ever-increasing evidence suggests that despite relatively high levels of productivity by world standards, or even by those of more developed nations, Egypt's potential for further augmenting agricultural output on existing arable lands is enormous. Such increases would be in excess of whatever gains might be realized by bringing additional lands under production through reclamation efforts.

Yield comparisons with other agricultural areas of the world often fail to take into account the truly unique nature of Egyptian agriculture. In no other country is the agricultural system so completely irrigation-based. In no other country is the total cropland so abundantly supplied with high quality water. This uniqueness is further enhanced by the deep, rich alluvial soils throughout the Nile River and Delta area. Finally, no country can claim more optimal climatic conditions for agriculture.

To derive a meaningful comparison of Egyptian agricultural productivity, the matter should be considered with reference to other areas where conditions are similar. However, a strictly parallel situation is not available. In its absence perhaps the most useful comparison would entail setting Egypt's productivity levels against those achieved under irrigated conditions in the U.S. When such comparisons are made, it is found that average U.S. yields are substantially greater than those in Egypt. This would suggest that the productivity of Egyptian crops has by no means attained full potential considering the fact that Egypt's overall environment for crop production is generally superior to that found under average

irrigated conditions in the U.S.

LARGE POTENTIAL FOR VERTICAL EXPANSION

Actual experiences within the country provide even more direct indication of the significant potential for increasing crop productivity on existing arable land (vertical expansion). Research trials, large-scale demonstrations conducted on farmers' fields, and experiences by farmers themselves have indicated the probability of achieving significantly increased yields.

Perhaps the most current and meaningful information available for cereal and vegetable crops are the data accumulated from large-scale field demonstrations carried out by the Ministry of Agriculture and USAID as part of the Rice Research and Training, the Major Cereals Improvement, and the Agricultural Assistance Projects. These extensive demonstrations under farm conditions, involving thousands of feddans, have indicated a potential with current technology and know-how for increasing yields of cereals by 50-70 percent and certain vegetables by 160-260 percent. Given the broad scope and scale of these demonstrations the yields realized represent levels that could be achieved by average Egyptian farmers within a few years provided the various constraints presently limiting production were appropriately addressed and removed.

Maximum yields observed in demonstrations and other field trials, as well as performance by better farmers, suggest that long-range potentials for increasing output are in the range of 200 percent and even higher for many crops.

Certainly, a strong, well-conceived and viable research program can be expected to develop the technology needed to increase yields far above the levels which are now possible--and, of course, even further above the average levels now realized.

Substantially less information is available to indicate the potential for improving animal productivity. The general information at hand, however, suggests that the opportunities may be of comparable magnitude.

A very general approximation of overall potential suggests that the opportunity exists for doubling broiler- and cattle-feeding efficiency, egg production per hen and milk production per cow over levels currently achieved in villages. It is further estimated that improvements in milk production by buffalo of 1 to 2 percent per year may be possible through genetic improvement and that fish production per feddan may be tripled.

LESS CERTAIN POTENTIAL FOR HORIZONTAL EXPANSION

The potentials for bringing additional land into production and expanding existing livestock enterprises (horizontal expansion) are not nearly so encouraging as prospects for increasing productivity of existing cropping areas and livestock operations (vertical expansion).

With only 3 percent of Egypt's land base under cultivation, there is obviously space for agricultural expansion. However, appropriate soils that could be developed at reasonable costs are extremely scarce. Although the water supply might support two million feddans of reclaimed lands, one might question the feasibility of bringing more than one million additional feddans into cultivation in the immediate future, given the nature of available soils and other topographic constraints.

In the 1960's considerable emphasis was placed on efforts to develop "new" lands; more than 900,000 feddans were reclaimed. However, the Ministry of Agriculture now indicates that only 500,000 of these feddans are "above marginal production." This reclaimed area, which constitutes approximately 13 percent of the total cultivated land in

Egypt, currently accounts for only about 2 percent of total agricultural production.

The great expense of reclamation, along with the low productivity realized to date, cause us to be less than optimistic regarding the short-range potential for substantially increasing agricultural output on "new" lands. Certainly, the potential for increasing output is much greater and the costs substantially less per unit of output on "old" lands than on reclaimed desert lands. Consequently, if the government of Egypt must choose between investing in "old" versus "new" lands for agricultural development, the greatest returns by far would be realized from investments aimed at maximizing output from land already being cultivated.

However, despite the disappointing history of reclamation efforts, the potential exists--given the application of the appropriate technology and suitable management--for producing acceptable yields of high-value, specialty crops on newly reclaimed desert lands. In addition, a broader range of crops could be cultivated in those areas left to be developed in the Delta.

Considerations other than agricultural production will influence decisions concerning reclamation. However, the results may continue to be disappointing unless a concerted research effort is undertaken to learn how the "new" lands can best be managed and utilized for agricultural purposes. Such research should be initiated at least ten years before large-scale projects are launched.

The relatively high levels of agricultural productivity permitted by Egypt's unusually favorable land, water and climatic resources support one of the most dense livestock populations in the world--about one animal unit (cow-equivalent) per feddan.

Given the fact that the country already falls far short of producing enough food to meet human needs, and given the limited availability of arable land, one might question the desirability of expanding the production of meat and animal products. Indeed one might question whether even the present level of resources devoted to animal production can be justified.

In this type of situation, priority is normally given to producing from a given land area, the staple food commodities that would generate the most energy and provide the best nutrition for humans. Converting large quantities of grain to meat or animal products and using large areas of fertile land to grow forages indicate a questionable allocation of scarce resources.

Given the severe food deficits that currently confront Egypt and the likelihood that the situation will be even more acute in the future, the strategy of continuing those policies which have favored expanded production of meat and animal products at the expense of crops needed for domestic consumption or export appears unwise. Furthermore, we doubt that Egypt's comparative advantage lies in the production of meat and animal products. Accordingly, it appears better to concentrate on producing those commodities for which Egypt does have a comparative advantage and to import whatever level of meat and animal products the country wants and can afford (above and beyond local production derived primarily by using residues and by-products for feed.

Two possible exceptions to this general statement might apply--the first is fish and the second, poultry. Egypt's distinctive resources and capabilities for aquacultural operations are such that further development in this area may be warranted. In addition, commercial poultry operations have shown impressive efficiency in terms of the effective conversion rates of feed to meat. Consequently expanding poultry production to supply more of the animal

protein needs of the country could also be warranted, especially in light of the substantially increased production levels of domestic maize and sorghum which now seem possible.

In the final analysis, however, as long as Egypt is in a deficit situation with respect to concentrates for poultry and fish, the relative merit of importing the meat directly (instead of the concentrates) should be carefully evaluated.

If Egypt hopes to attain its full potential in agriculture, then a broad array of effective and efficient agriculturally-related businesses and industries are needed. Certainly the potential exists to develop such enterprises. At present, however, many public-sector organizations have been established to serve these needs, and their performance leaves much to be desired in terms of providing the kind of assistance required. Unfortunately, the general economic climate, as well as many government policies, discourage private-sector investment in enterprises which are of crucial importance to the task at hand.

On the other hand, many leaders in government are now advocating more private-sector investment and activity. However, more sustained efforts to encourage the development of appropriate businesses and industries are necessary to bring about and sustain growth within the agri ltural sector.

CONSTRAINTS LIMITING ACHIEVEMENT OF DEVELOPMENT POTENTIAL

Although the potential for further agricultural development in Egypt is significant, many constraints limit the realization of this potential. We have grouped these constraints into four broad categories--policy, institutions and organizations, resources and technology--and examined their influence on both production and marketing.

1. Policies

Agricultural policies have acted to seriously constrain the growth of Egyptian agriculture. Prices for many agricultural commodities are fixed at low levels; this is a serious disincentive to farmers as it gives no encouragement for increasing production and actually promotes the inefficient allocation of resources and the inequitable distribution of sectoral income. Government pricing of major agricultural inputs has also been a part of Egypt's overall agricultural development strategy. Although such input subsidies partially offset the income transfer effects of administered commodity prices, they also contribute to misallocations of resources.

We recommend that the government of Egypt permit agricultural output and input prices to move towards world price levels. Correcting distortions in relative prices received and paid by farmers is central to using resources in the agricultural sector more efficienctly and reducing Egypt's growing dependence on imported food. Changing relative prices in the direction of world market prices will produce incentives for farmers to reallocate resources between crop and livestock enterprises. Allowing prices to reflect international opportunity costs will also provide incentives to adopt yield-increasing technologies.

We further believe that public-sector investment in agriculture has been insufficient for increasing the contribution of rural areas to Egypt's economic growth. Consequently, we recommend that the government of Egypt increase the rate of investment in the agricultural sector. The decision to invest should be based upon economic criteria and the country's development objectives.

2. Institutions and Organizations

The institutions and organizations related to the agricultural sector are complex. Four Ministries are directly involved in various aspects of food production. Others are indirectly involved. The result is overlapping duties and, not infrequently, conflicting policies. If the agricultural sector is to meet the future goals of food production, all facets of the sector should be considered within a holistic framework for planning and executing national programs.

A number of mechanisms could assist in coordinating the development of an integrated approach to problems presented by the agricultural sector. We suggest three:

--better cooperation between the Ministers and Undersecretaries of the involved Ministries;

--the establishment of a Supreme Council of Ministers for Food and Agriculture (Ministers of Agriculture and Food Security, Irrigation and the Sudan, Reconstruction and Land Reclamation, and Supply).

--the establishment of a formal structure that would encompass and relate all Ministries directly concerned with the agricultural sector (Agriculture and Food Security, Irrigation and the Sudan, Reconstruction and Land Reclamation, Supply) under the leadership of a Deputy Prime Minister for Food and Agriculture.

We believe that the establishment of the position of Deputy Prime Minister for Food and Agriculture would offer significant advantages.

We also recommend the formation of Inter-Ministerial Work Groups between the Ministry of Agriculture and the Ministry of Irrigation. Such work groups would be active at the national, governorate,

and district levels. Their purpose would be to focus on the interface between the responsibilities of the two Ministries.

Likewise, the establishment of Inter-Ministerial work groups between the Ministry of Agriculture and the Ministry of Reconstruction and Land Reclamation is also recommended, with these work groups also operating at the national, governorate and district levels.

At present, the organization "within" the Office of the Minister of Agriculture and Food Security involves a collection of 17 semi-autonomous groups and companies and 13 operating undersecretariats. Such an organizational structure is somewhat cumbersome and inefficient in that it results in overlapping or duplication of functions and engenders uncertainty regarding the responsibilities of the various agencies. We recommend a restructuring of the semiautonomous organizations under the Ministry as well as a reorganization of the Ministry itself to facilitate more efficient operations and a more effective span of control by the Minister.

We believe this can be accomplished by grouping the major organizations and agencies which report to the Minister under three first Undersecretaries as follows:
--First Undersecretary for Companies and Authorities,
--First Undersecretary for the Ministry of Agriculture,
--First Undersecretary for Agricultural Research and Extension.

There is a great need to substantially strengthen the agricultural research and extension programs so that they might provide the technology critically needed to further advance the nation's agricultural sector. To this end, we strongly endorse the recommendation of the USAID-BIFAD Extension Team in 1981 for the creation of an overall research and extension organization.

We have suggested that such an organization be an Agricultural Research and Extension Authority, established as a semiautonomous agency under a First Undersecretary who would report to the Minister. Specific recommendations focus on strengthening existing research and extension programs and on developing others to serve needs not now being met such as in marketing and areas related to rural women and development. It is also recommended that efforts be made to involve the faculty and other resources of the agricultural colleges throughout the country in programs carried out by the Agricultural Research and Extension Authority.

The universities are awarding large numbers of degrees in agriculture. However, many students receive little laboratory or field training, and laboratories are generally overcrowded and poorly equipped. We suggest that admission and graduation requirements be increased while the number of degree-granting programs is reduced. Many more agricultural graduates than can be effectively used are now employed within the government; under present circumstances we believe it would be better to provide an improved university education for fewer numbers of students in agriculture than to continue to try to accommodate the large numbers currently enrolled.

Likewise, the agricultural secondary schools should be upgraded, and the idea of establishing two-year technical institutes should be given careful consideration. Such facilities could train persons for government service or employment in the private sector in capacities that do not require university degrees.

3. Resources

a. Land Base. The amount of arable land is a key constraint to increased agricultural production in Egypt. The agricultural land base now consists of 5.8 million feddans of fully irrigated "old" lands and 900,000 of old "new" lands, only half of which are now in production. By the year 2000, sufficient water will be available in the Nile System to fully irrigate 2.0 million more feddans. Several steps which should be taken to preserve, improve and enlarge the land base for agriculture include:

--preserving for agricultural use all arable land. Construction activities by the government should lead the way in using nonagricultural land for building sites; laws should be enforced to protect arable lands from nonagricultural use.
--devising substitute materials that can be used in place of the bricks that are currently formed from agricultural soils.
--upgrading the productive capacity of "old" land by improving drainage and undertaking periodic land amelioration practices.
--completing the development of the old "new" lands by installing drainage systems and more appropriate systems of irrigation.
--giving priority to the development of "new" lands on low-lying, fine-textured soils.

b. Water Management. Imperfect water management is a serious constraint. Conveyance losses in on-farm channels are often high because of poor design and low flow rates from the sakia or meska. Poor land-leveling and low flow rates cause uneven field distribution and flow water applications that greatly exceed annual crop needs. These

imperfections result in reduced yields and restrict efforts that could be made to intensify cropping via more timely seedbed preparation, transplanting etc. Inadequate on-farm drainage often results from poor maintenance of field drains and/or main drains.

We recommend that farmers be provided with technical assistance in:

--rationalizing and improving within-farm conveyance channels.
--land-leveling.
--basin or furrow design and layout.
--obtaining appropriate flow rates for efficient irrigation, using pumps as needed.
--forming water use groups for better regulation of the meska.
--conducting field studies to develop and test alternative systems of group action by farmers for off-farm management and maintenance of irrigation and drainage systems.

c. Water Management Coordination. The physical limitations of the water conveyance system, as well as the human factors influencing its operation, together with the multiple objectives of the system lead to a situation that frequently is not compatible with best on-farm water management. Water is often delivered at the wrong time or at the wrong flow rates, making good water management impossible on the farm. Conversely, the diversion of a large flow upstream to irrigate quickly and efficiently may interfere with water availability downstream.

Good water management calls for "total" water management with careful and explicit integration of components. This highlights the importance of coordinated planning and operation of systems.

d. Soil, Water and Crop Management. Effective crop production requires a holistic approach that takes into account all the interacting components of the production system. The often fragmented approach that results when different entities are responsible for scheduling water, providing fertilizer, growing the crop, or installing and maintaining drains can lead to significant reductions in output.

Water, soil and crop management decisions should be closely coordinated and integrated at the farm level. This requires that necessary supplies and services be made available on a timely basis to the farmer decision-maker.

e. Drainage. Imperfections in the drainage system are a chronic constraint. Perennial irrigation with widespread over-irrigation and high conveyance losses have overtaxed existing drainage systems on "old" lands. The current, large-scale program of installing tile field-drains will help reduce waterlogging only if the basic system of open-drain outlets function properly. Lack of maintenance and the deterioration of pumping stations seriously jeopardize the drainage systems in many areas.

An accelerated program of renovation of the entire system of primary and secondary drains and associated pumping facilities should be implemented at once to avoid further deterioration of the system. A systematic program of monitoring the hydraulic, agronomic, and economic performance of the system should be established and used as an administrative and design data base.

f. Waterlogging. Waterlogging and secondary salinization are by-products of heavy irrigation. With the advent of perennial irrigation, the amount of water entering the

arable land area has far exceeded that lost by evapotranspiration. This has led to heavy recharge of the ground water and the rise of the water table, which in turn has caused secondary salinization of the root zone--both of which depress yields.

Closer operational relations should be developed between the Ministries of Irrigation and Agriculture at the branch canal level. Pilot studies of methods for converting canals and meskas to gravity flow with higher turnout flow rates and for devising and evaluating ways by which farmer groups can assume greater responsibility for operating and maintaining irrigation and drainage systems should be pursued.

g. New Land Development. Arable land constraints will continue to be addressed as efforts to develop "new" lands continue, even though past efforts have led to disappointing results. Large investments notwithstanding, returns have been meager.

To avoid the mistakes of the past, a well-planned and well-directed effort should be begun that develops crop production packages suitable for typical desert situations. Such efforts should precede the planning of large development projects by five years and implementation by ten years.

h. Agricultural Mechanization. A lack of appropriate agricultural machinery and support services is restraining agricultural production potentials. Over the last ten years the rapid increase in the use of agricultural machinery, particularly tractors and mechanical irrigation pumps, has been accompanied by problems in maintaining this machinery at full operating capacity. Constraints include: poorly

equipped village repair shops, inefficient supplies of spare parts and the cost of agricultural labor.

Extension education programs in preventive maintenance and repair should be undertaken for owners of agricultural equipment and operators of village repair shops. The Principal Bank for Development and Agricultural Credit should move to liberalize policies permitting loans to small farmers and owners of village repair shops who wish to undertake selected mechanization or make other improvements in support services. Research and development should be continued and intensified regarding appropriate equipment for improved fertilizer and seed placement, land-leveling, threshing and crop driers to reduce harvest times.

i. Agricultural Chemicals. The system for distribution of agricultural chemicals is inadequate to obtain production potentials. It is estimated that 5 percent of the fertilizer is lost before reaching the farmer with additional wastage occurring on the farms. There are shortages of appropriate fertilizer placement and spraying equipment.

The Principal Bank for Development and Agricultural Credit should proceed to improve its storage facilities and handling practices to reduce losses and prevent deterioration in quality of agricultural chemical supplies. Research and development should be continued and intensified concerning equipment for fertilizer placement and spraying with the goal of mechanization appropriate for small farm operations.

j. Agricultural Credit. There is currently a lack of sufficient medium- and long-term credit to realize the development potential of Egyptian agriculture. It is recommended that the Principal Bank for Development and Agricultural Credit substantially increase resources for

medium- and long-term loans. The PBDAC should also move to implement liberalized loan policies to meet the credit needs of small and tenant farmers and agriculturally related village enterprises.

k. Labor for Agriculture. There has been a continuing exodus of labor from farms and villages to cities and oil countries of the Middle East. The degree to which this is affecting agricultural production is difficult to assess. Shortages of male adult labor have been reported in various parts of the country, particularly in the peak labor seasons of May-July, and September-November. The wage rate has increased substantially for agricultural labor but is still less than that for workers in most other sectors.

If the current tightening of labor markets is a permanent phase of the development process in which labor is transferred from agriculture to other sectors, then a policy to induce gradual substitution of capital for labor would be appropriate. On the other hand, if the factors forcing a contraction of the hired agricultural labor supply are temporary or will be offset by additional entries into the labor markets due to the very high birthrates in rural areas, a policy of capital substitution for mechanization which is labor-displacing could generate unemployment and exacerbate the unemployment that already exists. At this time the evidence, which is far from clear, suggests a "go slow" policy of inducing selective mechanization without large labor-displacing effects would be appropriate.

l. Contribution of Women to the Human Resource Base for Agriculture. Rural women are carrying the heavy burden of family and household responsibilities without adequate nutrition, health-training or household technology. Training

in agricultural practices is directed towards and taught by men. Women are seriously limited by a pervasive lack of skills, illiteracy, lack of access to information and lack of involvement in decision-making outside the household.

More attention should be given to the needs of the rural family as a means of improving production and living conditions; such improvements would impact on health, nutrition, decisions on family size, education of the youth, management of the household and other factors which ultimately must be associated with a progressive agriculture.

4. Technology

Egypt's future in agriculture depends on a continuing stream of improved technology. Because of the relatively high levels of productivity already achieved, the technological constraints on Egyptian agriculture are greater and more sophisticated than those operating on most other developing countries. Indeed because of its unique circumstances, Egypt is perhaps more dependent upon improved agricultural technology than any other country in the world.

Accordingly, any strategy for improving the agricultural sector must give high priority to removing whatever constraints limit the effectiveness of programs concerned with the generation and application of improved technology. To be specific, developing the strongest possible programs in agricultural research and extension is absolutely essential.

It is obvious that there is much available but unused technology in Egypt which could readily be applied by Egyptian farmers. This emphasizes the need for strong and effective extension

programs.

While much improved technology is already available, it is likely that other technologies developed elsewhere and not yet evaluated in Egypt, could be adapted to Egyptian conditions. Strong programs in applied or adaptive research are needed to evaluate these technologies and to determine which might be used effectively.

Furthermore, strong agricultural research programs that go beyond adapting or applying to Egyptian conditions technology developed elsewhere are needed. Programs that push back the frontiers of knowledge in agricultural science by exploring new and more advanced means of enhancing agricultural production and marketing are also needed. Many believe that agricultural science is on the threshold of major breakthroughs which could contribute substantially to advances in such areas as improved photosynthetic efficiency and nitrogen fixation by plants, genetic improvement of plants and animals through a variety of new techniques etc.

Egypt has many well-trained agricultural scientists who can make significant contributions to such scientific endeavors. Research programs in Egypt should recognize and take advantage of such capabilities. Success in this type of endeavor could, in time, provide the basis for increased agricultural productivity substantially in excess of the short-range potentials considered in this report.

5. Marketing

The marketing of agricultural products in Egypt presents a generally bleak picture. Large quantities of food are never consumed because of spoilage and other losses. Markets and processing facilities are inefficient, and broader involvement

and more competition are needed.

The quality and quantity of produce available for consumption and export is seriously constrained by weaknesses in marketing. Lack of attention to the marketing system as production has shifted to more perishable crops such as vegetables, fruit and livestock products has resulted in the marketing infrastructure not having commensurate investment and development. As a result, quality of these products is frequently poor when they reach consumers and large losses occur.

Marketing of farm products in Egypt needs attention at all levels. It is recommended that many technological improvements be introduced, that cooperative and private sector marketing be encouraged while government involvement is reduced, and that a functional government marketing service be established. To this end a number of specific constraints along with related recommendations are addressed. These include constraints related to:

--Farm-to-market roads and transportation.
--Containers and packing.
--Lack of adequate off-loading at Egyptian ports.
--Storage and refrigeration.
--Sanitation.
--Grades and standards.
--Satellite wholesale markets.
--Facilities for preparing and handling products from animals.
--Food and vegetable processing plants.
--Difficulties of internal food distribution by the government.
--Poor performance of government export marketing organizations.
--Poor performance by food processing organizations.
--Concentration of power in the wholesaling of fresh fruits and vegetables.
--Government price policies.

--Import tariffs on equipment used in the marketing system.
--Lack of government monitoring of the marketing sector.

STRATEGIES FOR ACCELERATING AGRICULTURAL DEVELOPMEMT

We have considered in detail the problems or constraints which currently limit the further development of the agricultural sector in Egypt. We believe that a carefully conceived plan of action consistent with the recommendations set forth in this report needs to be developed by the government of Egypt to address and, to the extent possible, remove these constraints.

AREA OF EMPHASIS

While it would be difficult to establish a set of precise priorities in terms of needed government action, a few crucial areas should be emphasized:

--We believe that current government commodity price policies serve as serious disincentives to increasing agricultural output and changes must be made before there can be hope for substantial improvement. These changes must receive priority attention.
--With limited arable land and equally limited opportunities for expansion, Egypt is very dependent upon the development and application of improved technology. It is essential, therefore, that the country have strong and effective programs of agricultural research and extension aimed at serving the type of high-technology agriculture which Egypt must maintain. High priority should be given to the development and maintenance of such programs.
--Given Egypt's limited land and water resources, priority attention should be given to the management of these resources so that they will be used most effectively and efficiently. This will involve, among other things, better coordination of

efforts among the various Ministries concerned with soil and water management problems.

--In addition to addressing such specific constraints as those set forth above, the government should explore and develop more fully the agricultural enterprises concerned with producing those commodities for which Egypt enjoys a significant competitive advantage and which offer opportunities for developing or expanding export markets. We believe that Egypt's agriculturally related resources are sufficiently unique to suggest significant development opportunities in this area.

MAJOR PRODUCTION CAMPAIGNS

In terms of immediate action, and in addition to the areas of priority attention suggested above, we believe there is adequate basis to launch a series of major efforts to increase agricultural output through well-planned and executed production campaigns, suggestions for which follow.

We recommend that interdisciplinary teams in research and extension be formed to organize and carry out well-integrated programs involving "packages" of technological practices aimed at increasing productivity of principal agricultural commodities. These programs would constitute the basis for major national campaigns aimed at increasing agricultural output.

The proposed campaigns involve many of the same techniques used on a more limited scale in demonstrations carried out in the Major Cereals, Rice and ADS Horticultural Projects by the Egyptian MOA with USAID assistance. The success of these large-scale demonstrations indicates something of the potential of such efforts; these experiences should help facilitate the development of similar but larger country-wide campaigns.

In fact, we recommend that these USAID supported projects be institutionalized as part of the revitalized research and extension programs proposed herein. It is obvious that personnel associated with these projects could contribute significantly to the revitalization process.

We further recommend that USAID and other foreign donors, to the extent feasible, channel development funds towards the Egyptian government in carrying out the programs recommended herein. We also recommend that foreign assistance efforts continue to involve expatriate advisors in planning and carrying out such programs.

We believe that such campaigns carried out in conjunction with efforts to remove specific constraints limiting agricultural production could contribute significantly to diminishing the current food production/utilization gap within the country.

REDUCING THE GAP BETWEEN DOMESTIC AGRICULTURAL PRODUCTION AND UTILIZATION

The crux of the problem addressed by the Mission is the rapidly widening gap between the production and utilization of major food commodities over the last two decades. This gap translates into an expenditure of $4 billion for agricultural imports (mostly food commodities in 1981--up some 20 percent over the 1980 level). The rapidly escalating costs of agricultural imports could have significant economic consequences if something is not done to change current trends.

Two major factors contribute to the rapid increase in demand or utilization:

--the rapid increase in *per capita* utilization of food commodities;

--the high rate of population growth.

While the primary task of our Mission is to address issues related to production and to recommend actions that might over the next several years increase the slope of the production curve, we recognize that production increases alone will not narrow the gaps sufficiently to solve the problems of major food deficits.

We believe, therefore, that it is imperative that the government of Egypt initiate immediate actions aimed at reducing the rapidly growing demand for agricultural commodities, while continuing to meet the basic nutritional needs of the people. We believe both goals can be achieved.

First, the rapidly increasing rate of per capita demand or utilization of food is not within the scope of our primary concern. It is influenced, however, by a wide range of government policies which do relate to our concern and, accordingly, are briefly addressed here.

Very cheap food made possible by extensive government subsidies has undoubtedly contributed very directly to increased per capita utilization. There also have been significant indirect effects such as excessive waste made affordable by highly subsidized food commodities. We heard many reports that highly subsidized bread sold for human consumption was being fed to poultry and livestock. In addition, highly subsidized feed has encouraged the expansion of the livestock industry and the rapid increase in the use of such grains as maize. It is also alleged that low fixed prices for wheat have resulted in some farmers feeding their own wheat to livestock and buying highly subsidized wheat bread and flour for their own consumption.

A second step to reduce the rapid rate of increase in food consumption entails the establishment of effective programs of family planning to reduce the rate of population growth. It should be recognized, however, that even if such programs were initiated

immediately, there would be a substantial time lag before they would have a significant impact on reducing the rate of food demand.

Although these efforts to limit the future rate of increase in food demand could be influential, any significant reduction in the food production/utilization gap in Egypt by the year 2000 will be dependent primarily upon increases in production--the basis for which we have outlined herein.

PRIORITIES FOR INCREASING OUTPUT

We believe that the potential exists to reduce the production/utilization gap to manageable levels during the next two decades if the following efforts are given substantial endorsement policy-wise and financially:

--A major all-out effort to increase the productivity of currently available lands and farming enterprises.
--Further exploration of the potential economic returns from agricultural operations on "old new" lands and "new" desert lands, along with development and use of such lands insofar as is economically feasible.
--A concerted effort to explore fully the potential for developing significant export markets for high value horticultural crops.
--Further exploration of the potential for producing significant levels of agricultural commodities for Egyptian use in the Sudan and the development of this potential insofar as is economically feasible.

We believe the first action proposed above offers the greatest immediate potential for expanding the agricultural sector and achieving food security goals. We recommend that the Egyptian government give highest priority to efforts directed towards this objective.

The other proposals represent longer range potentials and should be pursued as resources and opportunities permit.

We conclude by expressing strong optimism concerning the future of Egyptian agriculture. Few places in the world, in our opinion, offer greater potentials. However, if these potentials are to be translated into reality, a major commitment on the part of the people and government of Egypt is essential. We fervently hope such a commitment will be made.

CHAPTER 1

AGRICULTURE IN THE EGYPTIAN ECONOMY

In the 1960's and early 1970's Egypt's agricultural sector was a major contributor to the nation's economy and the major source of foreign exchange. During this period the agricultural sector was exploited heavily in favor of other parts of the economy. In some ways the policy of extracting an economic surplus from Egyptian agriculture was successful, and during the 1960's, industry grew substantially.

Growth in the agricultural sector was slow with the exception of slight increases in output due to higher yielding varieties and to perennial irrigation made possible by the High Dam. By the 1970's, however, the relative contribution of agriculture to the national economy and to foreign exchange was declining. In 1974 Egypt became a net importer of agricultural commodities.

In the period since the October War of 1973 the economic situation in Egypt has changed dramatically. Petroleum exports, remittances from Egyptians working abroad, tolls from the Suez Canal, and tourism have become the major sources of foreign exchange. In 1975, Egypt was able to reopen the Suez Canal and once again collect tolls in foreign currency.

In the same year the first Sinai oil fields were returned to Egypt enabling the export of petroleum at high world prices. Subsequent return of the remaining oil fields four years later and increased production in the Gulf of Suez, coupled with steadily increasing oil prices, further enhanced Egypt's export position. Furthermore, in 1974-75, the Egyptian government significantly

altered its policy on migration to the Middle East oil-producing countries. As a consequence of new minimal restrictions, remittance income from workers abroad has contributed substantially to foreign exchange (Table 1.1).

This increase in foreign exchange earning engendered substantial economic growth with the consequence that, while real annual growth in the early 1970's averaged only 4 percent, since 1975 real growth has, in most years, been between 8 and 10 percent. Despite the fact that the current rate of population growth is approximately 3 percent per year, real GNP per capita income grew 5.3 percent per year from 1970 to 1980 and reached approximately $580 in 1980.[1]

Increased foreign exchange earnings along with increased activity in the private sector have allowed rapid growth in fixed capital formation, estimated by the Ministry of Planning to be about 30 percent per year. This investment has been largely concentrated in industry, mining, petroleum, transportation and communications. The agricultural sector by comparison has received little investment during the past decade (Table 1.2).

The allocation of investment has been partly responsible for sectoral performance in the Egyptian economy. Compared to other sectors, agriculture has shown the slowest growth with average increases of about 2½ percent per year between 1975 and 1980; services, in contrast, grew by an average of mor than 8 percent per year and petroleum by 30 percent per year (Table 1.3). By 1980 the services sector surpassed the agricultural sector as the major contributor to the gross domestic product (GDP) (Table 1.4). This sector, which includes housing, public utilities, tourism, and other services, contributed 23 percent to GDP as compared to agriculture's contribution of 21 percent.

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[1] World Bank Atlas. 1981. Washington, D.D. P. 12.

TABLE 1.1 EGYPT: BALANCE OF PAYMENTS, 1978 AND 1981

	1978	1981
	Million $U.S.	
CURRENT ACCOUNT		
MERCHANDISE TRADE	-3,151	-4,125
Exports	2,132	5,465
Petroleum	700	3,300
Cotton, Textiles, Yarn	600	700
Imports	-5,283	-9,590
Food and Agricultural	1,600	4,300
Intermediate	1,700	3,200
Capital	1,400	1,900
SERVICES	1,878	2,555
Receipts	3,446	5,430
Remittances	1,800	3,300
Suez Canal	550	1,000
Tourism	700	900
PAYMENTS	-1,568	-2,875
BALANCE ON CURRENT ACCOUNT	-1,273	-1,570
CAPITAL ACCOUNT		
LOAN REPAYMENTS	- 899	-1,345
Receipts	2,300	2,860
Donor Assistance	1,100	1,860
Other Credits & Investment	1,200	1,000
OTHER MOVEMENTS		
Short-Term Bank Facilities	- 379	- 400
BALANCE ON CAPITAL ACCOUNT	+1,022	+1,115
TOTAL BALANCE	- 251	- 455
CURRENT ACCOUNT	-1,273	-1,570
CAPITAL ACCOUNT	1,022	+1,115

Sources: Central Bank of Egypt, IMF, USAID, USDA.

TABLE 1.2 EGYPT: GROSS FIXED INVESTMENT AT CURRENT PRICES IN MILLIONS OF EGYPTIAN POUNDS (LE), 1975-79.

	1975	1976	1977	1978	1979
Commodity sectors	587.2	802.8	1,070.5	1,492.3	1,840.2
Agriculture	94.6	98.5	146.4	191.3	268.0
Industry and mining	286.8	378.7	561.0	765.0	817.2
Petroleum 1/	121.9	185.9	205.7	20.10	450.0
Electricity	53.3	59.4	109.0	202.7	229.0
Construction	30.6	80.3	48.4	132.3	76.0
Distribution sectors	399.2	398.8	473.1	728.6	952.4
Transportation, communication, and storage 2/	383.5	372.9	443.3	691.8	882.4
Trade and finance	15.7	25.9	29.8	36.8	70.0
Service sectors	295.9	269.5	329.7	443.9	609.0
Housing	176.8	127.8	125.5	136.4	142.0
Public utilities	46.1	45.0	66.2	95.6	160.0
Other services	73.0	96.7	138.0	211.9	307.0
Less expenditures for purchase of land	-17.0	-21.0	-35.0	-47.0	-56.0
Gross fixed investment	1,265.3	1,450.1	1,838.3	2,617.8	3,345.6
Public sector	1,064.4	1,153.3	1,477.2	2,178.6	2,547.0
Private sector	200.9	296.8	361.1	439.2	798.6

1/ Exploration and production by foreign and domestic companies

2/ Includes Suez Canal

Source: Ministry of Planning

TABLE 1.3 EGYPT: REAL GROSS DOMESTIC PRODUCT GROWTH (% CHANGE FROM PREVIOUS YEAR) BY SECTOR,[1] 1970-81.

SECTOR	1975/76	1976/77	1977/78	1978/79	1979/80
Agriculture	1	-2	5	3	2
Industry/Mining	6	6	5	10	4
Petroleum	77	32	22	10	10
Services	5	7	7	6	12
Suez Canal	264	20	17	22	9
Other	7	11	17	9	14
Total	9	6	10	8	9

[1] Based on 1975 prices.

Source: Central Agency for Public Mobilization (CAPMAS), International Monetary Fund (IMF), U.S. Department of State

TABLE 1.4 EGYPT: GROSS DOMESTIC PRODUCT BY SECTOR, 1970-81 IN MILLIONS LE, 1975 PRICES.

SECTOR	1970 1/	1975 2/	1976	1977	1978	1979	1980 3/	1981 4/
Agriculture	962.0	1,468.1	1,490.9	1,447.2	1,528.0	1,587.4	1,619.1	NA
Industry & Mining	790.2	887.6	947.9	1,012.4	1,067.8	1,179.6	1,226.9	NA
Petroleum	--	149.0	265.4	350.1	426.8	470.6	517.7	NA
Services	979.2	1,209.2	1,273.9	1,364.7	1,468.3	1,561.4	1,748.8	NA
Suez Canal	--	38.8	142.1	170.8	200.9	245.8	207.9	NA
Other	721.1	1,308.6	1,400.6	1,561.8	1,839.8	2,020.1	2,320.3	NA
Total	3,491.2	5,061.3	5,520.8	5,907.0	6,531.6	7,064.9	7,700.7	8,393.8

1/ CAPMAS - 1974 Statistical Yearbook.
2/ IMF - Recent Economic Developments, January 23, 1981.
3/ U.S. Embassy, Cairo-Economic Trends Report.
4/ IMF projected growth.

Sources: CAPMAS, IMF, U.S. Department of State

Within this sector the allocation of agricultural investment has not necessarily been optimal. Land reclamation, which receives 40 percent of the available funds, has had low returns. Other funds have been used mainly for the improvement of infrastructure, the Aswan High Dam, irrigation canals and drainage facilities. At the farm level relatively little investment in new technology has occurred. Farmers have not been encouraged to save or invest because administered price and other controls have limited the profitability of farming.

Industry, on the other hand, has received considerably greater amounts of investment funds, both direct and indirect, and has been growing rapidly. Although the degree to which the private sector has contributed to the national output has expanded since the mid-1970's, government-owned enterprises still accounted for about 75 percent of the total output in 1980. State-owned companies dominate most of the basic industries including textiles, food, chemicals, and durable products. In addition, textile and food manufacturing operations receive raw materials at low prices, a transfer from the agricultural sector. In the years since the initiation of the Open Door Policy in 1974, some liberalization in the industrial sector has occurred with one result being that individual enterprises have more control over management, imports and exports. The easing of foreign exchange constraints has been crucial to growth in this sector.

Although the bulk of Egypt's total investment is public, private investment has been increasing since 1975, up from 16 percent to nearly 25 percent of the total in 1979. Private investment has been largely in the petroleum and construction sectors, financed by foreign companies and remittance income. In the agricultural sector remittance income has been spent primarily on housing construction or consumer items, although some remittances have been used to upgrade farms, especially through the purchase of tractors.

The petroleum sector has been most dynamic in the economy. Its share of the Gross Domestic Product (GDP) has risen from 3 percent in 1975 to 7 percent in 1980. In 1981 crude oil was produced at about 34.6 million tons or 660,000 barrels per day. About 25 percent of this is exported; the rest is refined domestically, although some of this is then, in turn, exported. Domestic demand for petroleum, which is heavily subsidized, increased at a rate of 8.8 percent in the late 1970's. New reserves have been discovered in the Western Desert, and although the international price of crude oil has declined, export volume has not.

Different levels of performance within the various economic sectors have affected employment. Agriculture continues to be the largest single employer in Egypt, but it is not the fastest growing (Tables 1.5 and 1.6). The fact that the rate of growth in employment in the agricultural sector has been less than the rate of growth in rural population has resulted in migration from rural to urban areas and to other Arab oil-producing countries. In contrast, rapid growth has been experienced within the services and construction sectors.

Wages in the agricultural sector are lower than those paid in other sectors, and workers have left agriculture for better opportunities (Table 1.7). Jobs in Middle East oil-exporting countries have led to temporary migration of numerous workers both highly skilled and unskilled (Table 1.8). Remittances have stimulated the economy, especially in the construction and manufacturing sectors, leading to more employment opportunities. At present, however, there are signs of shortages of technicians, engineers, and of farm laborers during peak periods.

Considering the present situation in the world oil market, it is possible that the number of Egyptians working abroad may eventually decline. Also, the percentage of the population in the work force is

TABLE 1.5 EGYPT: NUMBERS OF WORKERS EMPLOYED BY SECTOR, 1975-80.

SECTOR	1975	1976	1977	1978	1979	1980
	Thousands					
Agriculture	4,217.9	4,067.8	4,103.0	4,140.0	4,150.0	4,160.0
Industry	1,175.1	1,200.0	1,245.2	1,280.0	1,310.0	1,370.0
Electricity	41.2	47.0	53.9	56.0	59.0	60.0
Construction	447.4	480.0	457.0	500.0	545.0	600.0
Total, Commercial Sector	5,881.6	5,794.8	5,859.7	5,976.0	6,064.0	6,190.0
Transport & Communication	404.2	414.4	444.3	460.0	480.0	495.0
Trade & Finance	966.4	1,014.2	1,050.6	1,150.0	1,230.0	1,312.0
Housing	142.9	144.0	145.1	150.0	160.0	165.0
Public Utilities	50.0	53.4	54.0	56.0	58.0	60.0
Other Services[1]	1,988.2	2,083.9	2,165.4	2,300.0	2,400.0	2,520.0
Total, Service Sector	3,551.7	3,709.9	3,859.4	4,116.0	4,328.0	4,553.0
TOTAL	9,433.3	9,504.7	9,719.1	10,092.0	10,392.0	10,742.0

[1] Includes tourist industry.

Source: CAPMAS

TABLE 1.5 EGYPT: GROWTH IN NUMBER OF WORKERS EMPLOYED BY SECTOR, 1975-76 - 1979-80.

SECTOR	1975-76	1976-77	1977-78	1978-79	1979-80
	Percent				
Agriculture	-3.6	0.9	0.9	0.2	0.2
Industry	2.1	3.8	2.8	2.3	4.6
Electricity	14.1	14.7	3.9	5.4	1.7
Construction	7.3	-4.8	9.4	9.0	10.1
Total: Commercial Sector	1.5	1.1	2.0	1.5	2.1
Transport & Communication	2.5	7.2	3.5	4.3	3.1
Trade & Finance	4.9	3.6	9.5	7.0	6.7
Housing	.8	.8	3.4	6.7	3.1
Public Utilities	6.8	1.1	3.7	3.6	3.4
Other Services[1]	4.8	3.9	6.2	4.3	5.0
Total: Service Section	4.5	4.0	6.6	5.2	5.1
TOTAL	.8	2.3	3.8	3.0	3.3

[1] Includes tourist industry.

Source: CAPMAS

TABLE 1.7 EGYPT: AVERAGE ANNUAL WAGES AND SALARIES BY SECTOR[1], 1975-1979 IN MILLIONS LE PER CAPITA.

SECTOR	1975	1976	1977	1978	1979
Agriculture	106	108	118	128	141
Industry	386	404	446	484	539
Electricity	376	379	393	441	533
Construction	302	318	336	402	456
Total: Commercial Sector	179	189	207	230	259
Transport & Communication	379	393	419	451	458
Trade & Finance	280	294	380	395	396
Housing	94	101	110	113	121
Public Utilities	268	281	294	338	371
Other Services	432	479	509	530	546
Total: Service Sector	368	401	446	466	475
TOTAL	250	272	302	326	349

[1] Total salaries paid to sector per year divided by the number of workers.

Source: Ministry of Finance as reported by IMF.

TABLE 1.8 EGYPT: ESTIMATED NUMBER OF WORKERS ABROAD IN SELECTED YEARS, 1973-81.

YEAR	LONG TERM[1]	SHORT TERM[2]
	Thousands	
1973	100	250
1975	332	500
1977	650	1,200
1979	1,000	1,850
1981	1,080	2,300

[1] Abroad 7 months or more each year.

[2] Abroad less than 7 months each year.

Source: United States Department of Agriculture (USDA) estimates, except that for "1975 long term," which was provided by the World Bank.

among the lowest in the world, estimated at only 26 percent of the total population. This is largely a result of low participation by females who make up only 5 percent of the labor force.[1] Egypt's rapid rate of population growth means that the work force will continue to grow.

Demand for Food

The large and growing demand for food and agricultural products in Egypt has been met by increasing food imports.

The demand for food is growing rapidly for a number of reasons-high rate of population growth, a shift in population from rural to urban areas, increasing incomes, and government subsidies.

The average Egyptian consumes 2800 calories and 77 grams of protein per day--levels which are considered nutritionally adequate, according to standards set by the Food and Agriculture Organization (FAO).

Aggregate consumption of all major foods has risen dramatically as a consequence of improved economic conditions during the mid-1970's and increased food aid (Table 1.9). Wheat is the primary staple in the diet of city-dwellers, and, to a growing extent, it is in the rural areas as well. Per capita consumption of wheat increased from 80 kg in 1960, to more than 170 kg in 1980. By comparison, annual per capita consumption of wheat in Algeria is 140 kg while in the United States it averages about 70 kg. In fact, Egypt's rate of wheat consumption is the highest in the world. It is estimated that more than 90% of the wheat is consumed as bread, averaging approximately 3 balady loaves (about one U.S. pound) per person each day.[2]

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[1] International Monetary Fund, Arab Republic of Egypt - Recent Economic Developments, January 23, 1981.

[2] Investments and Free Zones Authority, The Processing and Distribution of Egyptian Food Crops, Cairo, 1982.

TABLE 1.9 EGYPT: TOTAL DOMESTIC CONSUMPTION OF SPECIFIC AGRICULTURAL COMMODITIES.[1]

[000 Metric Tons (MT)]

	1973	1974	1975	1976	1977	1978	1979	1980	1981
Wheat & Wheat Flour	5019	5474	5833	5853	6041	7053	6763	7219	7816
Rice	1226	1472	1519	1330	1369	1452	1504	1463	1473
Corn	2575	2938	3199	3506	3315	3859	3431	4175	4616
Sorghum	853	875	775	759	648	681	619	643	636
Barley	97	99	118	123	111	132	122	107	102
Pulses	343	302	424	425	359	329	336	326	387
Onion	450	644	533	617	642	542	512	520	443
Potatoes	690	608	662	735	844	678	906	1013	1069
Sugar	600	620	670	790	940	1031	953	1154	1241
Cooking Oil	NA	NA	NA	294	369	385	403	395	459
Red Meat	304	306	298	320	390	461	410	448	466
Poultry	2	85	114	118	128	130	148	199	217
Butter	61	67	69	89	79	88	103	123	133

[1] Includes quantities used as animal feed.

Sources: Food and Agricultural Organization (FAO) Production and Trade Yearbooks; FAS and ERS, USDA

Maize bread is consumed in rural areas, but given the increased availability of imported wheat at subsidized prices, maize is becoming less important for human consumption. Rice, on the other hand, is becoming more important in both rural and urban diets, as it too is sold at subsidized prices. Wheat, maize and rice provide more than half the calories consumed in Egypt.

Edible fats and oils are the next most important food group in the Egyptian diet. In 1980 per capita consumption of vegetable oils was 11 kg; the growth in consumption of this commodity has been moderate in recent years.

The demand for meat has also been expanding. Although per capita consumption of both red and white meat in 1974 was only 11 kg, by 1981 it had increased to 17.5 kg. The total amount of meat consumed increased from 413,000 tons in 1974 to 660,000 in 1980. By world standards, however, these levels represent low rates of consumption. Per capita consumption of meat in the United States in 1981 was about 100 kg, in Saudi Arabia and Libya 50 kg, and in Sudan approximately 25 kg.

The demand for sugar has been growing at an annual rate of 11 percent and shows no signs of decreasing. Per capita sugar consumption reached nearly 30 kg in 1980, up from 16 kg in 1974. Sugar is consumed mainly in coffee, tea and soft drinks, as sugar cane juice, and in pastries and candies. Soft-drink processing and pastry-baking are steadily expanding.

Traditionally, pulses--broad beans and lentils--have played a major part in the Egyptian diet and have been an important source of protein. Although increasing consumption of the other staple commodities is somewhat displacing pulses, they are still important. Total supplies in 1980 were approximately 350,000 tons.

Much of the increase in food demand is due to population growth (Table 1.10). Although the rate of population growth in Egypt declined during 1966-1972, it has since increased significantly (Table 1.11). The country appears to have experienced something of a post-war baby boom. The birthrate is increasing, while the death rate is falling. Population growth, which was at 2.0 percent/year in 1972, had risen almost to 3.0 percent in 1981. Between 1970 and 1981 the population increased from 33 million to 43 million. A growth rate of 3.0 percent implies a doubling in Egypt's population in about 25 years.

Although the natural rate of increase is highest in rural areas, net growth is not. Between 1967 and 1976, the urban areas of Egypt grew at an average annual rate of 3 percent, while rural areas grew by only 1.6 percent per year (Table 1.12). Rapid urban growth has had serious implications for food demand. Residents of urban areas have a tendency to eat more processed and therefore more expensive foods, and subsidies in the urban areas have increased the demand for food.

Government policies have contributed to increasing consumption. The Egyptian government, through the Ministry of Supply, maintains a food-subsidy-and-ration system which provides foods at low cost to consumers. This system, which was oriented mainly to urban consumers, has recently been expanded to rural areas; it entails three basic programs: unlimited provision of subsidized wheat, rationing of other subsidized foods, and food/price controls.

Wheat, mainly in the form of bread, is sold to consumers in unlimited quantities at highly subsidized prices. Three types of bread are provided, with a loaf of the major type, balady, selling for only one piastre. Flour is also available in unlimited quantities at 8 to 10 piastres per kilo. Until recently subsidized wheat was available only in urban areas. In a policy shift, however, the Ministry of Supply recently began supplying rural areas with subsidized flour, greatly increasing its demand.

TABLE 1.10 EGYPT: POPULATION IN SELECTED YEARS, 1897-1981.

YEAR	POPULATION
	Thousands
1897	9,591
1907	11,136
1917	12,670
1927	14,083
1937	15,811
1947	18,806
1952	21,437
1955	22,990
1960	25,832
1965	29,389
1970	33,017
1975	37,011
1980	41,800
1981	43,012

Sources: 1897-1947, Population Census of Egypt; 1952-1979, CAPMAS; 1980, United Nations estimate.

TABLE 1.11 EGYPT: POPULATION BIRTHRATES, DEATH RATES, AND RATES OF NATURAL INCREASE, 1952-80.

YEAR	BIRTH	DEATH	NATURAL INCREASE
		Number/1000	
1952	45.2	17.8	27.4
1960	43.1	16.9	26.2
1961	44.1	15.8	28.3
1962	41.5	17.9	23.6
1963	43.0	15.5	27.5
1964	42.3	15.7	26.6
1965	41.7	14.1	27.6
1966	41.2	15.9	25.3
1967	39.2	14.2	25.0
1968	38.2	16.1	22.1
1969	37.0	14.5	22.5
1970	35.1	15.1	20.0
1971	35.1	13.2	21.9
1972	34.4	14.5	19.9
1973	35.7	13.1	22.6
1974	35.7	12.7	23.0
1975	36.0	12.1	23.9
1976	36.4	11.7	24.7
1977	38.4	11.9	26.5
1978	38.7	10.6	28.1
1979	39.0	10.7	28.3
1980	40.0	11.0	29.0

Source: CAPMAS

TABLE 1.12 EGYPT: URBAN AND RURAL DISTRIBUTION OF POPULATION, 1966 and 1976.

GOVERNORATE	1966		1976	
	URBAN	RURAL	URBAN	RURAL
Cairo	4,220	--*	5,084	--
Alexandria	1,801	--	2,319	--
Port Said	283	--	262	--
Suez	264	--	194	--
Ismailia	182	162	166	186
Behera	353	1,625	653	1,864
Damietta	115	317	143	414
Kafr-el-Sheikh	212	906	292	1,112
Gharbia	600	1,301	766	1,528
Dakahlia	470	1,815	655	2,077
Sharkia	389	1,719	530	2,091
Menufia	238	1,220	367	1,374
Kalyubia	381	830	685	989
Giza	647	1,003	1,379	1,040
Fayum	200	735	276	864
Beni-Suef	204	724	276	832
Menia	339	1,367	431	1,625
Asyut	336	1,082	470	1,225
Suhag	336	1,353	405	1,520
Qena	279	1,192	391	1,31[illegible]
Hswan	183	338	230	39[illegible]
Red Sea	38	--	48	8
New Valley	59	--	34	50
Matruh	124	--	51	62
Sinai	131	--	10	--
TOTAL	12,385	17,691	16,098	20,559

--* = not applicable.

Source: Population Census of Egypt 1966, 1976.

In addition to providing unlimited quantities of wheat and flour, the government rations tea, sugar, cooking oil and rice at subsidized prices. These four latter commodities can be purchased through private grocers in rationed amounts at subsidized prices. Additional quantities of tea and sugar can be purchased at subsidized prices in government stores in unrationed amounts. Rice and cooking oil, even in government stores, are rationed when supplies are short but can generally be found on the market at higher prices. Subsidized meat can also be purchased in rationed amounts, but only in government stores (Table 1.13). To obtain these items a family ration card is used.[1]

The Ministry of Supply also sets maximum prices for many commodities which are not rationed. Most fruits and vegetables have ceiling prices, even though they are sold for the most part by private traders. The processed products of Egypt's two public-sector food-processing companies, Edfina and Kaha, are also sold at set prices, generally below product cost. The prices of meat which is sold in private shops are also fixed.

Price subsidies and ceilings encourage greater consumption of subsidized staples and free up income for consumption of other goods. This extra income can be spent on more higly priced food, such as meats and processed items, that might not be affordable otherwise.

The food subsidy system of Egypt is expensive, amounting to LE 1.1 billion in fiscal year 1980 (Table 1.14). As the population increases, subsidy costs will also increase, even if present consumption levels do not grow.

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[1] A green card is issued to all families except those who own 10 or more feddans of land, work for foreign companies, or have an annual income of more than LE 2,000 and with the exception of public sector employees. Families not eligible for green cards can obtain a red ration card which enables them to purchase subsidized commodities, but at higher rates than those with green cards.

TABLE 1.13 EGYPT: RATIONED QUANTITIES AND PRICES OF BASIC FOOD ITEMS SOLD THROUGH GOVERNMENT FOOD STORES, 1981.

FOOD ITEM	Rationed Quantity per Month		Price[3]
	When Supplies Are Low[1]	When Supplies Are Normal[2]	
Cooking Oil: (plastic bottles)	4 kilos/family	No limit	34 Pt/kilo
Rice:			
Unbagged	5 kilos/family	No limit	4 Pt/kilo
Bagged	5 kilos/family	No limit	14 Pt/kilo
Sugar:			
Unbagged	4 kilos/family	No limit	30 Pt/kilo
Bagged	4 kilos/family	No limit	32 Pt/kilo
Cubed	4 kilos/family	No limit	35 Pt/kilo
Tea: (leaves)	No limit	No limit	12 Pt/25 grams 48 Pt/100 "
Red Meat:	(approximate)	(approximate)	
Beef	1-8 kilos/family	8 kilos/family	68 Pt/kilo
Mutton	No limit	No limit	85 Pt/kilo
Chicken:			
Domestic	1/family	1/family	86 Pt/kilo
Imported	1-2/family	3/family	105 Pt/kilo
Flour:			
Domestic	No limit	No limit	8 Pt/kilo
Imported	No limit	No limit	10 Pt/kilo
Pulses:			
Fava beans	1-4 kilos/family	4 kilos/family	12 Pt/kilo
Lentils	1-4 kilos/family	4 kilos/family	12 Pt/kilo

[1] Ration cards are used at the government food stores when supplies are low. Purchases are limited and the cards are marked.

[2] Ration cards usually are not used when supplies are adequate.

[3] 100 piastres (Pt) = 1 Egyptian Pound (L.E.) = U.S. $1.43.

Source: Entire table is from FAS, USDA, based on information from the Ministry of Supply.

TABLE 1.14 EGYPT: GOVERNMENT BUDGET FOR FOOD SUBSIDIES CY 1979, FY 1980-81 and 1981-82.*

COMMODITY	EXPENDITURE		
	1979 Budget	1980-81 Budget	1981-82 Budget
Wheat & Flour	588.2	776.0	845.5
Maize	50.4	104.0	152.7
Fava beans	12.7	19.8	33.0
Lentils	14.1	18.5	31.8
Edible oils/tallow	200.1	231.4	231.0
Meat, poultry, fish	41.5	92.2	148.2
Sugar	44.4	224.0	131.4
Tea	54.6	26.5	34.7
Rice	--	41.0	52.5
Sesame, Helava, Margarine	24.8	26.3	31.5
Administrative Costs	--	61.1	11.4
SUBTOTAL	1030.8	1620.8	1703.7
Profits	-44.5	-12.0	-14.2
Rationalization Measures	-89.7	0	0
SUBTOTAL	-134.2	-12.0	-14.2
TOTAL	896.6	1608.8	1689.5

*In 1980 the government moved from a calendar year (CY) to a fiscal year (FY) budget.

Source: Ministry of Finance

Supply of Food and Agricultural Products

The supply of food and agricultural products in Egypt has grown slowly. For food the major source of supply is domestic production, although approximately 48 percent of Egypt's staple foods--including wheat, flour, cooking oil, sugar, beans, lentils, red meat, poultry meat and dairy products--are imported. About 60 percent of the grain used as animal feed is domestically produced, and 40 percent is imported as maize.

Value-weighted agricultural output from 1970-1981 increased by 25 percent representing an average annual growth rate of 2.3 percent [1/] (Table 1.15a & b). Crop output value expanded 16 percent, while animal product value grew 42 percent. Growth in the output of crops was 1.5 percent annually, while growth in animal products was 3.8 percent. The value of crop output declined from 70 percent of total agricultural output in 1970 to 65 percent in 1981. While production of traditional field crops such as cotton, rice, wheat, and sorghum showed little growth, total output of berseem clover, maize, fruits, vegetables, and animal products was increased. These production shifts were related to government policies, farmer response to prices, consumer demand and technical constraints, among other factors.

Agricultural land area is limited mainly to the Nile Valley and Delta, with a few oases and some arable land in Sinai. The cultivated area is 5.8 million feddans (1 feddan = 1.038 acre), 3 percent of Egypt's total land area. All of the areas in crops are irrigated, except for certain rainfed localities or regions on the Mediterranean Coast. Over the last three decades land reclamation of 900 thousand feddans has been offset by land loss to urbanization of 700 thousand feddans. Land holdings are fragmented, with average operating farm units being less than 2.5 feddans in area. Land tenure is divided among owners, renters, and sharecroppers in order of magnitude. Laws restrict individual ownership to a maximum of 50 feddans and family

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[1/] USDA/ERS calculations.

TABLE 1.15a EGYPT: PRODUCTION BY COMMODITY--VALUE AND INDICES OF AGRICULTURE AND FOOD PRODUCTION, ANNUAL 1971 - 1981.

COMMODITY	Price Weight $	Average 1969-71	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
	000 Metric Tons												
Wheat	82	1,509	1,732	1,618	1,938	1,884	2,034	1,960	1,697	1,933	1,856	1,796	1,938
Rice, Paddy	67	2,614	2,507	2,274	2,242	2,242	2,424	2,300	2,272	2,351	2,510	2,384	2,236
Corn	76	2,369	2,342	2,421	2,508	2,641	1,782	3,047	2,724	3,117	2,938	3,230	3,307
Barley	74	92	76	109	97	89	118	123	111	132	122	107	103
Sorghum	66	847	854	831	843	824	775	800	648	656	635	643	653
Broad Beans	156	277	256	361	273	234	234	254	270	231	236	213	208
Lentils	232	35	50	54	62	51	39	40	24	16	9	7	5
Potatoes	52	495	451	595	796	709	720	893	1,010	772	1,019	1,214	1,210
Sweet Potatoes	31	87	84	86	60	75	75	69	68	63	104	86	86
Onions	32	525	571	519	539	550	572	652	723	599	560	568	654
Sugarcane	6	7,107	7,498	7,713	7,276	7,918	7,902	8,446	8,721	8,296	8,791	6,616	8,618
Cotton	663	520	510	514	493	441	382	396	399	438	484	520	508
Cotton Seed	66	897	886	893	851	819	652	677	690	736	792	844	800
Flaxseed	177	12	10	13	17	23	24	24	30	31	34	34	27
Soybeans	230	1	1	1	2	2	2	11	27	79	105	72	130
Peanuts in Shell	201	38	33	31	28	25	28	28	30	33	33	32	33
Sesame Seed	279	19	21	24	21	14	17	13	18	9	13	16	17
Sunflower Seed	210	16	33	18	8	11	12	14	12	7	8	9	
Cabbage	26	271	275	278	283	299	321	329	340	348	360	353	374
Tomatoes	58	1,579	1,637	1,668	1,577	1,729	2,197	2,066	1,967	198	2,421	2,571	2,453
Oranges	38	633	707	684	769	819	856	755	671	843	1,050	921	895
Tangerines	38	88	101	83	89	90	97	85	76	85	98	70	73
Lemons	29	66	70	74	83	51	59	57	46	58	64	72	60
Apples	147	29	35	36	37	35	33	33	31	32	31	27	35
Pears	99	17	15	23	21	20	21	26	30	32	50	52	55
Bananas	97	89	95	108	101	110	112	112	127	113	113	133	137
Grapes	73	108	121	142	149	221	225	279	248	274	242	299	298
Olives	56	5	6	6	6	6	6	6	5	5	5	4	5
Dates	47	330	340	396	397	396	405	410	461	377	406	446	391
Meats	1,125	318	330	335	345	360	400	410	436	436	448	472	493
Milk	120	1,621	1,651	1,688	1,721	1,759	1,790	1,748	1,780	1,801	1,830	1,865	1,902
Wool, Greasy Basis	748	3	3	3	3	3	3	3	4	4	4	4	4

Source: Index compiled by ERS, USDA. Production data from FAS, USDA and Egyptian Ministry of Agriculture.

TABLE 1.15b EGYPT: VALUE AND INDICES OF AGRICULTURAL PRODUCTION, 1971 - 1981.

AGGREGATES OF PRODUCTION	1969-71	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
	Million Dollars at Constant Prices											
Crops	1,270.0	1,296.2	1,314.4	1,307.5	1,272.8	1,287.9	1,323.7	1,274.7	1,360.4	1,428.9	1,474.8	1,473.9
Livestock	554.9	571.6	581.7	596.8	618.3	667.0	673.3	707.1	709.6	726.6	732.5	786.2
Total Agriculture	1,824.9	1,867.8	1,896.1	1,904.3	1,891.1	1,954.9	1,997.0	1,981.8	2,070.0	2,155.5	2,204.7	2,260.1
Total Food	1,475.7	1,525.7	1,550.8	1,572.2	1,592.2	1,728.1	1,209.0	1,771.1	1,771.1	1,825.2	1,834.7	1,915.2
INDICES OF PRODUCTION	(1969 - 1971 = 100)											
Crops	100	102	103	103	100	101	104	100	107	113	117	116
Total Agriculture	100	102	104	104	104	107	109	109	113	118	122	125
Total Food	100	103	105	107	108	115	117	116	120	124	126	130
Per Capita Agriculture	100	100	99	98	95	96	96	93	95	96	96	94
Per Capita Food	100	101	100	100	99	103	102	99	100	101	99	98
Index of Population 1969-71 Population = 33,302,000	100.0	102.3	104.6	107.0	109.4	111.8	114.3	116.9	119.7	122.9	126.9	130.3

Source: Index compiled by ERS, USDA. Production data from FAS, USDA and Egyptian Ministry of Agriculture.

ownership to 100 feddans. The size of holdings may exceed these limits if they belong to the public sector, cooperatives, or joint ventures.

The growing season extends year-round. Perennial irrigation made possible by the High Dam permits three crop seasons: winter (November-May), summer (May-August), and Nili (August-October). The Ministry of Agriculture prepares an annual cropping pattern which estimates the amount of land to be cultivated in each major crop by season (Table 1.16 and Figure 1.1). Major winter crops are berseem clover, wheat, broad beans and vegetables. Summer crops are rice, cotton, maize and vegetables. Orchards and sugarcane are year-round crops. A notable change in the cropping pattern over the last 3 decades reflects both the increase in acreage planted to clover, vegetables, orchards, rice and sugarcane, as well as the decline in area alloted to cotton, wheat and pulses.

The major area allocations in order of importance are to berseem clover, maize, wheat, cotton and rice. There are various rotation systems of two to five years.[1]

The Ministry of Agriculture oversees farm production and influences farm output through crop quotas, fixed crop rotations, input allocations and technical assistance. Government intervention in agriculture has been characterized by mixed goals which have included earning a surplus from the farm sector through low producer prices, acquiring cheap food for urban distribution, insuring production of profitable export crops, protecting farmers against world price fluctuations, encouraging economies of scale, and encouraging adoption of new technologies.

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[1] A 3 year rotation system is common, with winter berseem or a legume preceding summer cotton in the first year. Winter berseem is cultivated before summer rice or maize in the second year. Winter wheat precedes summer maize or rice in Egypt. Sorghum is substituted for maize in Upper Egypt. Barley is substituted for wheat along the Mediterranean coast.

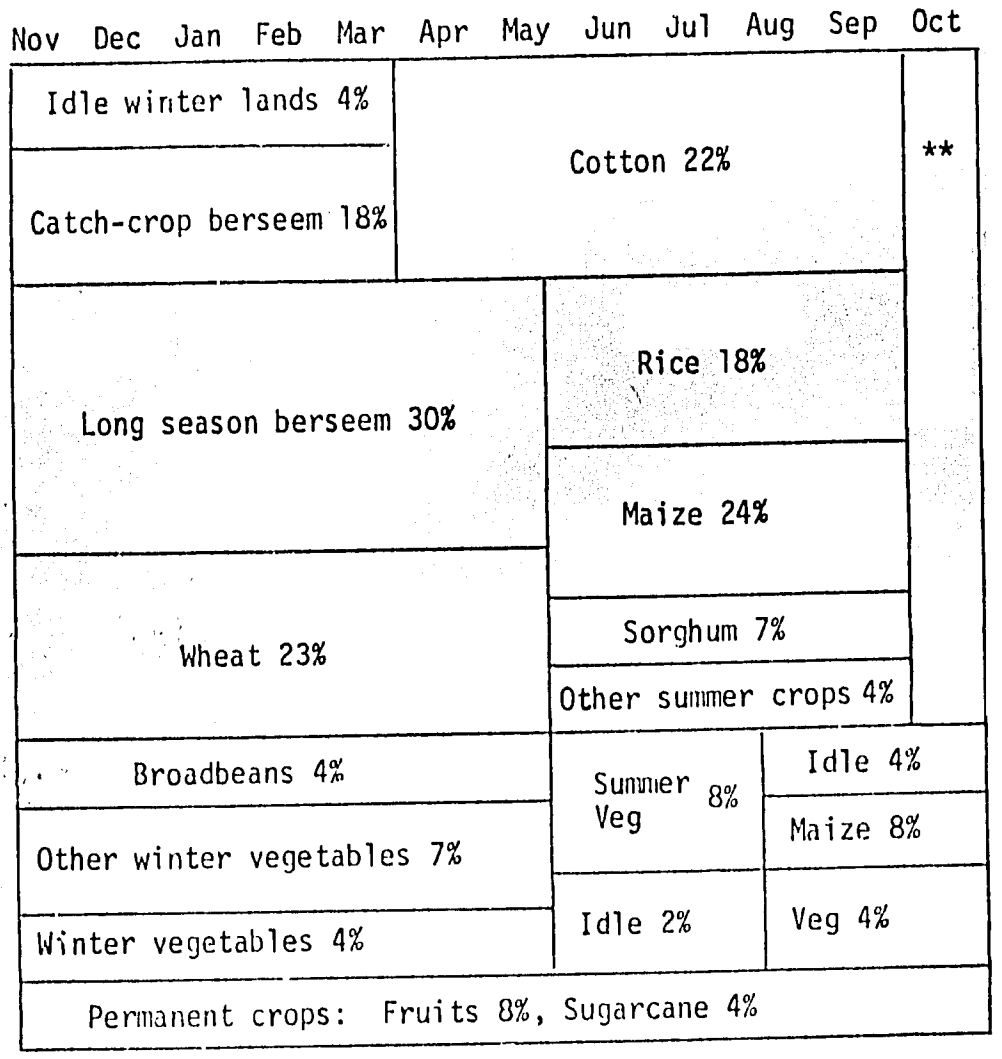
TABLE 1.16 EGYPT: PLANNED CROPPING PATTERNS,[1] 1979-1982 (000 FEDDANS*).

	1979	1980	1981	1982
WINTER CROPS				
Wheat	1,391	1,326	1,399	1,400
Full Term Clover	1,746	1,722	1,756	1,790
Catch Crop Clover	(1,031)	(721)	(750)	(750)
Beans	288	276	288	300
Barley	107	96	91	88
Lentils	22	15	12	10
Fenugreek	31	29	24	15
Chickpeas	15	17	19	15
Lupines	7	11	19	5
Flax	69	68	52	52
Onion	21	28	34	38
Vegetables (winter)	260	272	278	280
Other	75	74	45	49
SUMMER CROPS				
Cotton	1,196	1,245	1,178	1,100
Rice	1,040	972	955	1,150
Maize	1,413	1,433	1,434	1,400
Sorghum	394	398	400	385
Soybeans	104	83	109	150
Sesame	37	39	40	40
Groundnut	31	28	28	33
Vegetables (summer)	505	502	503	475
Other	132	130	80	37
YEAR-ROUND CROPS				
Orchards	340	360	395	350
Sugar Cane	248	254	253	265
TOTAL CROP AREA	5,816	5,865	5,884	5,800

[1] The cropping pattern is drawn up by the Ministry of Agriculture prior to the crop year and represents the expected land allocation for the coming year.

* = 1.038 acres.

Source: Ministry of Agriculture



** Represents lands which are temporarily idle between summer crops, e.g. cotton and rice, and winter crops, e.g. berseem.

Source: Nabil Habashy and James Fitch, "Egypt's Agricultural Cropping Pattern," Micro-Economic Study Unit, Ministry of Agriculture, Arab Republic of Egypt

FIGURE 1.1 CROPPING PATTERN IN 1977-1979.

In accordance with this policy mix, certain crops in Egypt are highly regulated, some loosely regulated, and others not controlled at all. The local institutions which implement farm policy controls are the village bank and the village cooperative.

The village bank, operated by the Principal Bank for Development and Agricultural Credit, provides credit to farmers; sells seeds, fertilizer, insecticides and machinery; rents out farm equipment; and purchases crops from farmers. The village cooperative, operated by the Ministry of Agriculture, supervises farmer compliance with rotation schedules, contracts for the spraying of pesticides on cotton, procures regulated crops from farmers, stores crops, and provides some commodities to state processing organizations.

Farmers are issued crop rotation cards which specify the growing season and area to be planted to basic field crops. In addition, the area planted to tree fruits is recorded. Farmers are expected to follow their schedule of cultivating crops and risk being fined if they do otherwise. Inputs are received on credit from the village bank, which maintains an account for each family farm unit. Since farmers must submit specified levels of their production to the government through the village cooperative, inputs are advances against the anticipated value of output to be delivered. In this way the bank insures that its loan will be paid, and the government is able to enforce crop quota policies.

Input prices are subsidized by the government. Irrigation water is delivered without charge. Diesel fuel is currently subsidized at about 40 percent of international prices. Fertilizer, cotton pesticides, feed concentrates, rentals and purchases of machinery, certified seed and credit are all subsidized. Since input allocations to farmers by the village bank are sometimes limited in quantity, a private market exists as well to supply such inputs as fertilizers and pesticides.

Government control over farmer output varies by crop. All cotton must be sold to the village bank which represents the State Cotton Organization, while wheat can be sold either to the government or on the private market. About 50 percent of the farmer's rice output must be sold to the cooperative while maize is sold only on the free market. Sugar producers dispose of their output through contracts with state sugar manufacturing companies. Quotas for other crops--onions, broad beans, sesame and groundnuts--may change annually.

The government maintains fixed producer prices for a number of crops. These prices are low relative both to internal Egyptian market prices and to international prices. There are fixed farm prices for all the major agricultural commodities, except maize, berseem, barley, sorghum, flaxseed, vegetables, fruits, meat and poultry.

No private market exists for cotton. For other regulated crops such as rice, wheat, broad beans, lentils, soybeans, onions, sesame etc., there are both a fixed producer price and a market producer price. Since only a portion of these crops must be delivered to the government, the remainder can be sold on the village market. The Ministry of Agriculture keeps records of "farmgate prices"--which are an average of the fixed price and the market price of commodities. Market prices (and farmgate prices) are generally higher than fixed prices (Table 1.17). Recent exceptions have been market prices of onions and wheat which in 1981 fell below fixed prices.

Given Egypt's distorted input and output prices, determining the net effect of intervention on the farm sector with any precision has been difficult. In the literature it has been stated fairly consistently that in recent years the heaviest taxation has been on those crops for which there are area or quota controls and fixed prices.[1] Cotton has

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[1] Khalid Ikram, Economic Management in a Period of Transition, World Bank, 1980, pp. 208-209.

TABLE 1.17 EGYPT: FIXED AND FARMGATE PRODUCER PRICES, 1980-81.

COMMODITY	1980			1981		
	FIXED LE/MT	FARMGATE LE/MT	DIFFERENCE %	FIXED LE/MT	FARMGATE LE/MT	DIFFERENCE %
Paddy rice	75.00	81.20	8	85.00	NA	NA
Sugarcane	13.00	15.27	17	16.00	NA	NA
Onions	50.00	42.07	-16	52.00	47.23	-9
Fava beans	161.30	199.10	23	225.81	234.71	4
Lentils	250.00	295.63	18	375.00	421.06	12
Soybeans	210.00	207.00	-1	230.00	NA	NA
Groundnuts	266.66	316.27	19	333.33	NA	NA
Sesame	541.66	604.00	12	625.00	NA	NA
Wheat, local variety	76.70	88.00	15	76.70	NA	NA

Source: FAS, USDA Ministry of Agriculture.

been most heavily taxed, while wheat and other crops have been taxed to a much lesser extent. Crops without acreage control, such as fruits and vegetables, have been effectively subsidized, since farmers have benefited from low cost inputs, including irrigation water.

Meat production has been encouraged through subsidization of feed concentrates; output of forages such as berseem and wheat straw has been encouraged as a result.

Because of distortions resulting from price regulations, farmers have often preferred to cultivate less-regulated crops, such as vegetables, fruit, and berseem. Farmers have diverted fertilizers and cut back on compulsory plantings of controlled crops. Cutbacks have been made despite the risk of fines, but apparently some farmers believe the extra profits are worth the risk.

During the last decade strong gains in output were made for less-regulated products including berseem, maize, vegetables, fruits, red meat, chicken, milk, and eggs. The output of strictly controlled crops, i.e. rice and cotton, generally declined, although cotton rebounded in 1980. Wheat, which was decontrolled in 1977, showed slight gains. The output of soybeans, with prices fixed at high levels, has advanced significantly.

Cotton acreage has declined due in part to farmer avoidance as well as to the fact that the government has not strongly encouraged larger cotton plantings. Large government cotton stocks have been accumulating as a consequence of export marketing bottlenecks and increased competition in the world market for long-staple cotton.

Egypt's feed situation has been one of short supply. Because livestock production is uncontrolled and provides high returns, forages like berseem, maize, and wheat straw have been lucrative. As a result, feed crops have occupied a growing portion of the cropped area while

production of foodgrains has declined. Farmers have not adopted high-yielding Mexican varieties of wheat because they provide less straw than traditional varieties, and with current price policy, straw is more valuable than the grain.

Certain agronomic factors have also influenced output. Poor on-farm water management practices result not only in water-logging and soil salinity but also in reduced yields. In Upper Egypt the production of such crops as sorghum, sugarcane, and legumes has been hampered severely by over-irrigation.

Trade in Agricultural Commodities

Egypt has become increasingly reliant upon imports to meet its food demand and on foreign assistance to finance them. The total value of Egypt's food and agricultural imports in 1981 was approximately $4 billion, compared to $3.4 billion in 1980.

Import dependence became significant in 1974 when the value of agricultural imports exceeded exports for the first time. Food imports rose quickly, and by 1981 Egypt was importing 48 percent of its staple food commodities. Major imports are wheat, flour, maize, sugar, vegetable oil, broad beans, lentils, red meat, and poultry meat (Table 1.18).

Having grown steadily in the last decade, wheat and flour imports amounted to 5.88 million tons (grain equivalent) in 1981 (Table 1.19). Imports accounted for 75 percent of the country's total wheat supply. As a consequence, Egypt has become the world's third largest importer of wheat and flour following the USSR and China.

Vegetable oil imports also have contributed heavily to overall supply. In 1981 oil imports were 313,000 tons, accounting for 68 percent of supply (Table 1.20). Sugar imports have been expanding rapidly and totalled 583,000 tons in 1981--47 percent of supply.

TABLE 1.18 EGYPT: PRODUCTION, IMPORTATION AND CONSUMPTION OF STAPLE FOODS 1977-1981.

COMMODITY	YEAR	PRODUCTION (1,000 MT)	IMPORTATION (1,000 MT)	CONSUMPTION[1] (1,000 MT)	PERCENT IMPORTED
WHEAT & FLOUR: (Grain Equivalent)	1977	1,697	4,344	6.041	72
	1978	1,933	5,119	7.052	73
	1979	1,856	4,906	6,762	73
	1980	1,796	5,423	7,319	75
	1981	1,938	5,878	7,816	75
VEGETABLE OIL	1977	91[4]	278	369	75
	1978	104 "	281	385	73
	1979	117 "	286	403	71
	1980	133 "	262	395	66
	1981	146 "	313	459	68
SUGAR[5]	1977	662	278	940	30
	1978	635	396	1,031	38
	1979	668	285	953	30
	1980	662	492	1,154	43
	1981	658	583	1,241	47
BEANS: (Fava and Dried)	1977	270	23	293	8
	1978	231	32	263	12
	1979	236	26	262	10
	1980	213	37	250	15
	1981	208	92	300	31
LENTILS:	1977	24	42	66	64
	1978	16	50	66	76
	1979	9	65	74	88
	1980	7	69	76	91
	1981	5	82	87	94
RED MEAT:	1977	315	75	390	19
	1978	321	140	461	30
	1979	328	82	410	20
	1980	336	112	448	25
	1981	343	123	466	26
POULTRY MEAT:[6]	1977	121	7	128	5
	1978	115	15	130	12
	1979	120	28	148	19
	1980	123	76	199	38
	1981	150	84	217[7]	39
CORN:	1977	2,724	197[3]	2,921	7
	1978	3,117	288 "	3,405	8
	1979	2,938	118 "	3,056	4
	1980	3,231	236 "	3,467	7
	1981	3,232	230 "	3,462	7

Continued on following page.

TABLE 1.18 CONTINUED.

COMMODITY	YEAR	PRODUCTION (1,000 MT)	IMPORTATION (1,000 MT)	CONSUMPTION[1] (1,000 MT)	PERCENT IMPORTED
RICE; Milled	1977	1,522	(153)[2]	1,369	--
	1978	1,575	(123) "	1,452	--
	1979	1,682	(178) "	1,504	--
	1980	1,597	(134) "	1,463	--
	1981	1,498	(25) "	1,473	--
TOTAL:	1977	7,426	5,244	12,517	42
	1978	8.047	6,321	14,245	44
	1979	7,954	5,796	13,572	43
	1980	8.098	6,707	14,671	46
	1981	8,178	7,385	15,521	48
AVERAGE	1977-1981	7,941	6,291	14,105	45

1/ Stocks not included, except as noted.

2/ Rice exports, data from the El Wadi Export Company.

3/ Consumed as food.

4/ Agricultural Counselor, FAS estimate.

5/ Sugar of 96 polarity. Production data from the Sugar Company.

6/ Includes a small amount of rabbit meat.

7/ Unusually large ending stocks of 27,000 MT of frozen chicken were taken out and estimated beginning stocks of 10,000 were added to the consumption.

Source: FAS, USDA: Production Data from Ministry of Agriculture and Imports from the General Authority for Supply Commodities.

TABLE 1.19 EGYPT: VOLUME AND VALUE OF WHEAT, FLOUR AND CORN IMPORTS, 1973-81.

YEAR	WHEAT	WHEAT FLOUR	CORN	WHEAT	WHEAT FLOUR	CORN
	Metric Tons			Thousands $ U.S.		
1973	2,865,000	226,987	67,025	266,500	26,670	6,288
1974	3,132,000	257,732	388,386	540,490	67,621	62,077
1975	3,067,000	521,400	417,552	544,445	118,877	69,333
1976	3,332,000	404,049	458,856	459,534	93,001	78,825
1977	3,346,323	718,630	590,860	437,427	126,162	76,706
1978	3,758,740	979,613	730,132	521,100	195,000	86,805
1979	3,608,596	934,465	493,879	585,000	215,000	44,825
1980	4,416,945	724,377	984,188	958,000	196,000	172,000
1981	4,500,000	1,481,000	1,343,762	1,072,000	309,000	230,000

Source: FAS and IED, USDA

TABLE 1.20 EGYPT: VOLUME AND VALUE OF VEGETABLE OIL IMPORTS, 1973-81.

YEAR	COTTON-SEED OIL	SOYBEAN OIL	SUN-FLOWER OIL	PALM OIL	OTHER OIL	TOTAL	COTTON-SEED OIL	SOYBEAN OIL	SUN-FLOWER OIL	PALM OIL	OTHER OIL	TOTAL
	Metric tons						Thousands $ U.S.					
1973	73,077	3,834	3,800	1,659	1,037	83,407	26,600	1,600	1,500	487	600	30,787
1974	60,076	22,024	36,200	3,488	9,008	130,796	25,896	19,936	29,000	2,253	5,796	82,881
1975	279,623	39,988	4,000	4,443	9,589	337,643	245,655	39,562	3,200	4,000	17,420	409,837
1976	140,000	40,000	41,000	5,000	10,330	236,330	67,857	20,560	25,625	3,000	8,156	127,198
1977	196,000	47,000	34,000	6,000	10,322	293,332	126,808	31,255	23,120	3,000	8,420	202,603
1978	209,650	36,295	43,500	7,000	11,191	307,636	163,946	30,319	31,244	5,000	9,341	239,850
1979	167,000	23,650	94,900	8,000	8,000	301,550	105,544	17,477	77,438	6,000	27,000	233,459
1980	217,500	37,000	45,000	4,900	6,100	313,500	143,332	25,937	31,815	5,000	9,150	215,234
1981	95,000	80,000	70,000	5,000	15,000	265,000	70,585	52,000	49,490	5,000	16,000	193,075

Source: FAS and IED, USDA

Imports of pulses have increased steadily, with 94 percent of the country's lentil supply and 31 percent of the broad beans now being imported.

Imports of poultry have shown significant growth, reaching 84,000 tons in 1981--about 39 percent of supply. Likewise, red meat imports have expanded and were 123,000 tons in 1981, representing 26 percent of the total red meat available.

Rice is the only major staple food in which Egypt is self-sufficient. However, the amount of rice available for export is rapidly dwindling, and Egypt may soon become a net rice importer. In 1981 the government imported about 1.2 million tons of maize--30 percent of supply. Of this, about 1 million tons were purchased for feed concentrate mills. The remaining 230,000 tons were distributed for human consumption.

Egypt has also imported substantial quantities of European dairy products--butter, oil, dry milk, and cheese (Table 1.21).

Government policies regarding food imports are closely linked to the food subsidy system. Staple food items are imported by the government through the General Authority for Supply Commodities (GASC), a semi-autonomous organization within the Ministry of Supply. The GASC is the sole importer of commodities entering the subsidy system.

The government benefits considerably from concessional financing of food imports. In 1981 the following credit arrangements were provided on wheat and flour. Egypt purchased 930,000 tons of wheat flour and 91,000 tons of wheat from France with a 10 percent down payment for a two-year credit period at 10.5 percent interest.

Under the U.S. Public Law 480 program, the Egyptian government purchased 994,000 tons of wheat and 384,000 tons of flour in 1981. The down payment was five percent, with a ten-year grace period,

TABLE 1.21 EGYPT: VOLUME AND VALUE OF DAIRY PRODUCT IMPORTS, 1973-81.

YEAR	MILK	BUTTER	CHEESE	EGGS	MILK	BUTTER	CHEESE	EGGS
	Metric tons				1,000 dollars			
1973	2,456	12	733	0	2,676	24	689	0
1974	4,868	4,088	1,480	0	4,941	3,587	1,530	0
1975	13,681	2,097	3,382	0	17,174	2,773	4,787	0
1976	11,152	23,564	8,857	0	10,059	31,936	13,257	0
1977	17,858	14,224	6,345	7	24,636	26,716	15,409	2
1978	38,726	22,174	12,207	91	33,791	65,912	29,869	181
1979	27,800	35,649	15,067	1,092	38,500	75,325	19,320	1,291
1980	32,000	55,207	14,146	3,500	42,000	60,018	25,189	4,500
1981	40,000	64,000	18,000	6,000	55,000	90,000	35,000	8,000

Source: FAS and IED, USDA

followed by a thirty-year repayment period at an interest rate of 3 percent. The government also bought 1.6 million tons of wheat under a three-year agreement with Australia, giving a down payment of 10 percent with two years to pay at 14 percent.

Egypt also has benefited from the U.S. Commodity Import Program, which provided grants and concessional loans totalling $300 million in 1981 (repayable over 40 years with a ten-year grace period). Of this allocation, $158 million was used by the Egyptian government to import corn, frozen chickens, lentils, vegetable oils, tallow, tobacco and fish meal. Egypt also purchased frozen chicken, frozen meat, dairy products, vegetable oil, and sugar from France on a two-year credit period with 20 percent down at 10.5 percent interest. From the European community (EC) Egypt buys dairy products which are low priced because of EC export restitutions.

While the volume of Egypt's agricultural imports is growing (Table 1.22a), the value of agricultural exports is falling (Table 1.22b). The volume of the three most lucrative exports--cotton, rice and oranges--declined over the last decade, due primarily to rising domestic consumption and export marketing bottlenecks.

Sales of cotton, traditionally Egypt's most important farm export, declined from 285,000 tons in 1973 to 150,000 tons in 1981. Rice exports fell from 298,000 tons in 1973 to 25,000 tons in 1981. Orange exports dropped from 248,000 tons in 1973 to 130,000 tons in 1981. In 1981 revenues from these three items were $645 million compared to a high of $797 million in 1974.

The volume of onion and potato exports has fluctuated and has not followed the downward trend of the primary exports. Revenue earnings from these two items combined were greater than $49 million in 1981, which can be compared to a high of $84 million generated in 1976. Exports of primary commodities are made almost entirely by state trading

TABLE 1.22a EGYPT: VOLUME OF AGRICULTURAL EXPORTS, 1973-81.

YEAR	COTTON	RICE	ORANGES	OTHER CITRUS	ONIONS	POTATOES
	Metric tons					
1973	284,780	297,804	247,959	276	89,422	107,921
1974	232,240	136,257	162,491	97	103,857	99,838
1975	185,100	104,310	210,317	97	70,042	47,565
1976	165,176	211,039	169,670	608	66,140	157,733
1977	143,900	222,997	170,603	649	80,870	166,100
1978	132,950	145,140	133,050	285	57,399	94,338
1979	146,884	94,878	82,954	491	23,928	113,072
1980	147,655	98,072	109,513	519	48,340	143,860
1981	150,000	25,000	130,000	1,000	82,567	144,000

Source: FAS and IED, USDA

TABLE 1.22b EGYPT: VALUE OF AGRICULTURAL EXPORTS, 1973-81.

YEAR	COTTON	RICE	ORANGES	OTHER CITRUS	ONIONS	POTATOES	TOTAL
	1,000 dollars						
1973	483,564	65,803	39,941	51	23,318	16,696	629,327
1974	648,048	92,127	25,880	19	17,598	13,674	797,346
1975	513,840	62,548	47,636	21	17,809	8,220	650,074
1976	395,546	79,157	48,582	204	40,499	43,863	607,851
1977	465,880	59,754	54,841	266	18,531	41,930	641,202
1978	336,172	50,818	53,144	176	12,980	14,783	468,073
1979	381,824	31,540	22,351	168	4,720	26,880	467,483
1980	423,413	35,223	28,940	157	20,096	32,501	550,330
1981	517,000	10,750	67,600	570	27,200	21,600	644,720

Source: FAS and IED, USDA

companies. Egypt's total earnings from agricultural exports in 1981 were approximately $700 million, while total agricultural imports cost $4 billion (Table 1.23).

TABLE 1.23 EGYPT: VALUE OF AGRICULTURAL IMPORTS AND EXPORTS, 1970-81.

YEAR	IMPORTS	EXPORTS
	Thousands $ U. S.	
1970	209,610	521,370
1971	309,640	557,500
1972	283,590	512,120
1973	427,429	717,150
1974	1,005,720	892,620
1975	1,497,432	782,090
1976	1,358,949	733,610
1977	1,670,858	822,820
1978	2,193,227	663,780
1979	,565,000	610,110
1980	3,363,000	672,780
1981	4,000,000	700,000

Source: FAO Trade Yearbooks, United Nations Trade Data, CAPMAS, USDA Estimates.

CHAPTER 2

AGRICULTURAL DEVELOPMENT POTENTIALS

Before considering strategies for accelerating agricultural development in Egypt, the opportunities or potentials which might facilitate such development should be examined. These include:

- --the potential demand (domestic and export) at adequate[1] price levels for increased agricultural output.
- --the potential for increasing unit productivity of existing crop lands and livestock enterprises (vertical expansion).
- --the potential for bringing additional lands into production and expanding existing livestock enterprises (horizontal expansion).
- --the potential for developing agriculturally-related businesses and industries which would provide inputs as well as accomodate the marketing, processing, storage and transportation needs of a rapidly developing agricultural sector.

POTENTIAL DEMAND FOR AGRICULTURAL PRODUCTS

The principal requirement for growth in any economic sector is sufficient demand for the sector's products at adequate[1] price levels. In the case of the agricultural sector in Egypt, overwhelming evidence indicates a strong domestic demand, while likewise valid indicators point to potentially strong international demands.

INCREASING DEPENDENCE ON IMPORTS

Prior to 1974, the value of Egyptian agricultural exports was substantially greater than the cost of agricultural imports. Since

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[1] "Adequate" in terms of being high enough to provide sufficient incentive to the farmer to encourage production.

that time, however, the value of agricultural exports has remained essentially constant while the cost of importing agricultural commodities has increased almost ten-fold. In 1981 Egypt imported agricultural commodities valued at $4 billion while exporting only $700 million of such commodities (Table 1.23).

The extent to which Egypt has become increasingly dependent upon imports of major agricultural commodities, especially since 1974, is shown in Figures 2.1 and 2.2.

INCREASING PER CAPITA DEMAND

It is readily apparent (Figure 2.3) that as a result of rising consumer income, substantial governmental subsidies, and perhaps other factors, per capita utilization of most basic food commodities has increased rapidly, particularly since 1974.

The data in Figures 2.4 and 2.5 show per capita production and utilization of many important food commodities from 1960 to 1980. These charts, except for rice, reflect rather dramatically the widening gap between production and utilization, especially since 1974.

RAPID POPULATION GROWTH

In addition to the rapid rise in per capita consumption of food, the demand for agricultural commodities in Egypt is further exacerbated by rapid population growth. Figure 2.6 depicts the relatively steep slope of the population growth curve and emphasized the likelihood that a rapidly increasing population will contribute substantially to increased food demands during the next two decades. In fact, if present rates of population growth continue unabated, Egypt will have approximately 70 million people to feed by 2,000 A.D.

In view of (1) Egypt's current food deficit in terms of domestic production, (2) rapidly increasing per capita consumption of food and (3) the rapid increase in the number of consumers of food, the question

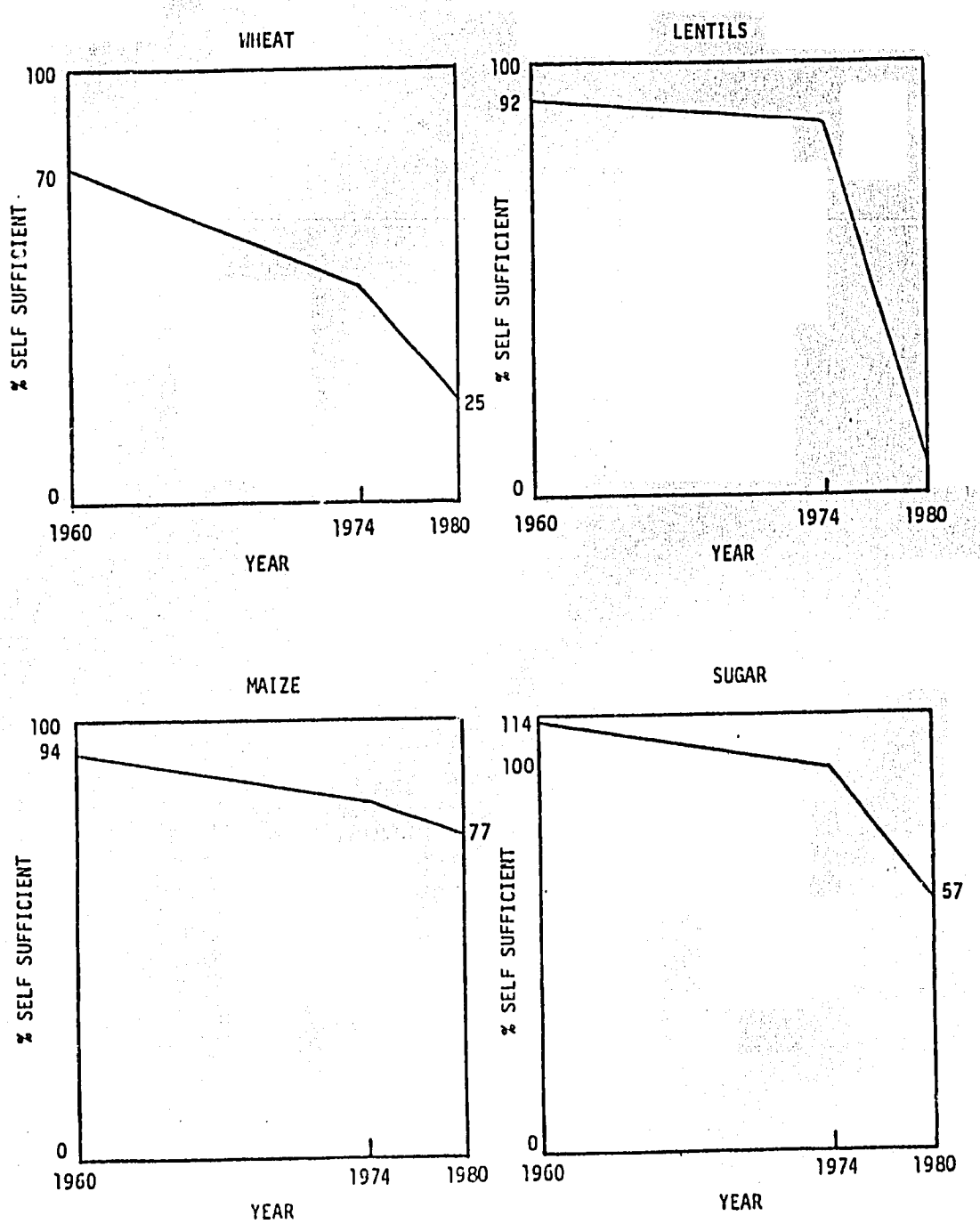

FIGURE 2.1 PERCENT SELF SUFFICIENCY - 1960-1980.

Source: Wally, Youssef. "Strategies for Agricultural Development in the Eighties." 1982.

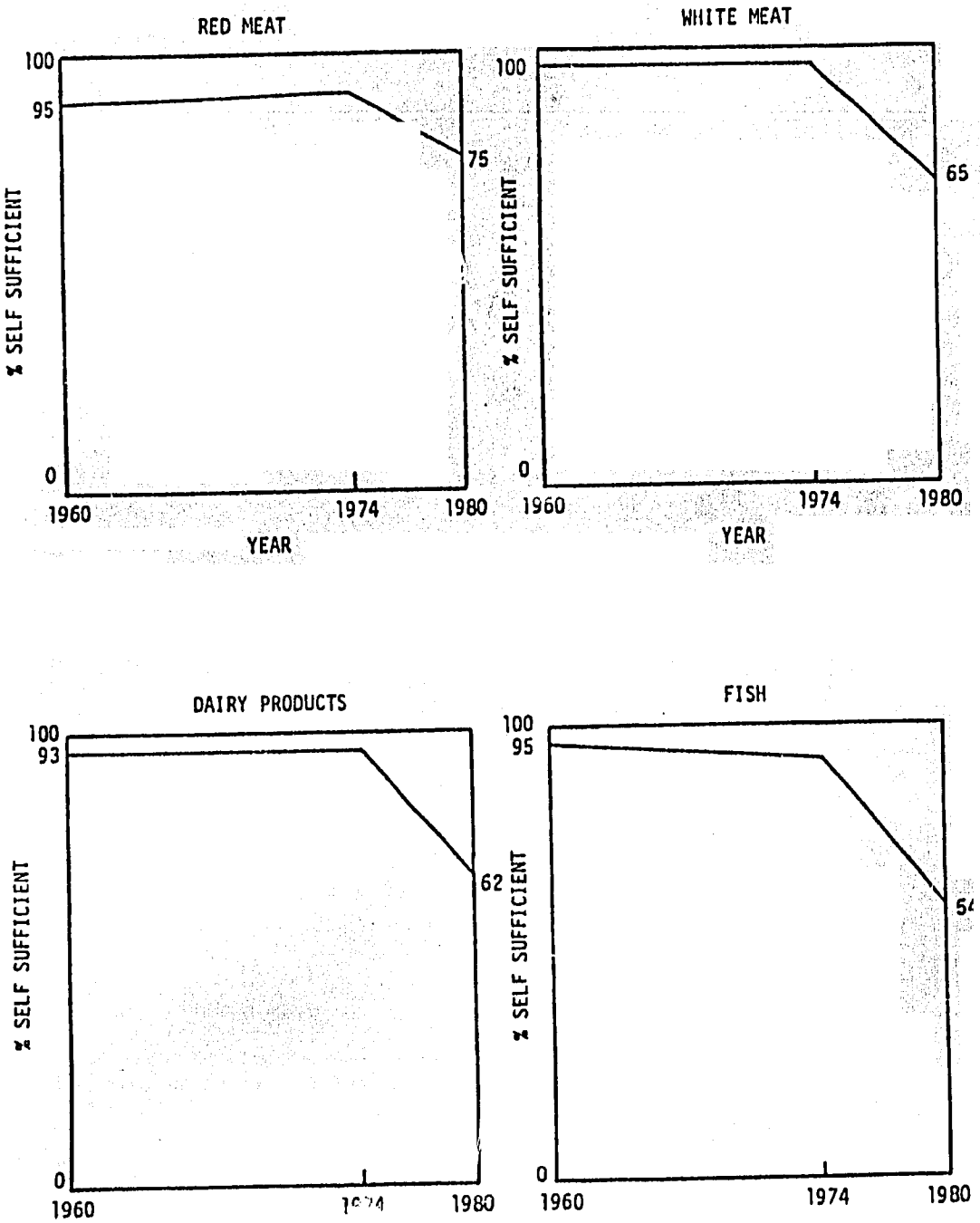

FIGURE 2.2 PERCENT SELF S[illegible]CY - 1960-1980.

Source: Wally. Ibid.

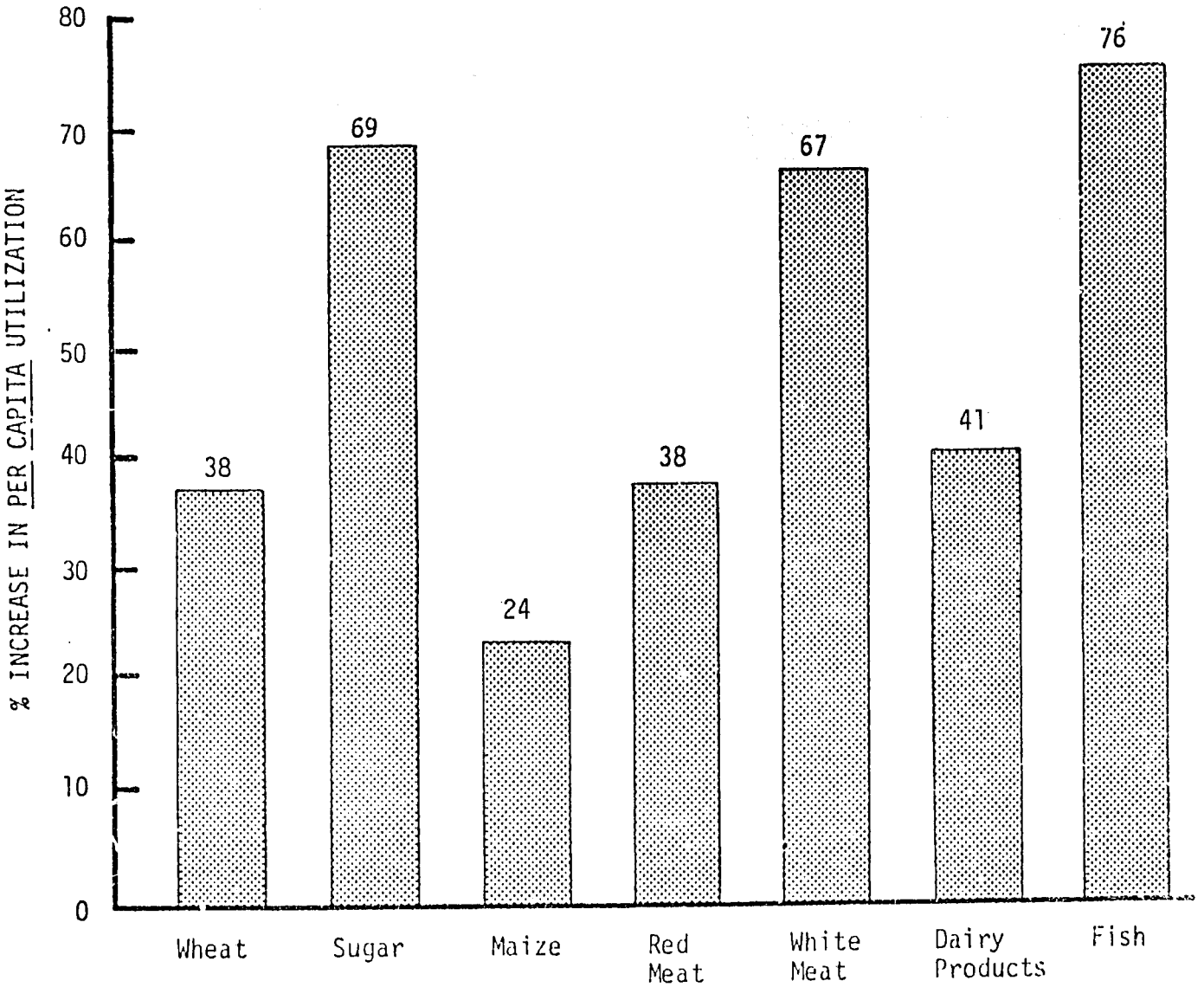

FIGURE 2.3 PERCENT INCREASE IN PER CAPITA UTILIZATION, 1974-1980.

Source: Wally. Ibid.

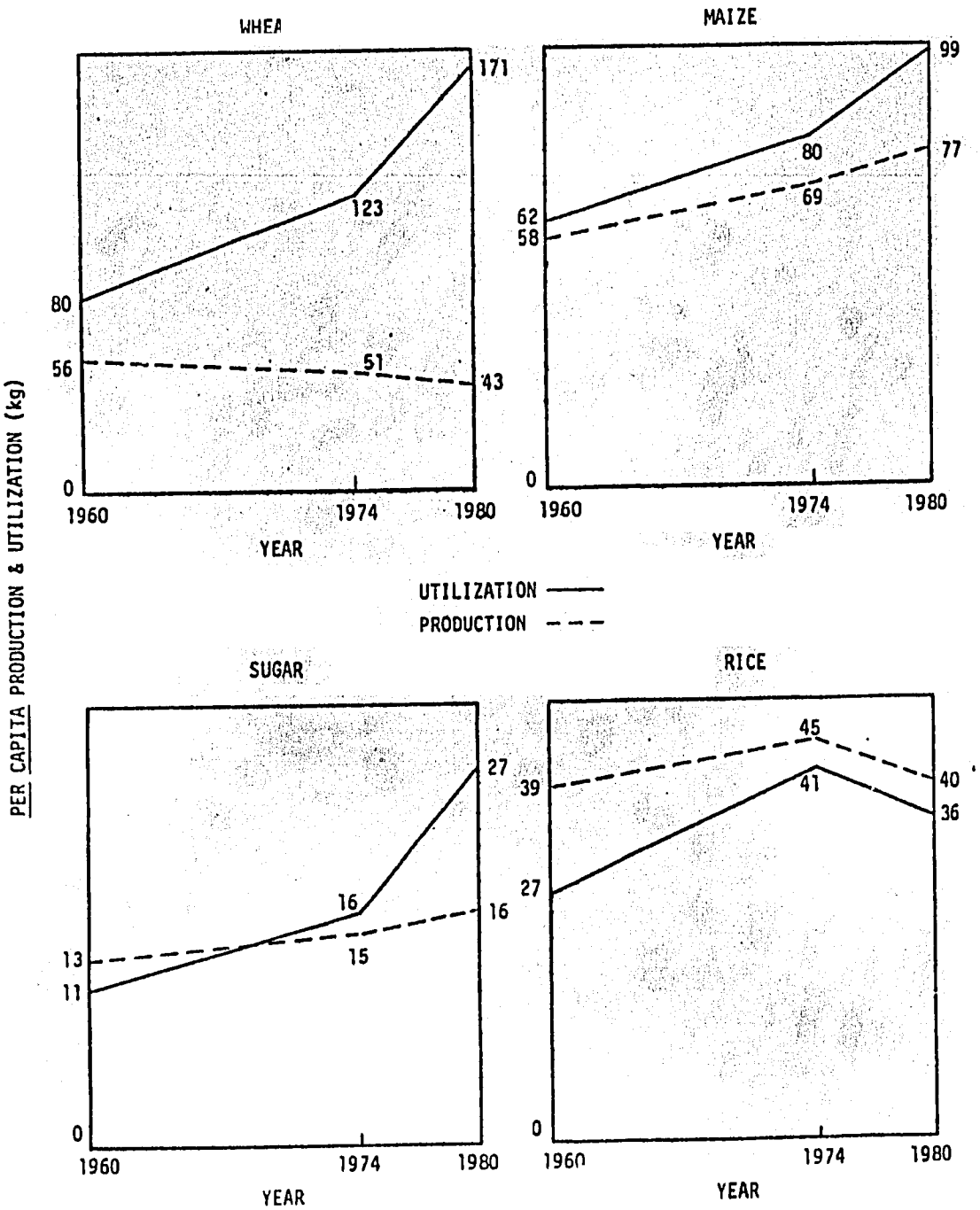

FIGURE 2.4 PER CAPITA PRODUCTION AND UTILIZATION OF WHEAT, MAIZE, SUGAR, AND RICE 1960-1980 (KILOGRAMS ANNUALLY).

Source: Wally. Ibid.

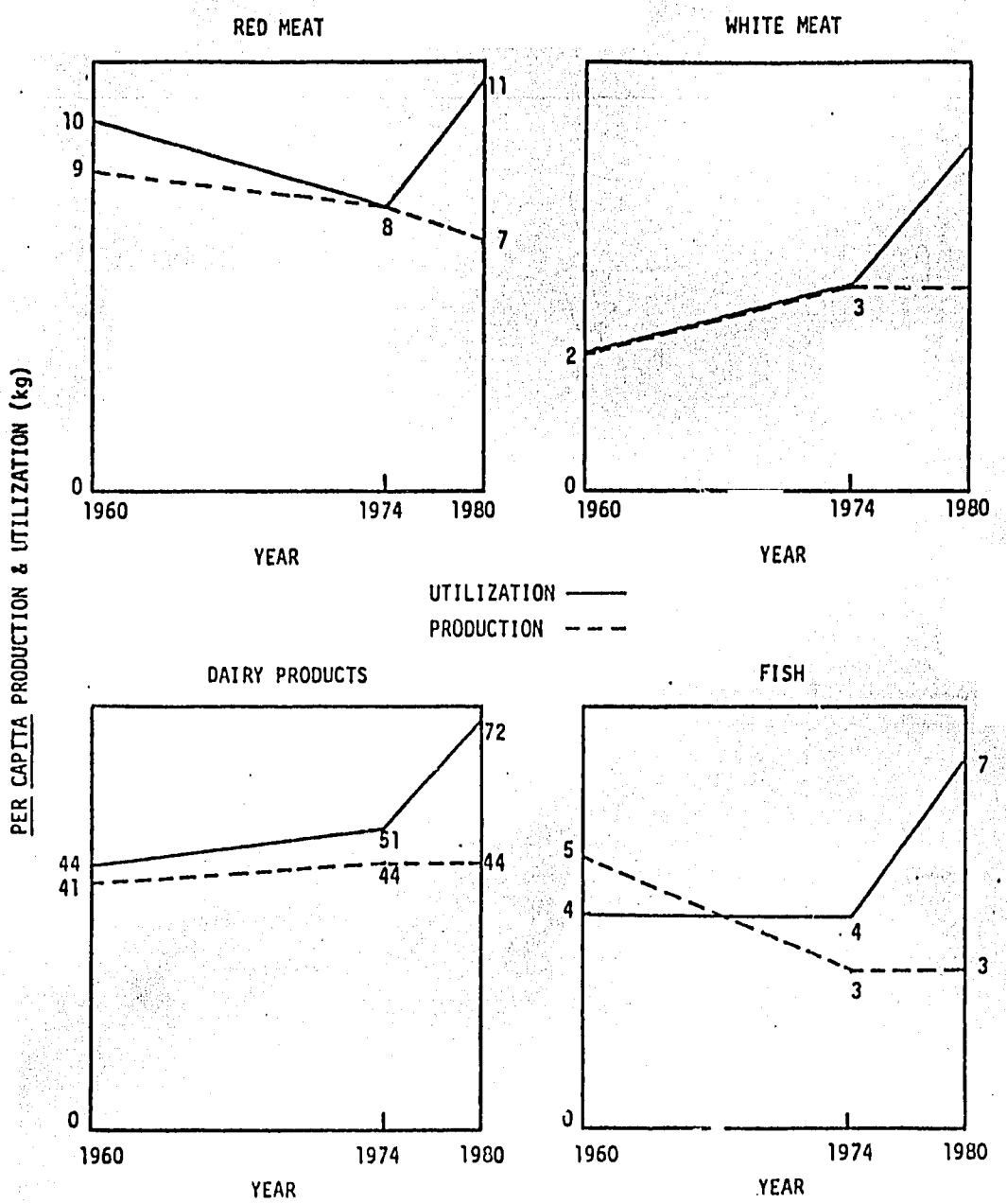

FIGURE 2.5 PER CAPITA PRODUCTION AND UTILIZATION OF MEAT AND ANIMAL PRODUCTS 1960-1980 (KILOGRAMS ANNUALLY).

Source: Wally. Ibid.

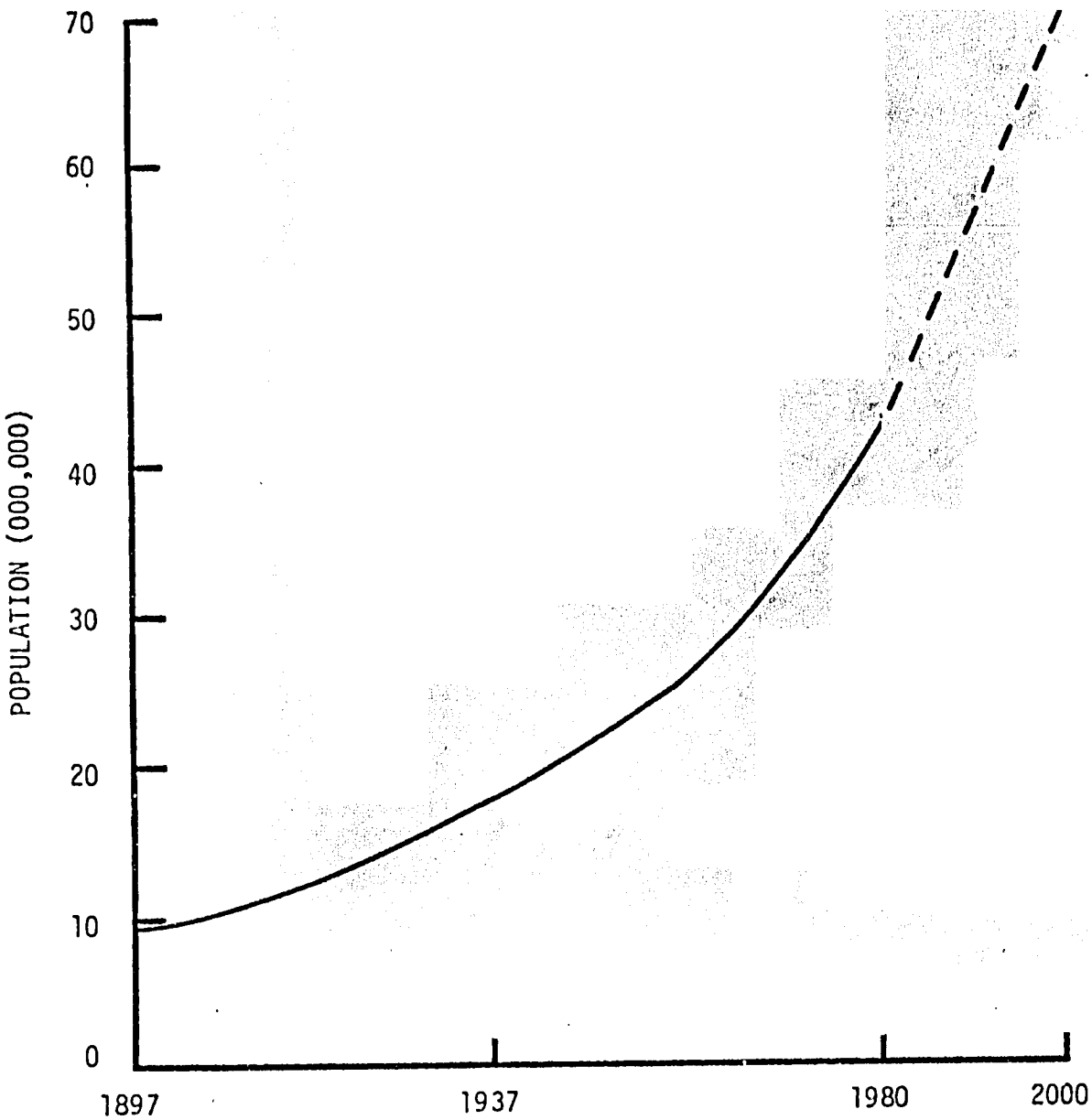

FIGURE 2.6 POPULATION GROWTH IN EGYPT, 1899-1980 WITH PROJECTIONS TO THE YEAR 2000.

Source: Data from Table 1.10.

is not whether there will be sufficient demand for food to sustain a more rapidly developing agricultural sector. The real question is whether Egypt can marshal its resources in the agricultural sector sufficiently to meet its food security needs during the next two decades.

Trends in overall production and utilization of major food commodities[1] since 1960, shown in Figure 2.7, illustrate the magnitude of the challenge presented by attempts to change the slope of both the demand and supply curves in order to reduce the substantial food gap which is at this point rapidly widening.[2]

EXPORT POTENTIALS

Domestic demand for Egypt's agricultural produce is likely to be so formidable that one might question the feasibility of accomodating a substantial export market demand. However, Egypt's goal should not necessarily be that of achieving a state of food self-sufficiency. The goal of food security embraces or, in our opinion, should embrace the concept of giving priority to producing those commodities for which Egypt holds a comparative advantage--with the goal of exporting at least sufficient agricultural commodities to offset the expense of commodities which must be imported.

With this in mind the issue of Egypt's comparative advantage in agriculture should be carefully studied, and efforts should be made to encourage further agricultural development so that whatever advantages may exist can be more fully exploited.

Despite the absence of such a careful study, it appears that Egypt has the potential to develop significant export markets,

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[1] wheat, corn, beans, lentils, sugar, oils, rice, red meat, white meat, dairy products and fish.

[2] Data from Wally, Youssef, "Strategy of Agriculture Development in the Eighties," 1982.

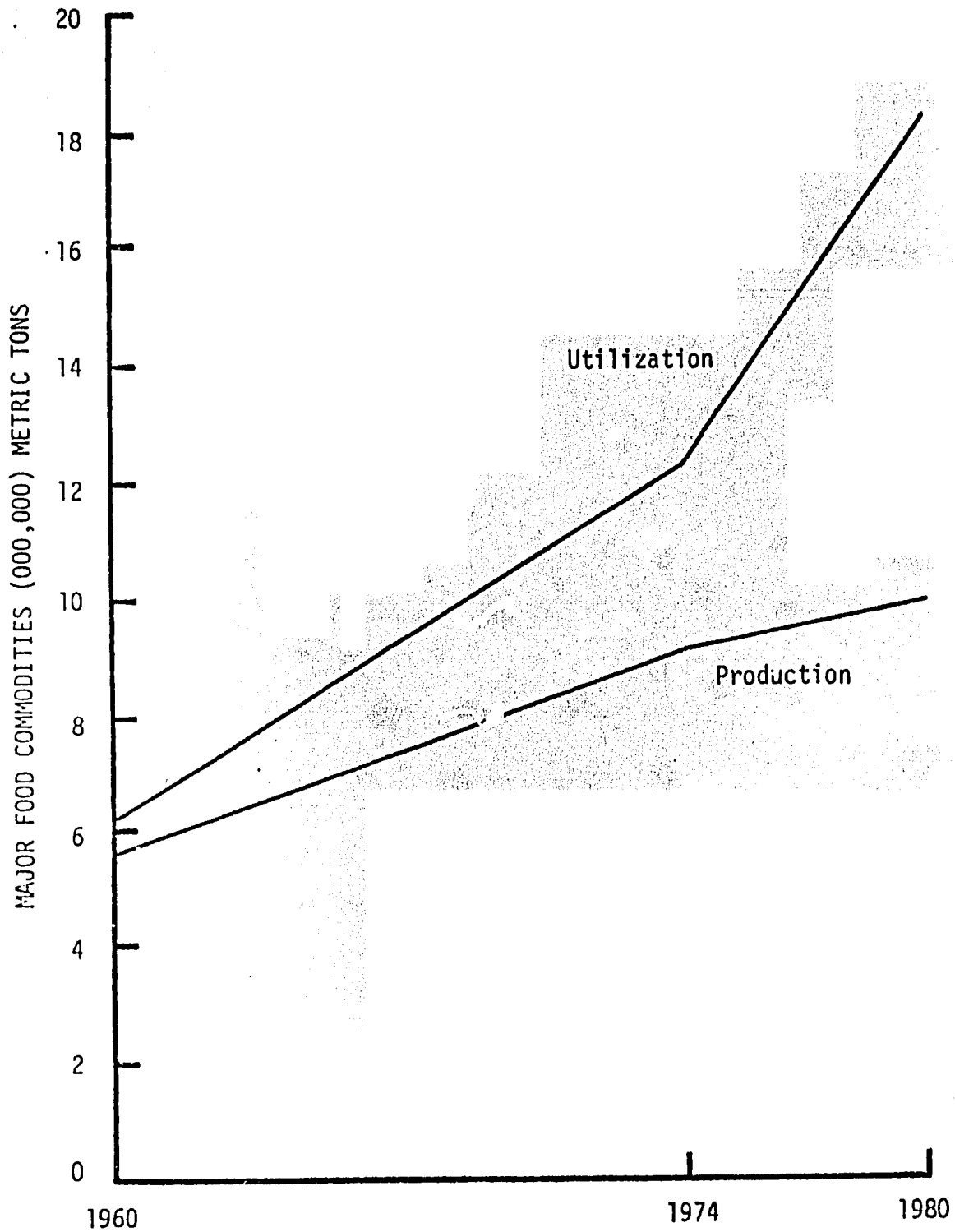

FIGURE 2.7 PRODUCTION AND UTILIZATION OF MAJOR FOOD COMMODITIES[1] IN EGYPT, 1960-1980.

Source: Wally. Ibid.

[1] Wheat, maize, rice, sugar, red meat, white meat, dairy products, fish, vegetable oils.

especially of horticultural crops. Considering (1) Egypt's unique capability to produce high value horticultural crops, (2) the rapidly growing demand for such commodities throughout the Mediterranean Basin and especially in the oil-rich Arab nations, and (3) Egypt's historical access to Eastern European markets--to say nothing of the export potential to Western Europe--it can be concluded that Egypt's potential for exporting such commodities is very likely substantial. This matter warrants careful exploration.

Some indication of this potential was found in information provided the Mission while the final draft of this report was being prepared. In a private-sector joint-venture project in West Nubaria, the Egyptian-American Agriculture Company has planted some 590 acres of tomatoes for both domestic and export markets. We were told that high quality tomatoes are being exported this year to Western Europe as well as to certain Arab countries throughout the Mediterranean Basin.

POTENTIALS FOR PRODUCTIVITY INCREASES (VERTICAL EXPANSION)

Prior assessments of Egyptian agriculture have often emphasized Egypt's unusually favorable land, water and climatic resources, along with the relatively high levels of agricultural productivity which these resources have enabled the country to achieve. Evidence of this relatively high productivity is found in Table 2.1 where yields of most Egyptian crops are shown to be substantially above average world yields.

Other data further indicate that yields of many Egyptian crops compare very favorably with production in more developed regions of the world such as North American and Europe.[1/] Many have assumed from such comparisons that the opportunities in Egypt for further increase in productivity per unit of land are limited. Such views have been reinforced by the fact that during the past decade yields of Egyptian

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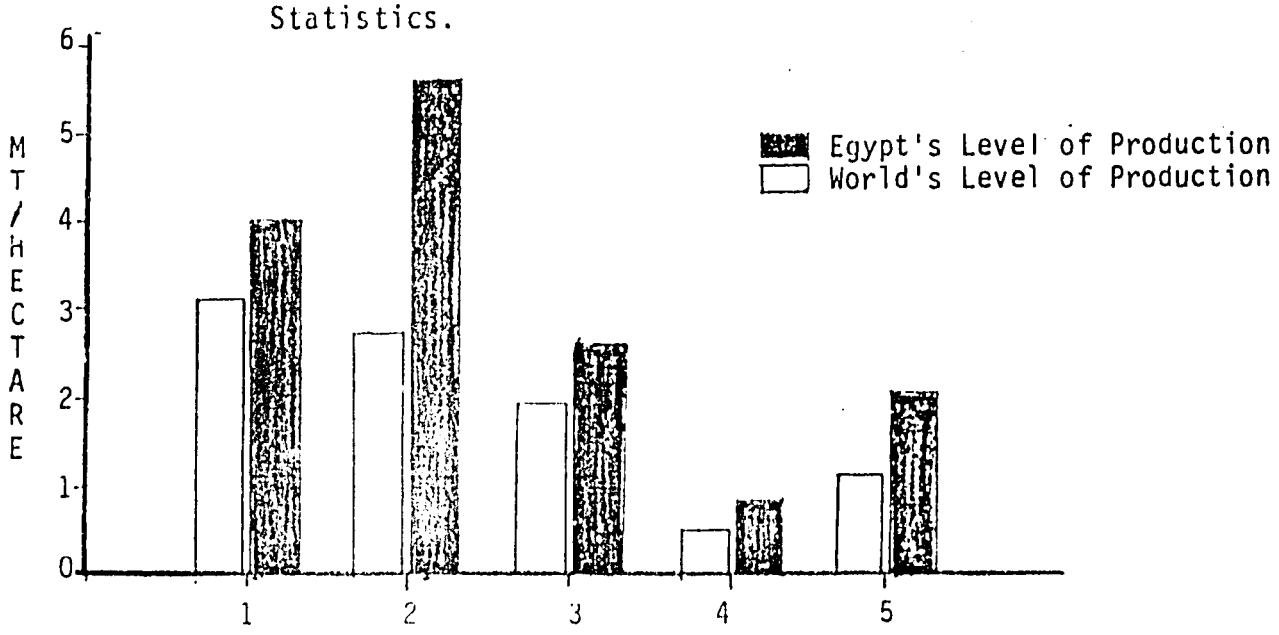
[1/] FAO Production Yearbook, 1972 and 1980.

TABLE 2.1 COMPARISON OF EGYPTIAN AND WORLD YIELDS OF 13 FIELD CROPS ON THE BASIS OF 3-YEAR (1978-80) AVERAGES.

CROP	WORLD YIELD tons/ha	EGYPTIAN YIELD tons/ha	EGYPTIAN YIELD AS % OF WORLD YIELD
Maize	3.126	3.884	124
Barley	1.977	2.682	136
Onion (winter)	12.431	26.517	213
Sugarcane	56.533	82.681	146
Wheat	1.906	3.241	170
Broadbean	1.001	2.190	219
Flax (fiber	0.417	1.000	240
(seed)	0.468	1.219	260
Rice	2.723	5.643	207
Groundnut	0.964	1.683	175
Lentil	0.611	1.046	171
Sesame	0.294	0.898	305
Potatoes	12.294	15.295	107
Tomatoes	20.955	17.262	82

Source: FAO Production Yearbood, 1980, and Egyptian Agricultural Statistics.



1. Maize 2. Rice 3. Barley 4. Sesame 5. Groundnuts

Fig. Comparison of world agerage production with Egyption productivity for five selected crops

crops generally have tended to level off or, in several instances, to decline.

Furthermore, increases in average yields of most crops worldwide were substantially greater than Egyptian yield increases in the eight-year period, 1970-72 to 1978-80.[1] For example, in the early 1970's, Egypt's maize yields were 41 percent above average world levels, while in the late 1970's yields were only 24 percent higher. Corresponding figures for wheat were 87 percent and 70 percent, sugarcane 71 percent and 46 percent, rice 132 percent and 107 percent, lentils 185 percent and 71 percent, and groundnuts 134 percent and 75 percent.

The limited potential for further increase in agricultural output has also been suggested by some who until quite recently questioned the need to develop an effective agricultural extension program in Egypt under the assumption there was little to "extend" and, consequently, little opportunity to improve productivity and output.[2] However, ample and ever-increasing evidence suggests that Egypt has enormous potentials to further increase its agricultural output on existing arable lands, despite its relatively high levels of productivity by world standards or even by the standards of more developed nations. Such increases would be over and above what might be realized by bringing additional lands into production through reclamation efforts.

In the following section evidence will be cited to support the contention that the potential for such increased productivity does indeed exist. In Chapter 3 the problems or constraints limiting the realization of such potential will be examined, and recommendations for dealing with these problems will be provided.

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[1] FAO Yearbook, 1980.

[2] GAO Report on AID to Egypt, 1981.

PRODUCTIVITY UNDER COMPARABLE CONDITIONS

Yield comparisons with other agricultural areas of the world often fail to take into account the truly unique nature of Egyptian agriculture. No other country has such a completely irrigation-based agricultural system as Egypt. In addition, no country has its total crop land so abundantly supplied with such high quality water and has such deep, rich, alluvial soils characteristic of the Nile River and Delta.

Finally, no country can claim more optimum climatic conditions for agriculture. These include:

--the absence of untimely rain and damaging storms (hail, tornadoes etc.)

--a temperature range sufficiently moderate to

(a) avoid untimely freezes and extremely cold weather,

(b) facilitate the production of tropical and subtropical crops such as deciduous fruits and potatoes,

(c) facilitate the growth of two or three crops annually on the same land.

--nearly optimum solar-radiation conditions for photosynthesis, with an atmosphere relatively free of clouds and smog.

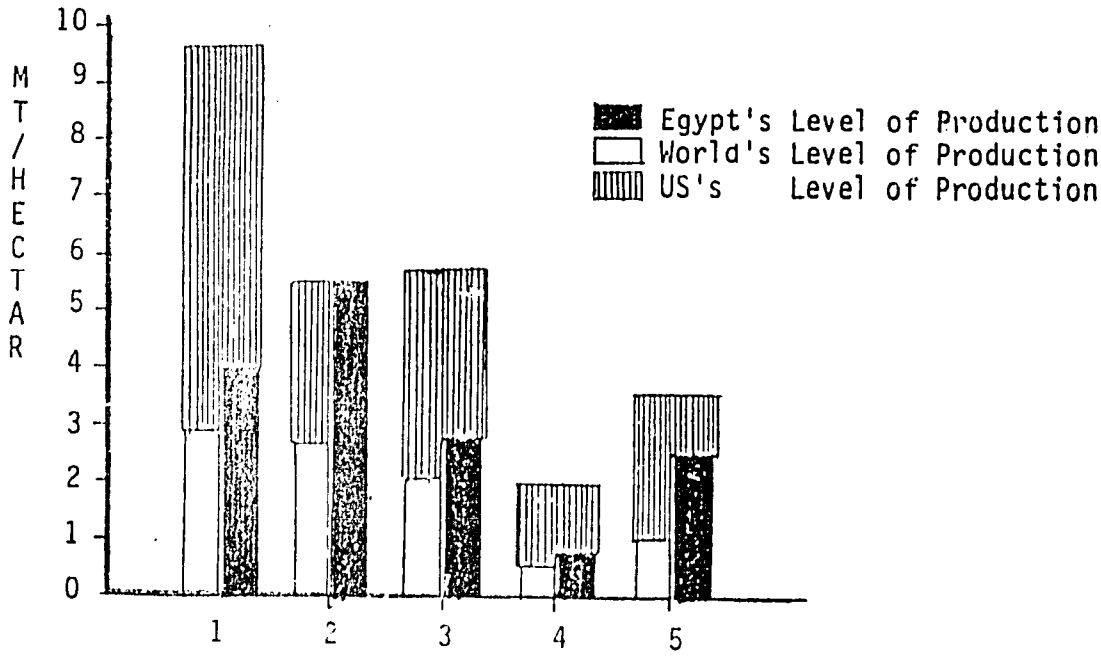
Given these unusually favorable water, soil and climatic factors, the high productivity of Egyptian agriculture compared to the rest of the world is not surprising. Indeed, one might wonder why it is not even higher.

It would be more meaningful to compare agricultural productivity in Egypt with that of areas where soil, water and climatic conditions are similar. However, such conditions of strict comparability are not available. It is possible to compare Egypt's productivity with levels in the U.S. under irrigated conditions, and this information is presented in Table 2.2.

TABLE 2.2 COMPARISON OF AVERAGE U.S. AND EGYPTIAN CROP YIELDS UNDER IRRIGATED CONDITIONS.[1]

CROP	AVERAGE YIELDS (MT/ha)	
	EGYPT	U.S.
Maize	4.0	9.6
Sorghum	3.8	6.5
Rice	5.6	5.5
Barley	2.7	5.7
Soybeans	1.1	3.4
Sesame	0.8	2.0
Groundnuts	2.4	3.4

[1] Data supplied by Economic Research Service, U.S. Department of Agriculture.



1. Maize 2. Rice 3. Barley 4. Sesame 5. Groundnuts

Fig. 2.9 Comparison of US and Egyption productivity for five selected crops under irrigated conditions

These data indicate that with the exception of rice, average U.S. yields are substantially higher than average Egyptian yields. Indeed, aggregated U.S. average yields for all crops shown in Table 2.2 were some 72 percent higher than average Egyptian yeilds.

Despite the implications of these figures, we believe potential crop productivity levels in Egypt are considerably higher than the current or potential irrigated yields in the U.S. because the overall environment for crop production is generally superior in Egypt to average irrigated conditions in the U.S.

CROP PRODUCTIVITY POTENTIALS

Actual experiences within the country provide more direct indications of the significant degree to which crop productivity in Egypt can be augmented. These experiences take several forms:

--research trials or experimentation throughout the country.
--large-scale demonstrations conducted on farmers' fields.
--experiences of farmers.

Perhaps the best information available for cereal and vegetable crops are the data accumulated from extensive field demonstrations carried out in recent years by the Ministry of Agriculture and USAID as part of the Rice Research and Training, the Major Cereal Improvement, and the Agricultural Development Systems (ADS) projects. The details concerning these demonstration programs are provided in the annex to this report; brief summaries are provided below.

(1) Rice

Rice demonstrations were conducted on 630 hectares in 23 districts in six governorates. Through the application of current technology and the appropriate training and motivation of rice production advisors working with 829 farmers, yields substantially higher than the national average were achieved. Specifically, the average

yield for all the demonstrations was 8.5 metric tons/hectare (MT/ha), a figure 54 percent above the country-wide average. The average of the maximum yields produced at the various locations was 81 percent above the national average. The highest yield at a given location (K. el-Sheikh) was 14.5 MT/ha or 156 percent above the average country-wide yields.

(2) Wheat

Wheat demonstrations in 1981 involved 6,363 farmers and 2,455 hectares in eight governorates and 65 districts. Their average yield was 5.5 MT/ha--some 65 percent above the national average of 3.33 MT/ha. In addition to the significant increases in grain yields, straw production also increased 32 percent--an important consideration for farmers who value straw for livestock feed. It was estimated that the increased net return to the farmer as a result of the improved practices used in the demonstration was LE 140 per hectare.

(3) Maize

In a series of farm trials in 1980 involving a "package" of improved cultural practices, it was found that maize yields generally tended to be higher in middle Egypt than in the Delta. However, using the mean from all tests, grain yields were approximately 7 MT/ha or 74 percent greater than the national average. In 1981 farmer verification trials on some 2940 hectares produced average yields of 8.9 MT/ha--125 percent above country-wide maize averages.

(4) Sorghum

In 1981 demonstrations were carried out with 736 farmers on 249 feddans in 18 districts within two governorates as a part of the Major Cereals Project. These demonstration areas produced an average of 6.2 MT/ha of grain--a 63-percent increase over the average produced by local farmers.

(5) Citrus

No experimental data or large-scale demonstrations document the yield potential of citrus in Egypt. However, as a result of a recent survey carried out under the ADS project, individual well-managed citrus orchards were found to be producing at very high levels. In fact, one particular orchard was producing 47.6 MT/ha of Naval oranges on 15-year-old trees. This yield is some 252 percent above the country-wide average of 13.5 MT/ha and is, in fact, equal to the production realized under the most favorable conditions in Florida, U.S.A.

(6) Tomatoes

Tomatoes are considered Egypt's most important vegetable crop and are grown on about 3 percent of the total cultivated area. The significant potential for increased tomato yields was demonstrated by the ADS horticultural project. By using improved varieties and a "package" of improved production practices, the average yield from all demonstrations throughout the country was 64 MT/ha. This represents a 258 percent increase over the average national yield level of 17.9 MT/ha.

(7) Garlic and Onions

Garlic and onions represent important vegetable crops which offer significant opportunities for improved production. Average yields of garlic in Egypt have been 18.3 MT/ha for the past ten years. Yet garlic yields in California are 71.4 MT/ha--about 300 percent higher. A principal reason for the lower yields in Egypt is infestation with mites, yet these can be controlled easily by dipping garlic cloves in water. This control measure alone has resulted in yield increases of 70 percent in the ADS demonstration programs. Even greater increases could be achieved through the breeding and planting of virus-free garlic cultivars and the implementation of other improved technologies.

In the case of onions, yields reached a country-wide average of 28.7 MT/ha in 1976 but have dropped precipitously to a current level of 11.3 MT/ha due to the widespread incidence of white rot disease, Schlerotium cepivorum. Technology to control this disease would obviously result in substantially improved yield levels. Indeed, it is estimated that if this problem were to be solved, onion yields could be raised to approximately 47.6 MT/ha, an increase of more than 300 percent over present average yields for the country.

(8) Potatoes

As a horticultural crop, potatoes, in terms of cash value and total production rank second only to tomatoes. In terms of exports, however, potatoes rank first among the vegetables. Demonstrations with improved practices for potatoes have generated yields of some 47.6 MT/ha--an increase of 163 percent over average country-wide yields of 18 MT/ha.

(9) Cotton

Because of the historical importance of cotton in Egypt, major efforts have been made to improve production over the years. Accordingly, the opportunities for further yield increase may not be as great as for many other crops. This does not mean, however, that the potential for significant increases through the development and application of a "package" of improved production practices as has been done in demonstrations associated with rice, major cereals and ADS (horticultural) programs should be ruled out. This potential certainly merits further exploration.

One of the greatest opportunities for further increasing cotton productivity may lie in shifting at least a portion of the current production to the shorter staple type, Gossypium hirsutum. Some indication of this potential is found in comparative U.S. yields of the two types. Generally, U.S. yields of G. hirsutum under

comparable conditions are considerably higher than yields of longer staple types. If U.S. yield differences in the two types are transferable to Egypt, significant opportunities for increased output could be expected from shifting at least a portion of production to the shorter staple type.

Not only are yields higher from this latter type, but the maturation period is significantly less--85 days as opposed to 128-130 days for the traditional longer-stapled Egyptian cottons. The extra 35-45 days that the shorter staple cotton would allow would accomodate another cutting of berseem in rotations where berseem precedes cotton. This, in addition to the higher yield, could have considerable economic consequences country-wide.

While Egypt would not want to give up its historical export markets for long-staple cotton, it would appear that much of the country's domestic needs could be met using shorter staple types. However, some Egyptian officials are concerned over the possibility of having the shorter staple cotton mix genetically with Egyptian varieties, thereby jeopardizing the purity of the long staple types. This concern is certainly understandable and could possibly be accomodated by having the two types grown in specific zones, well apart from one another. In any event the potential of the shorter staple types is worth investigating and should be further explored.

IMMEDIATE AND LONG RANGE POTENTIALS

The preceding examples of productivity levels substantially above average yield for many of the major crops in Egypt suggest the potential for increasing production within the country. Extensive demonstrations involving thousands of feddans carried out under farm conditions have indicated that by applying current technology, output of cereals can be increased by 50-70 percent and certain vegetables by 160-260 percent, as summarized in Table 2.3.

TABLE 2.3 SUMMARY OF PRODUCTIVITY INCREASES OVER AVERAGE PRODUCTION LEVELS OBSERVED IN LARGE-SCALE DEMONSTRATIONS WITH MAJOR FOOD CROPS IN EGYPT.

CROP	% INCREASE OVER AVERAGE YIELDS
Rice	54
Wheat	65
Maize	74
Sorghum	63
Tomatoes	258
Potatoes	163

Source: Egyptian USAID projects.

The extensive nature of these large-scale demonstrations in farmers' fields suggests that the yields realized represent levels the average farmer in Egypt could achieve within a relatively short time, if the various constraints currently limiting production (discussed in Chapter 3) could be appropriately addressed and removed.

Added confidence is given to this possibility by the fact that the demonstration yield-levels for cereals in Egypt are within the general range of the crop yields produced under irrigated conditions in the U.S. (Table 2.2). Although the potential yield for potatoes and tomatoes seem high in comparison with the cereals, average yields of these two crops in Egypt are currently low relative to cereals when compared with world-wide yield levels (Table 2.1).

Maximum yields observed in field demonstrations and trials, as well as productivity levels reported by better farmers suggest that the long range potential for increasing output may be in the range of 200 percent or more. These higher yields provide an indication of what is biologically possible under the most favorable conditions.

Many farmers do not have now and never will have these "most favorable conditions." However, new technology developed through continuing research serves not only to augment production under "most favorable conditions," but can also promote improved productivity on farms where less favorable conditions prevail.

Experience in the U.S. has shown that in many instances average farm yields within a state have reached the highest levels obtained under favorable research conditions within 12-15 years after the research trials were conducted.[1/] Similar potentials appear to exist in Egypt.

[1/] York, E. T. Better Crops, 1955.

Certainly a strong, well-conceived and viable research program can be expected to develop the technology needed to increase yields far above the levels which are now possible--and of course, even further above average levels now realized.

POTENTIAL FOR INCREASED ANIMAL PRODUCTIVITY

Substantially less information exists regarding potential improvement in animal productivity when compared with crops. However, general information that is available suggests opportunities of comparable magnitude.

For example, in many other developing countries crossing Holstein or Friesian with native cattle has promoted very significant increases in milk production. Based on these experiences, one might expect such crosses with indigenous cattle in Egypt to increase production over the lifetime of the crossbred cows to at least double that of the native cow. This would result from the effects of earlier ages at first calving, higher levels of milk production and shorter calving intervals. Thus, whatever size national herd may ultimately be justified relative to feed resources, a given amount of milk may be produced with fewer crossbred animals than would be expected with native cattle, or more milk overall will be given by incorporating crossbreds into the herd.

The meat production characteristics of crossbred cattle are unlikely to be appreciably different from the native type.

It is assumed that one reason farmers have been reluctant to accept crossbred cattle is their fear that crossbreds may be less suitable as work animals. It is difficult to ascertain the validity of this concern; however, with increased mechanization, its relevance declines. Furthermore, increasing numbers of relatively small-scale commercial dairy units demonstrate the advantages of using improved breeding stock by virtue of their increased levels of milk production.

Many factors suggest that, as in the case of cattle, water buffalo too may offer excellent opportunities for genetic improvement, resulting in greater productivity per animal.

In the case of poultry, a number of large-scale production units throughout the country seem to be operating rather efficiently. Yet, in relative terms, village-level poultry operations, which account for approximately 50 percent of the poultry meat and 90 percent of the table eggs, are much less efficient. In fact, it is estimated that village flocks consume more than two times the amount of feed per pound of edible meat produced as do poultry raised in large commercial enterprises.

While obvious opportunities exist for increasing productivity per animal, there are also excellent opportunities to increase animal productivity per unit of land allocated to animal production. Despite the fact that berseem occupies a larger land area for a greater period of time than any other crop and that it returns more per feddan than any other major field crop, little effort has been made to improve its productivity through research. However, the opportunity to increase berseem production through genetic improvement, better fertilization and cultural practices should be equal to what has been demonstrated with other crops. This would mean substantial increases in output per feddan of land devoted to animals.

One of the greatest opportunities for increasing the output of current livestock operations entails greater efficiency in the use of straw and certain waste products from cropping operations. It is estimated that approximately one kg of crop residue or straw is produced for each kg of grain. Accordingly it is estimated that more than 7,000,000 metric tons of straw and residue from cereal crops are produced in Egypt. Furthermore, certain wastes which accumulate at cotton gins and rice cleaning plants are available for livestock consumption. Untreated, these wastes are not very nutritious and

can do little besides barely maintaining the animal during periods of shortages of berseem or green fodder. However, ammonia can be used to hydrolize this roughage and greatly improve its value as livestock feed. It is estimated that one kg of ammonia used to treat straw can produce one kg of live-weight gain in animals--equal to the live weight produced by six kg of feed concentrates.

The value and palatability of these roughages might be further enhanced by using more of the molasses produced as a by-product of the sugar industry. Currently only 14 percent is used as livestock feed, with the remainder being exported. It is estimated that when used up to 25 percent of the diet, molasses is worth 75 percent as much as maize.

Perhaps one of the greatest opportunities to increase the output of current operations is aquaculture. Recent advances in the technology of fish culture suggest that the potential increase in the productivity of such enterprises is substantial.

Overall, we believe the opportunity exists to approximately double broiler and cattle-feeding efficiency, egg production per hen, and milk production per cow over current levels in villages. Furthermore, it is estimated that potential improvement in the milk production of buffalo can be expected to run at 1 to 2 percent per year through breeding efforts, and fish production per feddan should be able to triple.

POTENTIAL FOR "HORIZONTAL" EXPANSION

The potential for bringing additional land into production and expanding existing livestock enterprises (horizontal expansion) is not nearly so evident as for increasing productivity of existing cropping areas and livestock operations (vertical expansion).

Since any additional land brought into production will require irrigation, the amount of water available constitutes an obvious limit on agricultural expansion. The amount of water currently available substantially exceeds the demand for irrigating the area now being farmed. The consumptive use from 6.5 million feddans, even if continuously cropped, should not exceed 42 milliard[1] m^3/yr, while the water allocated to Egypt at Aswan, currently 55 milliard m^3/yr, is expected to increase to 60 milliard m^3/yr. Thus, the available supply would permit significant expansion of the agricultural base. At least until the year 2000, water shortages, should they occur, will be due to poor distribution or misuse, not to shortfalls in total supply.

With respect to land, the situation is fundamentally different. With only 3 percent of Egypt's land base under cultivation, there is obviously room for agricultural expansion. However, the supply of good quality soils that can be developed at reasonable cost is extremely limited. Although the water supply might support two million feddans of reclaimed lands, one might question the feasibility of bringing more than one million additional feddans into cultivation in the foreseeable future.

CROPS

At the present time the good soils of the Nile Valley and Delta are already being cropped intensively and the primary opportunity for horizontal expansion lies in bringing desert lands into production. Experience has shown that reclamation efforts on desert soils are very expensive, and even when they are "reclaimed," they continue to present many problems not found in the "old" lands resulting in productivity levels substantially lower than on the better Valley and Delta soils.

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[1] British equivalent for "billion."

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Discussion:

If the agricultural sector is to meet future goals of food production, all facets of the agricultural sector must be considered within a holistic framework for planning and executing national programs.

A number of mechanisms might be helpful in coordinating and developing an integrated approach to the problems of the agricultural sector; three of these mechanisms are:

Better cooperation among the Ministers and Undersecretaries of the involved ministries. This would probably require person-to-person contact among the Ministers and certain undersecretaries on a regular and frequent basis, possibly as often as every two weeks, to focus on joint issues and to develop the personal rapport necessary for success.

The establishment of a Supreme Council of Ministers for Food and Agriculture. This council could be composed of those ministries directly involved in the agricultural sector (Ministries of Agriculture and Food Security, Irrigation and the Sudan, Reconstruction and Land Reclamation, and Supply). They would function as primary members while other ministries that are also concerned with general or specific functions gearing on the agricultural sector would be secondary members (Ministries of Planning, Economy, Industry, Transportation and Treasury).

The establishment of a formal structure of ministries directly concerned with the agricultural sector (Ministries of Agriculture and Food Security, Irrigation and the Sudan, Reconstruction and Land Reclamation, Supply) under a Deputy Prime Minister for Food and Agriculture.

Recommendations:

- Although the desired coordination among ministries could be achieved in several different ways, we believe the preferable approach to be through the appointment of a Deputy Prime Minister for Food and Agriculture. The Ministries of Agriculture and Food Security, Irrigation and the Sudan, Reconstruction and Land Reclamation, and Supply would report to the Prime Minister through the new Deputy Prime Minister. The creation of this post would provide a positive mechanism for assuring joint consideration of policies and goals of the agriculture sector by the Ministries directly involved and should assure a holistic approach.

- It is recommended that an inter-ministerial work group be established between the Ministry of Agriculture and the Ministry of Irrigation. This Agricultural-Irrigation Work Group would be active at the national, governorate and district levels with the prime purpose of focusing on criteria and selection of "new" lands to be reclaimed for irrigation agriculture and on those interface areas of mutual concern related to accelerating agricultural development.

- It is also recommended that an inter-ministerial work group between the Ministry of Agriculture and the Ministry of Reconstruction and Land Reclamation be established. This Agricultural-Land Reclamation Work Group would be active at the national, governorate and district levels with the prime purpose of focusing on criteria and selection of new lands to be reclaimed for irrigation agriculture and on those interface areas of mutual concern related to accelerating agricultural development.

  The Ministry of Reconstruction and Land Reclamation is responsible for developing the infrastructure and irrigation works on "new" land and subsequent management of these areas. At present the Ministry of Agriculture is not fully involved in the selection of land to be developed or in providing guidance and services for the lands after they are developed.

B. ORGANIZATION "WITHIN" THE OFFICE OF THE MINISTER OF AGRICULTURE AND FOOD SECURITY

Constraint:

The present collection of 17 semiautonomous organizations and companies and the 13 operating Under Secretaries does not permit effective management and operation of the Ministry. Such a structure also leads to inefficiencies because of overlapping or duplication of functions, as well as uncertainty about responsibilities of the various agencies.

The Minister of Agriculture is Chairman of the semiautonomous agencies, which are not part of the Ministry of Agriculture. Several of these agencies were created to perform certain functions which would normally be activities of the Ministry of Agriculture--or of private enterprise--such as procuring fisheries equipment, producing horticultural planting materials, supplying funds for farm credit to the village banks for distribution to farmers, or managing a cattle insurance fund. For example, the Agricultural Research Center was set up as a semiautonomous agency to permit a certain amount of freedom from normal governmental operating procedures. This pattern has been followed in many developing nations in the past decade to accelerate a sustained flow of production technology. However, these various developments in research and other functional areas have resulted in a set of allied agencies too complex and diverse for efficient management.

Meanwhile, the Ministry of Agriculture (MOA) continues to be organized into 13 Undersecretariats, the functions of which overlap considerably with the allied organizations and companies.

Recommendation:

- It is recommended that the MOA be restructured to insure effective attention to the essential functions and services of the Ministry

(Figure 3.2). Primary functions of the Ministry would include:

--determining the requirements, goals and services of the agricultural sector, with attention to policies and incentives to insure the productivity and profitability of Egyptian agriculture (i.e. planning and budgeting),

--providing for the continuous flow of improved technology, including field evaluations, extension, and the use of technology,

--insuring an adequate supply of production inputs,

--developing and maintaining infrastructures for support services,

--administering the laws and regulations relating to agricultural production, processing, and marketing, and

--maintaining and improving the productive use of land and water resources.

The primary objective for developing an organizational and management structure within the Office and Ministry of Agriculture is to assist in achieving the goals of agricultural development in the most efficient manner. There are many ways to develop such a structure or organization; regardless of how it is done, it should focus in an organized and nonduplicative manner on the main objectives and responsibilities. The organizational structure suggested here is just one of many ways to accomplish this task.

The plan we recommend groups the Ministry under three First Undersecretaries as follows:

1. First Undersecretary for Companies and Authorities

As discussed earlier, there has been a proliferation of semiautonomous organizations over a period of years. A number of these have important functions and should continue as semiautonomous companies or authorities. Others, however, should be transformed into private sector organizations or considered for joint

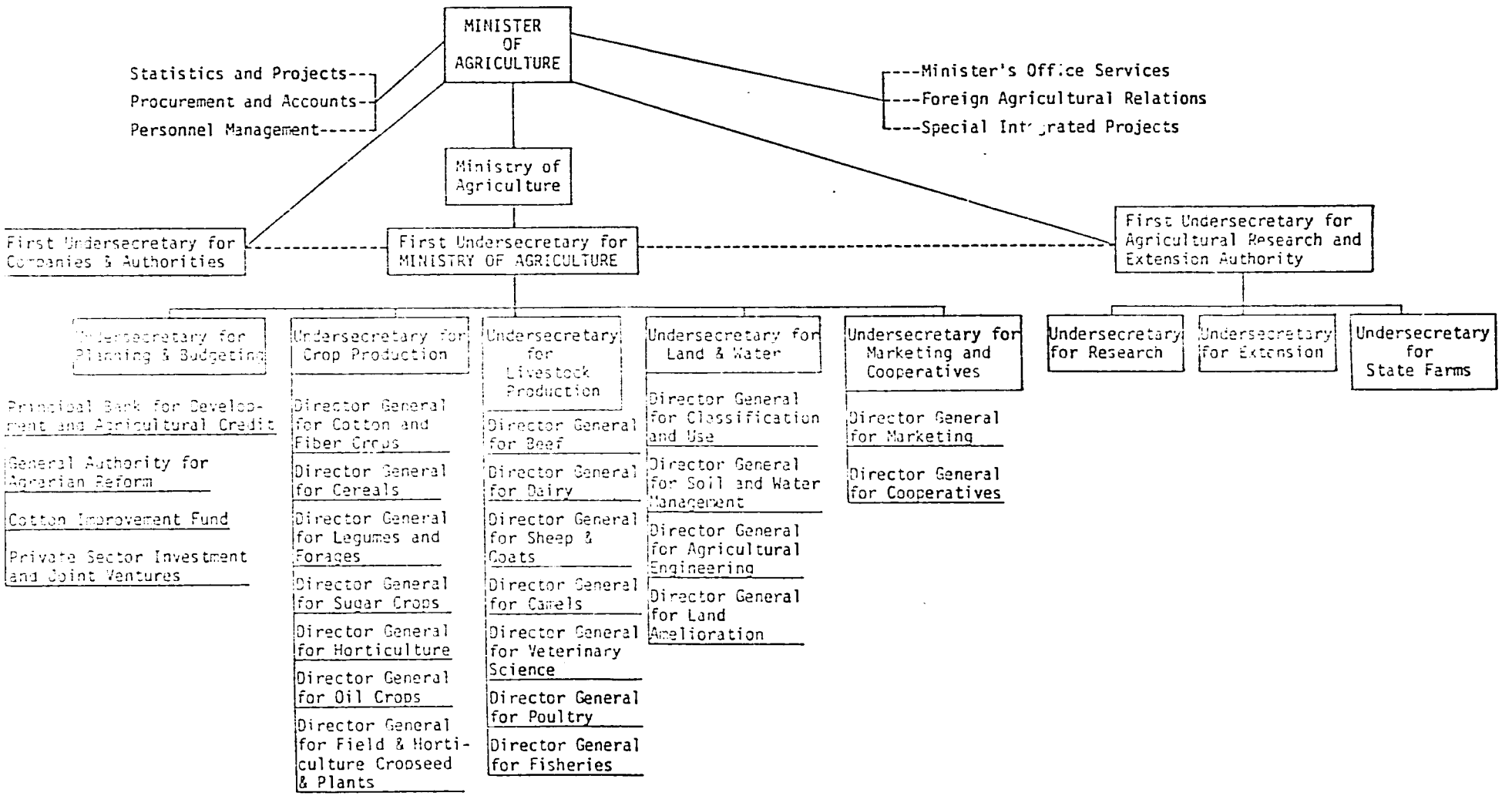

FIGURE 3.2 PROPOSAL FOR A REORGANIZED OFFICE OF THE MINISTER OF AGRICULTURE AND FOOD SECURITY

ventures. It is recommended that the first three continue as semiautonomous companies of authorities; the others listed are recommended for transformation into private sector organizations or joint ventures.

a. Principal Bank for Development and Agricultural Credit (PBDAC). This bank is the major source of credit for farm machinery, soil amelioration, livestock and poultry production, fertilizers, seeds etc. The Cattle Insurance Fund (CIF) should be merged into the MBDAC. Although theoretically this insurance is optional to farmers, it is required if funds are borrowed for purchase of cattle or feed.

b. General Authority for Agrarian Reform. This organization was established to handle the distribution of 1,000,000 feddans to small farms. Cooperatives, marketing services and other functions are handled by the approximately 40,000 employees of the Authority. It would appear that certain of the activities and services should be consolidated with or coordinated more effectively with other agencies involved in similar functions. However, it is the firm view of the Minister of Agriculture that the role of this organization is most significant in carrying out the programs of the MOA and should be continued.

c. Cotton Improvement Fund. The special tax to provide support for cotton research has been critical in insuring the stability and scientific stature of the research that has gained for Egyptian cotton a position of eminence worldwide.

d. Private Sector Investment and Joint Ventures. This office would be a source of information and encouragement for attracting private capital, both foreign and domestic, for private as well as joint-venture undertakings. A

number of existing companies and authorities are engaged in commercial ventures that seem to have limited relavance to the essential functions of the MOA. Some of these might be discontinued or shifted to the private sector. Others might best be handled as joint ventures involving either domestic or foreign capital or a combination of both. The companies involved include:

--High Seas Fishery Company
- North Fishery Company
--Fishery Equipment Company
--General Company for Meat Production
--General Company for Poultry Production
--General Authority for Agricultural Stabilization
--Egyptian Agricultural Authority
--Nubaria Company for Seed Production
--West Nubaria Agricultural Company
--Egyptian Company for Vines and Distillation[1]

2. First Undersecretary for the Ministry of Agriculture

The services of the Ministry would be organized under five Under Secretaries as follows:

a. Undersecretary for Planning and Budgeting. The Ministry of Agriculture needs an Office of Planning and Budgeting with planning procedures that involve economists and other specialists concerned with the programs and responsibilities of the Ministry. The office would be responsible for assembling and integrating information on funding needs and recommending budgetary allocations among all the undersecreatriats over which the Minister of Agriculture has administrative contol.

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[1] For details on the above companies, see Kelley and Lovvorn paper on "Institutions and Organizations" in Annex C.

b. Undersecretary for Crop Production. The success of a national food and agriculture program is measured in large part by the quantity and quality of the commodities available at harvest for domestic consumption or international trade. Production goals; provision of inputs, supplies and services; and the harvesting, processing, transport, storage and distribution of agricultural products are all "commodity-oriented." This undersecretariat would be organized under seven Director Generals responsible for: cotton and fiber crops, cereals, legumes and forages, sugar crops, horticulture, oil crops, and field and horticultural crop seeds and plants.[1]

c. Undersecretary for Livestock Production. The functions and responsibilities of the Livestock Production Undersecretariat would be similar to those of the Undersecretariat for Crop Production. Both organizations would have specialists in the disciplines relevant to crop and animal agriculture. This Undersecretariat also would be composed of seven Director Generals with responsibility for: buffalo and beef, dairy, sheep and goats, camels, veterinary science, poultry and fish. The Fisheries Unit in this Undersecretariat would be responsible for aquaculture also.

d. Undersecretary for Soil and Water Management. Land and water are the most critical resources of Egyptian agriculture. Yet the responsibility for land and water development and use are dispersed among the Ministry of Agriculture, the Ministry of Irrigation and the Ministry of Reconstruction and Land Reclamation. Following this plan of reorganization the Under Secretary for Soil and Water Management would comprise four Director Generals responsible for: soil classification and use, soil and water management,

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[1] Ibid.

agricultural engineering and land amelioration.[1]

e. Undersecretary for Marketing and Agricultural Cooperatives. Marketing of agricultural products has received little attention in Egyptian agriculture. An Under Secretary for Marketing and Agricultural Cooperatives would provide the needed organizational structure to strengthen and improve post-harvest systems. It would have two Director Generals, one for marketing, the other for agricultural cooperatives.

3. First Undersecretary for Agriculture Research and Extension Authority

The Agricultural Research Center is now a semiautonomous agency, while the Agricultural Extension Service is handled by an undersecretariat of the Ministry. It is essential to integrate the following activities so they represent a continuous process:

--research leading to the development of improved technology,
--field evaluations and verification,
--local testing and demonstrations and
--the farm application.

This situation was reviewed in a study of the extension program in Egypt in November 1981, and it was recognized that the research and extension should be administratively consolidated.[2]

The recommendation to combine agricultural research and extension includes also the suggestion that the General Authority for Agricultural Production (GAAP) be consolidated into a new Agricultural Research and Extension Authority. The GAAP manages the lands on which the research stations operate; it also is

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[1] Ibid.

[2] "Increasing Agricultural Production through more Effective Use of Technology." Report of a U.S. Extension Study Team, November 1981. AID.

responsible for increasing foundation stock and production of other seeds. This creates a situation of conflict with regard to decisions on the priority uses of lands for either research or seed production. More importantly, field experiments are frequently not reliable because of uncertainty about previous treatments--fertilizer applications etc.--of the plots. The seed production function of the GAAP should be reviewed and coordinated with the Undersecretary for Crop Production at the time the GAAP is transferred to the Agricultural Research and Extension Authority.

The following pages will treat research, extension and the faculties of agriculture at selected universities in some detail.

a. Coordination needed at the Agricultural Research Center (ARC)

Constraints:

Research Institutes are faced with several major problems which seriously limit their effectiveness.

Laboratories and field stations are very poorly equipped to carry out satisfactory research.

The present system of providing graduate training, although commendable, will eventually lead to inbreeding and a loss of quality.

The inability of the ARC to control its own land, farming schedule or equipment seriously undermines the effectiveness of the organization.

Isolation of research workers from other related disciplines impedes linkage with extension. The logical relationship between research and extension provides for feedback in both directions.

Recommendations:

- We recommend that the Agricultural Research Center be expanded into the Agricultural Research and Extension Authority (AREA) which would include all state-operated farms. The research unit would be called the Agricultural Research Service. The Director would have three deputies: one for administration and financial affairs including the library, one for program development and cooperation, and one for interdisciplinary research. The Research Institutes would remain as they are at present, except that the Extension Research Institute would be eliminated with some of their functions being transferred to the Director of Extension and some to appropriate universities.
- A Marketing Research Institute should be established under the auspices of AREA for the purpose of conducting research on all aspects of marketing including post-harvest losses, transportation and housing. The focus would include both biological and economic proglems associated with marketing. (See Chapter 3, Section V, for further details).
- A Research Institute for Rural Women and Development should be established within AREA with the charge of providing a research base for strong extension programs directed toward the roles of women in relation to their increased productivity in agriculture and their responsibilities for improving the quality of rural life.
- An effort should be made to combine field crops and horticultural and livestock stations into multidisciplinary stations to serve the type of farming within the area. This would allow for more efficient use of facilities, including housing, laboratories and libraries.

- A major investment is needed to upgrade laboratory equipment at the Research Institutes.
- There is need to send a larger number of the more promising young scientists overseas for training. (Ninety percent of the research staff has been trained locally.)
- National commodity research and development teams for all major commodities should be organized for the purposes of identifying major research needs for each particular commodity, outlining research methods for developing the needed technology, and implementing the research according to agreed-upon procedures. Membership should include representatives from the university community.
- Sub-teams of the above should be formed at all research stations working on a particular commodity. Membership should include representatives from the same disciplines as cooperate on the national team, from the regional extension specialist for that crop, and from the university community whenever appropriate.

Funds should be made available for the expenses necessary to conduct this research; some previously agreed-upon salary incentives should be financed as well. The team leaders should be designated by the Director of the Agricultural Research Service. The results should be summarized annually and made available to the national team.

Participation of university professors on regional teams should depend upon the importance of the commodity in their locality, the capability of the professor, and his/her interest in collaborating in national research programs. Expenses incurred, including salary incentives, would be accomodated by funds from the Agricultural Research Service.

A unit should be established in the Research Director's Office to serve two primary functions, namely, to implement the programs of the multidisciplinary research and development teams and to administer a competitive grants program for the support of specific research at universities. This office should have funds to meet supplementary needs (including salary incentives) beyond those coming from the Research Institutes.

b. Reorganization of the Extension Service

Constraint:

The current Extension Service is suffering from an inadequate concept of mission, conflicting assignments, very low status and compensation, many poorly trained people, and a general lack of funds for training, equipment and transportation. These problems are all documented at length in the USAID (BIFAD) report published in November 1981.[1/] Recommendations of the U.S. Extension Study team to the Ministry of Agriculture and the U.S. Agency for International Development (November 1981) have been favorably accepted by both governments. A subsequent study team on "Implementation of a Strengthened Agricultural Extension Program in Egypt" outlines the mission and philosophical concepts of Extension and provides a detailed statement of job descriptions at all levels of operation. Both studies emphasize the necessity of subject matter specialists and the need for a closer working relationship with research.

Recommendations:

- The establishment of a National Agricultural Extension Service within AREA is recommended. It should be administered by a Director, an Associate Director, and two Deputy

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[1/] Ibid.

Directors, one for the National Extension Field Execution Division and one for the Technical Support Division. The absence of an effective Extension Service is considered to be one of the greatest constraints to the short-term improvement of agricultural production.

- The Technical Support Division under a Deputy Director would consist of Extension Program Leaders and subject matter specialist groups corresponding to the Research Institutes. Extension specialists concerned with rural development and programs for rural women would relate to the Rural Women and Development Research Institute.
- The Field Execution Division Director would be responsible for all field extension personnel. A Director would be located in each governorate.
- The District Extension Directors and Assistant Extension Directors would be responsible for day-to-day activities of village extension agents.
- Village workers would function in a single village or for multi-villages when the villages are small.
- Joint appointments for individuals who serve in both research and extension should be encouraged within the Agricultural Research and Extension Authority. Where feasible, joint appointment between university faculty members and the Authority also should be encouraged, depending on the capability, availability and attitude of the individuals.

4. Organization of the Staff Offices of the Minister

A number of functions and activities are of broad concern to the Ministry and transcend the responsibilities as delegated to the various First Undersecretaries. It is proposed that these be handled in offices responsible directly to the Minister.

a. Statistics and Projects Office. Heretofore, collecting and publishing agricultural statistics has been a function of the Undersecretariat for Agricultural Economics. This important task is quite different from conducting economic analyses. The task is large but relatively routine, and it might best be performed by a separate staff office which could also be responsible for assembling and classifying projects.

b. Procurement Office. A Central Procurement office usually helps to increase the efficiency with which needed equipment and supplies are obtained. This office would also be responsible for final accounting procedures.

c. Personnel Management. This office would be responsible not only for hiring, employment records, separations etc., but would be involved also in training and manpower development in cooperation with the various units of the Ministry.

d. Minister's Office Services. The functions of this unit would be essentially those now performed in the Undersecretariat for the Minister's Office.

e. Foreign Agricultural Relations. The responsibilities of this office would be those now handled by the present Undersecretariat for Foreign Relations.

f. Special Integrated Projects. There is a new organizational need of major proportion that does not show up on any present organizational chart. It relates to two problems that have arisen as a consequence of having several foreign donor-aided "projects" operating in a country. One problem is the confusion and duplication that arises when some personnel operate within such projects and other personnel

operate outside of the projects in regular, wholly domestic agricultural agencies. At times professional employees have had identical or very similar tasks. The other problem relates to the issue of how best to absorb the activities of a project into on-going domestic agricultural programs when the foreign aid ceases.

Suggested steps for dealing with these problems follow:

- The first involves recognizing the advisability of marshalling "in project-like fashion" the resources of regular agricultural agencies for purposes of concentrating for a period of time on either a current problem or a promising opportunity. Such campaigns should be an on-going feature of the program of regular domestic agricultural agencies.

- A second step would entail augmenting the competence of personnel in the domestic agricultural agencies through appropriate in-service training. As a consequence, they would be fully competent to carry out their respective roles in integrated special projects or campaigns.

- A third step would be for donor agencies to shift much of their aid from project grants and loans to program support; these agencies should work with appropriate government officials to determine whether support should be allocated to domestic agencies for single-agency programs or for integrated programs involving more than one agency.

Experience with past cooperative development projects in Egypt (and in many developing nations throughout the world) has clearly demonstrated that "institutionalizing" such projects and insuring their on-going contribution to national development are critical problems. The formation of an Office for Special Integrated Projects is

proposed; this office would be responsible for addressing this issue and for working with donor agencies to develop corrective actions. It also would work closely with the national commodity research and development teams of the Agriculture Research and Extension Authority (AREA).

C. OTHER INSTITUTIONS

1. University Students, Programs and Faculty

Constraint:

The universities are graduating students in agriculture and home economics who receive little laboratory or field training. When employed, they are often poorly prepared, and productivity is low. The system does not provide much motivation for exceptional performance in employment. Laboratories are overcrowded and poorly equipped--especially at the graduate level.

Recommendations:

- The number of degree-awarding programs in agriculture at the various universities should be reduced. Graduate degrees should be restricted to the major commodity departments--field crops, horticultural crops and livestock; and to the major disciplines--soils, botany, physiology, plant pathology, entomology, microbiology, genetics, animal nutrition and physiology, agricultural economics and sociology, including training in extension and research methods. The undergraduate degree-awarding programs should be limited to four: crop production, animal production, pest control, and agricultural economics.
- Egypt needs to raise requirements for graduation from its universities and to change university admission standards; in addition, the current policy of guaranteed employment by the government should be modified. The present program is resulting in many poorly trained graduates with little professional future.

- Existing university programs in home economics should be strengthened in high-priority areas to better meet the needs of rural women and families. Such areas include foods and nutrition, family economics/family resource management (including energy resources, income-generating skill development and analysis) and family environment (including sanitation of farm and home) and animal care.

- University programs in rural home economics with a strong agricultural base of study should be developed in one or two rural universities in order to create a pool of rural-oriented professionals who can serve in extension.

- Better budgetary support is recommended to improve the climate for research, extension and teaching.

- A higher percentage of the candidates for the Ph.D. degree should attend foreign universities. Because of budgetary constraints in recent years, the traditional mix of training overseas and in Egypt has not been maintained.

- If the research potential of university faculty in Egypt is to be realized, certain important changes in policy must be carried out. Professors now have heavy teaching loads plus other duties that compete for their professional time. Budget adjustments need to be made to allow time for research as well as teaching.

- A major investment is needed to greatly improve the quality and quantity of laboratory equipment and reference materials.

- University research programs related to rural women are primarily dissertation- and thesis-based, and at present the results are not reaching the extension program. Meaningful-action research aimed at solving problems related to rural women and families, and expanded extension efforts to disseminate findings must be staffed by personnel oriented toward the concerns of rural women.

- The Minister of Agriculture should take the initiative in developing a national policy that would permit university faculty members in agriculture to participate more fully in the research and extension activities of the country.

2. Vocational Training for Agriculture in High Schools

Constraint:

The 59 agricultural secondary schools do not have any dormitories, and all enrollees must commute a distance too far for many potential students. The laboratories and libraries are crowded and poorly equipped, and much of the teaching material is out of date. The policy of giving 50 percent of the profits from the farm to staff and workers is not conducive to objective teaching.

Recommendations:

- Funds should be made available to provide the agricultural secondary schools with dormitories, equipment and libraries, and teaching materials. Consideration should be given to the establishment of two-year technical institutes (at the university level) for training prospective employees for service in government or in the private sector.

III. RESOURCES

A. SOIL AND WATER RESOURCES AND THEIR MANAGEMENT

Egypt has some of the best natural resources for agricultural production in the world. The climate is very uniform and provides a great deal of sunshine with few of the problems that hamper production in much of the world. In addition, the Nile is an exceptional source of water, and soils near the Nile are generally of excellent quality. Egypt's production potential for the future rests on how well these basic resources are conserved and managed.

Egypt's land and water resources are sufficient, if properly developed and wisely managed, to support an accelerated growth of agricultural production to the year 2000 and beyond. Such growth will depend on the orderly increase in the yield per feddan and in the area cultivated. Productivity of the area now cultivated can be increased through greater intensity of cropping and higher yields resulting from improvements in crop varieties, production techniques, and from better on-farm management of water and production inputs.

1. Land Base for Agriculture

Constraint:

The amount of arable land is a key constraint to increasing agricultural production in Egypt. The land base for agricultural production now consists of 5.8 million feddans of fully irrigated "old" lands and 900,000 feddans of "old new" lands only about half of which are in production. Sufficient water will be available in the Nile system to fully irrigate 2.0 million more feddans by the year 2000. Expansion of the cultivated area in the New Valley region, based on groundwater, may add 100,000 feddans. Between 0.5 and 1.0 percent of the cultivated land area is lost each year to nonagricultural uses.

Experience to date with development of "new" lands has not met expectations. The always difficult task of bringing land into production is aggravated because circumstances in the "new" lands (e.g. pressurized irrigation of sandy soils) differ dramatically from those upon which the experience base is built. In addition, the expertise as well as responsibility for the development, water delivery and farming system are vested in separate sectors and organizations with disparate interests.

Recommendations:

The following steps should be taken to preserve, improve and enlarge the land base for agriculture.

- Preserve for agricultural use all arable land. Construction activities by the government should lead the way in using non-agricultural land for building sites. Laws should be enforced to protect arable lands from nonagricultural use.

- Develop substitute construction materials to be used in place of bricks, which are currently made from agricultural soils.

- Upgrade the productive capacity of "old" land by improved irrigation and drainage and periodic land-amelioration practices.

- Complete the development of the "old new" lands by installing drainage systems and more appropriate systems of irrigation.

- Continue to develop new lands, giving priority to low-lying, fine textured soils.

Increased emphasis should be given to pre-development evaluation of prospective development areas, including pilot-scale research studies to field-evaluate alternative water management and cropping systems.

2. Soil Management

Constraint:

Soils can only produce maximum crops if they can provide proper nutrition, maintain good tilth and avoid accumulation of excessive salts. Nile Delta soils tend to be naturally productive, profiting from annual flooding in times past. Since the completion of the High Dam has permitted better water control, cropping intensity and consequently fertilizer requirements have increased. Salt accumulations near the surface of fine-textured soils, lack of proper and timely tillage, and application of inadequate fertilizers have led to reduced crop yields.

Recommendations:

- Not only should existing facilities be maintained, they should be expanded so that complete diagnoses of nutrient requirements and complete assessments of needs for tillage and soil amendments, over and above drainage needs, can be carried out.

- Facilities must be established to provide farmers with appropriate and timely information on a field-to-field basis with regard to fertilizers, amendments and tillage requirements.

3. Water Management

Constraint:

Imperfect water management is a serious constraint. Conveyance losses in on-farm channels are often high because of poor design and low flow-rates from the *sakia* or *meska*. Poor land-leveling and low flow-rates cause uneven field distribution and total water applications that greatly exceed actual crop needs. These imperfections result in reduced yields and restrict crop intensification via more timely seedbed preparation, transplanting etc. Inadequate on-farm drainage often results from poor maintenance of field drains and/or main drains.

Recommendations:

- Provide farmers with technical assistance in:

  --rationalizing and improving within-farm conveyance channels,
  --land-leveling,
  --basin or furrow design and layout,
  --obtaining appropriate flow rates for efficient irrigation, using pumps as needed,
  --forming water-user groups for better regulation of the meska and conducting field demonstrations of improved water management and conveyance systems operations, (Such demonstrations should show effects on uniformity and yield of crops, reduction in time and cost of tillage and crop production etc.)
  --conducting field studies to develop and test alternative systems of group action by farmers for the off-farm management and maintenance of irrigation and drainage systems.

4. Water Management Coordination

Constraint:

The physical limitations of the water conveyance system and the human factors influencing its operation, together with the multiple objectives the system serves--e.g. power generation and irrigation water supply--lead to a situation that frequently is not compatible with best on-farm water management strategies.

Water is often delivered at the wrong time or at the wrong flow-rate, making good water management impossible on the farm. Conversely, the diversion of a large flow upstream to irrigate quickly and efficiently may interfere with water availability downstream.

Recommendation:

- Good water management calls for "total" water management with careful and explicit integration of components. This constraint is listed to highlight the importance of coordinated system-planning and coordinated system-operation. As illustrated by the Egyptian Water Use Project (EWUP), effective management starts with the farm unit in planning and implementing physical system improvements (e.g. raising the meska and leveling the field) and then advances to larger and larger units. Conscientious planning, together with small-scale experience, will thus lead to identification of many desirable improvements, the implementation of which may require substantial capital investment.

5. Soil, Water and Crop Management

Constraint:

Effective crop production requires a holistic approach that takes into account all interacting components within the production system. An often fragmented approach results when different entities are responsible for scheduling water, providing fertilizer, growing the crop or installing and maintaining drains; such an approach inevitably leads to significant reductions in output.

Recommendations:

- Water, soil and crop management decisions should be closely coordinated and integrated at the farm level. This requires that the necessary supplies and services (including information) be made available on a timely basis to the farmer/decision-maker.
- Farmers should be encouraged to form associations to jointly plan and implement water-management decisions. Representatives from various services (e.g. MOA, MOI, MLR) should establish a system

of cooperation that will lead to coordinated and holistic, system-oriented advice and actions.

- Demonstration plots (or farms) that evaluate as well as illustrate the consequences of good (or bad) management decisions can be the focal point of such coordinated transfer of cropping system technology.

6. Drainage

Constraint:

Imperfections in the drainage system are a chronic constraint. Perennial irrigation with widespread over-irrigation and high conveyance losses have overtaxed the existing system of drainage in the "old" lands. The current large-scale program for installing tile field drains will help reduce waterlogging--but only if the basic system of open drain outlets functions properly. Lack of maintenance and deterioration of pumping stations seriously jeopardize the drainage systems in many areas.

Recommendations:

- An accelerated program to renovate the entire system of primary and secondary drains and associated pumping facilities should be implemented at once to avoid further deterioration of the system. An effective and continuing maintenance system must be devised, and a systematic program for monitoring the hydraulic, agronomic, and economic performance of the system should be established and used as an administrative and design data base. Field studies and pilot-scale evaluations should be made of alternative drainage systems.

7. Waterlogging

Constraint:

Waterlogging and secondary salinization are by-products of

heavy irrigation. With the advent of perennial irrigation the amount of water entering the arable land area has far exceeded that lost by evapotranspiration. This has led to a heavy recharge of the groundwater and the rise of the water table into the root zone, which in turn has caused secondary salinization of the root zone. Both the high water table and the root-zone salinization depress the yield of crops.

Recommendations:

- A closer operational relationship should be developed between the Ministries of Irrigation and Agriculture at the branch canal level. Joint training programs to build an appreciation of the need to better match canal operations to on-farm needs should be conducted. Pilot studies of methods for converting canals and meskas to gravity flow with higher turn-out flow rates as well as devising and evaluating ways by which farmer groups can assume greater responsibility for operating and maintaining the branch canal/meska subsystems should be pursued.

The technical and economic feasibility of the conjunctive use of groundwater to supplement canal water should be field evaluated as a means of introducing greater operational flexibility into the system. Where feasible, this would enable the system to supply water at any time, at any point in the system, and therefore permit the individual farmer groups to better "fine-tune" the on-farm use of water.

8. Water Conservation vs. Water Quality

Constraint:

Roughly 16 x 10^9 m^3/year of water drains to the sea via the Nile. The salt content of this water varies from 1,000 to 2,000 mg/l, with some drains running as high as 3,000 mg/l. Current plans call for intercepting roughly 5 x 10^9 m^3 of this water for reuse,

with or without blending. As pressures on water supply increase, the "loss" of the remainder (possibly 10×10^9 m^3) will become binding.

Recommendation:

- It has been demonstrated that water with a salt content of up to 3,000 mg/l can be used readily, and with as much as 5,500 mg/l tentatively, for irrigating salt-tolerant crops. Saltier water can be used to grow biomass for forage, as a wildlife habitat, for biogas production etc. Investigations are in order to determine the potential for further utilizing a significant part of the drainage water now returning to the sea, with full recognition that drainage for disposal of accumulated salt must be maintained to avoid damage to crops and soils.

Such investigation should build on current and completed work of the MOA Soil and Water Institute and should take into account:

--the possibility of extending current plans in terms of volumes and salt concentrations,

--ultimate disposal of remaining water with reference to specific sites considered,

--costs associated with alternative plans and benefits anticipated,

--plant species suited for available water and their market value and

--breeding of crop cultivars for higher salt-tolerance.

9. "New" Land Development

Constraint:

Efforts to develop "new" lands will continue, although the results of past attempts have been disappointing. Large

investments notwithstanding, returns have been meager. Energy costs have been flagged as constraining development requiring in excess of 20 m lift.

Recommendation:

- It is a foregone conclusion that efforts at reclamation will continue. It is also beyond doubt that, technically, good crops can be grown on desert soils.

To avoid the mistakes of the past, a well-planned and well-directed effort should be undertaken to develop crop production packages appropriate for typical desert conditions. A preliminary attempt on a small (but field) scale should enable researchers to pinpoint crops, varieties, crop management and irrigation practices suited to the situation; careful soil and hydrologic investigations are essential prerequisites.

This sort of effort should precede the planning of large development projects by five years, and implementation by ten years. To be effective, they must be supervised by a competent multidisciplinary team of dedicated scientists who have close ties with the Ministries of Reclamation, Agriculture and Irrigation.

10. Funding for Irrigation System Operation and Maintenance

Constraint:

The chronic shortage of funding for the operation and maintenance of the Nile Valley irrigation and drainage system is a constraint, and delays in making the necessary investments threaten the continuation of the present level of operational efficiency. Furthermore, additional investments are needed to improve the operation of the water delivery and drainage system, including the meskas and drainage ditches which directly serve farmers' fields.

An annual investment of LE 200 million approximates the needed investment and operational funding. This is equivalent to LE 30 per feddan now served.

Public revenues support the irrigation system, and irrigation water is currently provided to farmers without charge.

Recommendation:

- In view of the scarcity of public revenues for improving the existing irrigation delivery and drainage system, it is recommended that consideration be given to strategies for raising the additional runds required to meet this need.

B. INPUTS: TECHNICAL AND HUMAN

Overall, Egypt is doing a "fair" to "good" job in supplying inputs to farmers. Yet the supply and management of inputs are so critical that continued attention to them must receive high priority. The following comments are directed to that end.

1. Agricultural Mechanization

Constraint:

A lack of appropriate agricultural machinery and support services restrains agricultural production. During the last ten years, the rapid increase in the use of agricultural machinery in Egypt, particularly tractors and mechanical irrigation pumps, has been accompanied by problems in maintaining this machinery at full operating capacity. The constraints include poorly equipped village repair shops, insufficient supplies of spare parts and the lack of proper preventive maintenance.

Recommendations:

- Extension education programs in preventive maintenance and repair should be offered for agricultural equipment owners and village repair shop operators.
- Financial resources are short at the village level. The Principal Bank for Development and Agricultural Credit (PBDAC) should liberalize policies and permit loans to small farmers and village repair shops so that selective mechanization can be undertaken and support services can be improved.
- Research and development should focus on expanding the selection of appropriate equipment for improved fertilizer and seed placement, land leveling, threshing, and crop driers (to reduce harvest time). This research should draw on the experience of other countries with similar agricultural production systems.

2. Agricultural Chemicals

Constraint:

The system for distributing agricultural chemicals is inadequate. At present, agricultural chemicals are provided to farmers through the PBDAC distribution system. The amounts are determined by Ministry of Agriculture technical committees and modified according to the availability of supplies. In the past, shortages have required farmers to take formulations other than what were preferred. Therefore, an active free market has existed. Increased allocations of fertilizers have recently been made and reports indicate that shortages are less of a problem.

Distribution and storage facilities of the PBDAC are inadequate. It is estimated that 5 percent of the fertilizer is lost before reaching the farmer, while on the farm there is additional wastage of agricultural chemicals. Generally there are shortages of equipment for appropriate fertilizer placement and spraying.

Recommendations:

- Assuming continued availability and adequate supplies of fertilizers and pesticides, more consideration should be given to the types and concentrations preferred by farmers.
- PBDAC should proceed to improve storage facilities and handling practices to reduce losses occasioned by deterioration of agricultural chemical supplies.
- Research and development on equipment for fertilizer placement and spraying should be continued and expanded with the goal of finding mechanization strategies that will prove appropriate for small farm operations.
- On-farm water management should be improved in order to prevent losses of fertilizer nutrients. As crop production incentives are provided through higher prices, the prices of agricultural chemicals should be increased to reflect the costs of production of importation plus distribution costs. Increased prices will provide farmers with a strong incentive to improve on-farm practices and to invest in appropriate fertilizer placement and spraying equipment.

  The private sector might also be encouraged to provide some of these needed functions and services.

3. Agricultural Credit

Constraint:

There is currently a lack of sufficient medium- and long-term credit to realize the development potential of Egyptian agriculture.

The principal source of credit for crop production is the government owned and operated Principal Bank for Development and Agricultural Credit (PBDAC); 130 PBDAC branches, 740 village banks and an estimated 4,200 agencies serve farmers and cooperatives at the village level throughout Egypt. The system is also

the major source of credit for farm machinery, soil amelioration, livestock and poultry production, and establishment of orchards. Access to credit by women is important in increasing opportunities for agriculturally related income-generating projects.

The major emphasis in lending activity has been on short-term loans mostly made in kind (95 percent). Longer term loans--as for the purchase of tractors or construction of poultry housing--have been made, but the demand has exceeded the supply of available loan funds. In order to qualify for such loans farmers are required to provide substantial collateral, e.g. five feddans for tractor loans and three feddans for water pumps. Thus, these loans have been limited to relatively large land owners.

Recommendation:

- It is recommended that the Principal Bank for Development and Agricultural Credit substantially increase medium- and long-term loans. The PBDAC should move prudently to implement liberalized loan policies to meet the credit needs of small farmers, tenant farmers, and women in income-generating enterprises and agriculturally related village enterprises.

4. Labor for Agriculture

Constraint:

There has been a continuing exodus of labor from farms and villages to cities and oil-producing countries in the Middle East. The degree to which this is affecting agricultural production is difficult to assess. Shortages of male adult labor have been reported in various parts of the country--particularly during the peak labor periods of May-July and September-November. Although the wage rate has increased for agricultural labor, it if still only one-third to one-half that of workers in other sectors.

Recommendations:

- It is very important that the characteristics of rural labor markets be identified more accurately than at present as a basis for formulating appropriate policies.

  If the current tightening of labor markets is a permanent phase of the development process in which labor is transferred from agriculture to other sectors, then a policy to induce gradual substitution of capital for labor would be appropriate.

  On the other hand, if the factors forcing a contraction of the hired agricultural labor supply are temporary or will be offset by additional entrants to labor markets as a result of the very high birth rate in rural areas, a policy of capital substitution through mechanization, which is labor-displacing, could generate unemployment and exacerbate the underemployment already existing. The Ministry of Agriculture should undertake continuing research on the current and future availability of agricultural labor, including unpaid family work. Such data and a system for periodic data collection and analyses are needed as a basis to (a) determine agricultural policies in relation to mechanization and (b) monitor the effects of policy changes on the labor force.

  At this time the evidence, which is not conclusive, suggests that a "go-slow" policy of inducing selective mechanization without generating large labor-displacing effects would be appropriate. Such selective mechanization aimed at facilitating the timeliness of farming operations (harvesting, planting etc.) would be particularly desirable. The development and/or transfer of mechanical technology more adaptable to small scale labor-intensive Egyptian agriculture (small tractors, planters, harvesters etc.) should also be considered.

  It is important that Egyptian economic planners take into account the secondary or indirect effects of national economic policies

upon the agricultural sector, including their effects on the supply and demand of farm labor.

5. Contributions of Women to the Human Resource Base for Agriculture

Constraint:

Rural women are important human resources in Egyptian agriculture but have a pervasive lack of

--literacy,
--information related to agricultural practices and
--involvement in decision-making outside the household.

Women shoulder the heavy demands of child-bearing and responsibilities in the household.

In agriculture women participate in a wide variety of crop-production activities and consistently hold responsibility for poultry-raising and care of cattle and buffalo. Women serve as a labor reservoir, often being heavily involved at times of peak demand--planting and harvesting.

Training in agricultural practices is directed toward and taught by men. Programs for women in household or agricultural practices are very limited.

Recommendations:

- Priorities for developing and strengthening educational programs should reflect a systematic assessment of program needs. Since women are heavily involved in agriculture, but under-trained, their needs should receive high priority as training programs are developed.

Extension programs should be strengthened in the areas of household management, household living conditions, health and nutrition practices, decisions related to size of family, and education of youth. These programs should be taught by and directed toward women. Selected extension programs in agricultural practices and income-generating skill development should be developed and the few existing programs should be strengthened.

IV. TECHNOLOGY

Egypt's future in agriculture depends on a continuing stream of improved technology. Because of the relatively high levels of productivity already achieved, the technological constraints on Egyptian agriculture are greater and more sophisticated than those operating on most other developing countries. However, the general areas of technological constraint in Egypt are similar to those found elsewhere.

Constraints:

1. Crops

   Technological constraints affecting crop production relate to:

   --limited genetic potential
   --disease
   --insect pests and nematodes
   --nutrition
   --cultural practices
   --soil and water management

2. Livestock

   Technological constraints limiting animal production relate to:

   --limited genetic potential
   --nutrition
   --reproductive problems
   --parasites
   --disease
   --physiological difficulties

Specific problems or constraints relating to given crops or livestock enterprises are covered in the papers prepared by individual Mission members and published as Annexes F, G & H and will not be

given detailed treatment here.

Recommendations:

- It is obvious that there is much available but unused technology in Egypt which could readily be applied by Egyptian farmers. In fact, such available technology provides the basis for much of the potential increase in agricultural productivity discussed in Chapter 2. Recommendations in Section II. B. 3. b. of Chapter 3 emphasize the critical need to give priority attention to the development of strong extension programs aimed at getting more effective utilization by farmers of the agricultural technology already available.

- While much improved technology is available to Egyptian farmers, it is likely that other technologies developed elsewhere and not yet evaluated in Egypt, could be adopted to Egyptian conditions. Strong programs in applied or adaptive research are needed to evaluate these technologies and to determine which might be used effectively. In Section II. B. 3. a., we have recommended the development of a strengthened research program to serve this need.

- Strong agricultural research programs that go beyond adapting or applying to Egyptian conditions technology developed elsewhere are needed. Programs that push back the frontiers of knowledge in agricultural science and explore new and more advanced means of enhancing agricultural production and marketing are necessary. Many believe that agricultural science is on the threshold of major breakthroughs which could contribute substantially to advances in such areas as improved photosynthetic efficiency and nitrogen fixation by plants, genetic improvement of plants and animals through a variety of new technologies etc. Unlike many developing countries, Egypt has many well-trained agricultural scientists who can make significant contributions to such scientific endeavors. Research programs in

Egypt should recognize and take advantage of such capabilities. Success in this type of endeavor could, in time, provide the basis for increased agricultural productivity substantially in excess of the short-range potential discussed in Chapter 2.

- As consideration is given to the development of "new" lands, we strongly recommend that comprehensive on-site research programs be launched five to ten years in advance of the initiation of actual large-scale development in order to determine more effectively how these lands can best be managed and used. Otherwise, such efforts are very likely to encounter technological problems of major magnitude which could seriously jeopardize the success of such efforts.
- Research is also needed on the effects of agricultural and household technological changes on human resources.

V. MARKETING

The marketing of agricultural products in Egypt presents a generally bleak picture. Large quantities of food are never consumed because of spoilage and other losses. Processing and markets are inefficient; broader involvement and more competition are needed.

The quality and quantity of produce available for consumption and export are seriously constrained by weaknesses in the marketing system. Lack of attention to this aspect of agriculture as production shifted to more perishable crops, such as vegetables, fruit and livestock products, has resulted in the marketing infrastructure not receiving communsurate investment and development. As a result, quality of these products is frequently poor by the time they reach consumers, and large losses occur.

Marketing of farm products in Egypt needs attention at all levels. It is recommended that many technological changes be introduced, that cooperative and private-sector matketing be increased while simultaneously reducing government involvement, and that a functional market service be established. (See also Sections II. B. 2. e. and 3. in this chapter). To this end, a number of specific constraints and recommendations should be noted.

A. TECHNOLOGICAL CONSTRAINTS AND RECOMMENDATIONS

1. Farm to Market Roads and Transportation

Constraint:

Many farm-to-market roads are very rough and the methods of transportation are slow. Perishable products are bruised in transit and are not protected from the hot sun, resulting in rapid deterioration.

Recommendations:

- Collection points should be established in rural areas where products can be assembled in an approved manner; storage and transportation facilities should be improved. Rural collection stations should have holding facilities that will protect products against deterioration until ready for delivery to markets. Refrigerated storage should be available. Products should be delivered by trucks from the collection stations to the central urban markets, storage warehouses, processing plants or retail markets, depending upon the product and marketing situation. By collecting products at central points, delivery to markets would be faster and losses reduced. Congestion at markets would also be lessened because of less traffic.

- Trucks hauling products from the collection stations should be properly equipped. Refrigeration or icing should be provided where needed. When products require protection from the sun, trucks should be covered.

2. Containers and Packing

Constraint:

Flat cardboard packing for eggs and palm-rib crates for fruits and vegetables result in egg breakage and many cuts and bruises on the latter. While these crates are relatively inexpensive, they do not provide protection for the products, particularly when loaded on motor vehicles that travel rough roads. Furthermore, the palm-ribs have rough edges that cause cuts and abrasions. Generally the crates are overfilled and then stacked one on top of another. Since they are not built in uniform sizes, they do not stack and load with any degree of satisfaction. Likewise unsatisfactory are egg-packing techniques which do not provide enough cushion, so many eggs are broken while in transit.

Recommendations:

- As rapidly as possible, a conversion should be made to plastic boxes which are smooth, durable, and can be reused numerous times. Easy to wash, they stack systematically and so can be palletized for mechanical loading and unloading, and they are light-weight. While the cost of plastic boxes is greater than that of palm-rib crates, they are much stronger and longer-lasting. They also lend themselves to mechanical handling and when emptied, can be stored in an orderly manner in less space. Citrus packing houses with automatic box emptying equipment require plastic boxes, and a few vegetable farmers have converted to their use with noticeable improvement in their crop. As long as the palm-rib crates continue to be used, a cushioning material of paper or some other substance should be used to line the crates.
- In the handling of eggs, conversion should be made to a container with a cover to provide much greater protection.

3. Lack of Adequate Off-loading at Egyptian Ports

Constraint:

The off-loading facilities at Egyptian ports is very inadequate for the amount of food being imported. Bulk-handling facilities for both grains and edible oils are insufficient. In addition, insufficient port refrigeration facilities are available for the large amounts of imported meat. Items not imported in bulk are generally handled badly. Bags of wheat and flour are off-loaded using rope slings which cut bags causing spillage. Bags are hand-loaded onto trucks using stevadore hooks, and this causes more spills. Trucks weighed on leaving ports showed a one-percent weight loss for grains when compared with the bill-of-lading weights; this represents tremendous waste.

Recommendations:

- More bulk-handling facilities need to be added at Egyptian ports to decrease losses and accelerate operations.
- Bagged commodities should be off-loaded using cargo nets rather than rope slings.
- Either bags should be reduced in weight from 100 kg to 50 kg or conveyor handling should be introduced to end the need for stevedore hooks.
- More port storage should be added to allow faster off-loading of ships.
- Port should be deepened to allow larger ships, thus reducing traffic and congestion.

4. Storage and Refrigeration

Constraint:

Limited storage is available in Egypt, especially refrigerated storage. All products have optimal storage conditions for preserving quality and reducing rates of deterioration and ultimate spoilage. Highly perishable products, such as tomatoes, milk, fish, meat and eggs deteriorate rapidly in hot climates. When products are infected with microorganisms, the rate of disease development and spoilage is much more rapid in hot climates. Storage-life can be extended many days and quality maintained by holding products at moderately low temperatures. Also, nonperishable foods, such as grains, can be kept longer if stored under proper moisture conditions. This is not widely done in Egypt, especially in local shounas.

Recommendations:

- Egypt should expend a major effort to construct adequate refrigerated storage in urban centers and at strategic locations between cities. Also, sufficient refrigerated trucks should be available and used for transporting perishables. Refrigerated storage is inadequate at ports where imported meat, fish, poultry, eggs and dairy products are received. There is extremely limited refrigerated storage in the wholesale and retail markets. With refrigerated trucks unavailable for transport from port-of-entry to markets, products are being moved in open trucks resulting in quality-deterioration and loss of products.

- Pallets should be used to store bagged grain and flour as significant quantities are damaged by moisture entering bags stored directly on the ground.

5. Sanitation

Constraint:

Consumer health is negatively affected by poor sanitation. A large proportion of food products are being handled, prepared, stored and displayed under very unsanitary conditions. Contamination with dirt and microorganisms leads to illnesses and health problems for those persons consuming the food.

Recommendation:

- Where food products are stored, handled or displayed, facilities should be installed to maintain good sanitation. This requires that adequate supplies of hot water and sanitizers be conveniently available. Depending upon the particular facilities and the activities, special equipment to produce high water pressure or special spray nozzles may be necessary. Central wholesale markets,

slaughterhouses, locations for dressing poultry, dairy plants and equipment for delivering milk, fish houses, processing plants, bakeries, delivery trucks as well as other activities involved in food-handling and preparation should have a regular sanitation and maintenance schedule.

6. Grades and Standards

Constraint:

Income is lost because of lack of grades and standards. Except for the few crops that enter the export market, no organized effort is made to market products on the basis of grades and standards. This contradicts production efforts aimed at consumers who demand quality as well as undermining efforts to serve specialized markets. In some markets size, color, absence of defects and other easily identified product characteristics are important.

Recommendations:

- Definitive grades and standards should be established for tomatoes, fruits, eggs and other products for which there is a demand in the market.

7. Satellite Wholesale Markets

Constraint:

A single large market in a city does not provide for effective marketing. Cairo and Alexandria each have one large central market for fruits and vegetables. Both are very congested and have no modern facilities, such as refrigerated storage or installations for sanitary maintenance. The markets are reportedly controlled by a few middlemen. From time to time consideration has been given to relocating these markets.

Recommendations:

- Rather than relocating these markets one or more satellite markets should be located on the peripheries of Cairo and Alexandria. Many producers would have a shorter distance to travel, the markets would be more convenient for many retail merchants, congestion would be reduced and control by middlemen could be fragmented. Model design with essential operational facilities should be provided with construction.

8. Facilities for Preparing and Handling Products from Animals

Constraint:

Current facilities for handling animals and fish are inefficient. Facilities for slaughtering cattle and buffalo are very old; they have little or no modern equipment and generally are in a bad state of maintenance. Proper facilities for handling and packing of fish are almost nonexistent. Dairy plants do not have adequate modern equipment for pasteurizing milk.

Recommendation:

- Where needed, new and modern facilities should be constructed for handling the operations connected with animal products. New slaughterhouses are particularly urgent. New equipment for milk processing could probably be installed in existing dairy plants.

9. Fruit and Vegetable Processing Plants

Constraint:

Fruit and vegetable processing plants have good installations for fabricating cans from tin plate. Plants have more than adequate area for the processing lines, but the equipment is old and in a bad state of maintenance. Floors are cracked and broken. Sanitation in processing areas is inadequate.

Recommendation:

- In processing plants where floors are broken, where water drains are not working or are inadequate, and where walls are cracked, completely new installations should be made. After these repairs have been adequately taken care of so that sanitary conditions can be maintained, then new and modern processing equipment should be installed.

B. STRUCTURE AND ORGANIZATIONAL CONSTRAINTS AND RECOMMENDATIONS

In addition to the technical problems of marketing, the structure and organization of this sector also present major problems regarding the efficient movement and distribution of agricultural products. While there are many producers of agricultural products and many retailers, there is not much in between. In Egypt very few wholesale merchants, processors or distributors participate in the marketing of most agricultural products, including fresh fruits and vegetables. This has meant a severe lack of competition within the sector--a factor which has seriously inhibited revitalization.

1. Difficulties of Internal Food Distribution by the Government

Constraint:

The greatest part of marketing is done by the Egyptian government, and there are many inefficiencies and problems. The Ministry of Supply is responsible for most basic food commodities (wheat, cooking oil, rice, sugar, and meat) as well as many other foods. The General Authority for Supply Commodities both purchases locally produced crops (mostly under the quota system) and imports many food items. The commodities are then distributed by two Ministry of Supply wholesale companies. The General Company for Wholesale Supply Commodities services the northern half of Cairo, the Delta, and Alexandria. The Egyptian Company for Wholesale of Supply Commodities services the southern half of Cairo and

Upper Egypt. These two companies are responsible for storing, packaging and distributing both rationed and non-rationed commodities to private retail stores as well as to government-controlled outlets. Both companies own and operate their own warehouses and transport fleets.

The marketing operations of the Ministry of Supply are subsidized; their products for the most part are sold below purchase and distribution costs. This gives little incentive for handling commodities efficiently or with care. Bags of wheat grain and flour are handled with stevedore hooks, for instance, causing a large amount of spillage, while much of the meat distributed is transported in unrefrigerated trucks. As a result many products arrive at retail outlets in poor condition. Since they are sold at subsidized prices and no one is really responsible, the situation continues. In addition the subsidization of government marketing makes it very difficult for private wholesalers to compete, especially in the area of bulk commodities. The recent provision of subsidized wheat and rice to rural areas has been especially harmful to local merchants, as in the past the rural areas were the only markets in which they could handle bulk commodities.

Recommendations:

Rather than continuing government responsibility for the storage, packaging, and transport of goods, contracts could be awarded to private firms to conduct these operations. Since such firms would operate as smaller units, many present management problems could be eliminated. Under this plan accountability would be added to the system as contracts could be taken away as well as awarded. This could be a first step in changing to more private marketing and increasing competition within the system.

2. Poor Performance of Government Export Marketing

Constraint:

Another group of public-sector companies, these under the control of the Ministry of Economy, are responsible for exporting Egyptian agricultural products. Cotton, Egypt's largest agricultural export, is exported only by the Egyptian State Cotton Organization. Rice, Egypt's second largest agricultural export, is handled by El-Wadi Company and El-Nil Company, two other public-sector firms. El-Wadi also has sole responsibility for exporting Egyptian oranges. Vegetables, mainly onions and potatoes, are sold in part by El-Wadi and El-Nil, although the private sector is also able to export substantial quantities.

Government control has had many adverse effects on export marketing. The Egyptian government has a tendency to meet domestic requirements first, exporting only the remainder. Since the prices of most agricultural products are either subsidized or controlled, domestic demand is not inhibited. This leads to loss as goods are sold domestically for less than their export value. In addition, whatever profits are made by public exporting companies are returned to the government. This has discouraged these exporting companies from expanding exports or cutting costs with the result being a steady decline in Egyptian agricultural exports. Only exports of onions and potatoes, of which there is substantial private exporting, have been maintained.

Recommendation:

- More private-sector marketing organizations should be established. The most successful export commodity in Egypt during the last few years has been potatoes, which are privately marketed for the most part. Egypt's second most successful

export crop has been onions, of which 50 percent are exported privately. Exports of crops under full government control--cotton, rice and oranges--have been declining.

More private involvement should be allowed; government monopolies should be ended; private cooperative marketing should be encouraged and supported. The United Cooperative Society for Fruits and Vegetables (UCS), formed only a few years ago, has been very successful in developing a program for exporting potatoes. This is an independent (nongovernmental) cooperative made up of the marketing cooperatives (also independent) of Alexandria, Beheira, Gharbia and Menufia. Cooperatives of this type should be further developed.

3. Poor Performance of Food Processing

Constraint:

In addition to controlling most local distribution and exporting, the Egyptian government is also deeply involved in the processing of fruits and vegetables. Two sector firms--the El-Nasr Company for Preserved Foods (Kaha) and the Edfina Company under the Ministry of Industry--control most food processing in the country; Kaha is the larger of the two. Like other government firms, these two companies are subsidized. As a result, they are able to sustain large losses without bankruptcy--in fact, this is exactly the situation, especially for the Edfina Company. Both firms are over-capitalized and are working well below capacity. They have difficulty obtaining raw products to process, as most produce in Egypt is marketed fresh. The produce that they do obtain is usually not grown for processing and thus does not have the qualities which would optimize processing procedures. Further, because of government control, these operations are forced to sell many of their products at a loss. Subsidization and low prices make competition by private firms much more difficult and encourages inefficiency. Still a few firms have been able to compete

by having both good management and being able to sell at prices higher than the government's.

Recommendations:

- Further private-sector involvement in the area of food processing is strongly recommended. At present, private processors do have the advantage of selling their products at free market prices (an advantage that should also be given to public-sector processors), but it is very difficult for private companies to obtain needed financing. A program to provide long-term low-interest loans is needed. The United States Agency for International Development has a program known as the Private Sector Commodity Import Program, but its annual disbursements have been limited to about $35 million. This program should be expanded, and the Egyptian government should begin its own program as well.

- In addition, import tariffs on capital goods should be changed to allow the importation of processing and support equipment. At present, import tariffs of 200 percent on equipment are not uncommon.

4. Private Sector Concentration

Constraint:

Most private-sector activity in Egyptian wholesaling is in fresh fruits and vegetables. Here middlemen abound at all levels. These are generally small businessmen who handle a variety of products at different points. Thus farmers do not necessarily sell their commodities directly to central wholesale markets like Rod El-Farag in Cairo or El-Nuzha in Alexandria; rather there may be one or two other buyers in between. In the other direction--wholesale market to retail--there may also be middlemen. Although this implies competition, this may not, in fact, be true. Although there are many stalls in the major

wholesale markets, a few large sellers exert major influence over prices, eliminating competitiveness in this area of the market as well.

Recommendations:

- A number of steps should be taken to improve competition in the private marketing of fruits and vegetables and to break the large influence of a small number of wholesalers.

  a. The major step probably should be to encourage much more cooperative marketing. Cooperatives would provide strong competition to large private wholesalers with the goal of obtaining the highest prices possible in order to benefit member farmers.

  b. Better monitoring of wholesaling operations is needed, including licensing. This would permit better observation of the influence of certain individuals and allow for checks against possible collusion. Licenses could be revoked if any wrongdoing were uncovered.

  c. The creation of new satellite markets as mentioned earlier could also help in this matter by decentralizing the marketing system.

Conclusions:

The major need of the Egyptian marketing system entails improvin competitiveness in both domestic and export marketing and in processing. The government has not been able to carry out its duties in the internal distribution of agricultural products either inexpensively or efficiently. Therefore, the government should allow and, in fact, encourage more private involvement. This could be done in a number of ways.

In summary, Egypt's marketing system is, at present, in disarray. Not only does it suffer from many technical inadequacies, but these are aggravated by the lack of competition. Cooperatives and private operations need to be encouraged; greater competition and efficiency should result.

C. OTHER GOVERNMENT INFLUENCES IN THE MARKETING SECTOR

In addition to actively participating in marketing, the Egyptian government influences the sector through many of its policies. Government pricing policies greatly influence what is produced, the handling of the product, and its final quality. In addition, government import tariffs often add so much to the cost of handling equipment that these, combined with set prices, leave no incentive for improving product quality. These problems are at the heart of Egypt's marketing difficulties.

1. Government Price Policies

Constraint:

Prices set by the government on most food products generally take the form of price ceilings and are applied without consideration of quality or condition of the product. This is especially true when the commodity is in short supply. Meat is rationed and sold at set prices with no differentiation between cuts. A similar situation exists for fruits and vegetables. Grading occurs only at retail level, and then only when supplies are abundant. The net result is that suppliers have little incentive to provide high quality products to consumers.

Recommendations:

- Steps should be taken to encourage more price differentiation based on quality. This could be begun by setting ceiling prices based on different grades. This system exists to a degree now, since consumers frequently pay premiums for high quality.

2. Import Tariffs

Constraint:

If improving the quality of products is to be encouraged, more support facilities will be needed. At present, the system actually discourages them. High import tariffs charged on such items as refrigeration equipment (100%), small trucks (200%), and household refrigerators (250%) constrain improvements in marketing. These and similar tariffs discourage the sort of development that is badly needed if marketing is to be improved.

Recommendations:

- The Egyptian government should immediately modify its import and tariff policies. Economic losses from inefficiency in the marketing sector are much greater than revenue from tariffs. Duties on refrigeration equipment should be dramatically reduced, both for commercial operations and private households. More importation of processing equipment should be encouraged; it is employment-generating as well as essential to the marketing sector. Vehicle tariffs should be realigned so farmers are encouraged to import trucks rather than large tractors for more efficient marketing. These policy changes would do much to eliminate the technological shortcomings of Egyptian marketing.

D. NEEDED GOVERNMENT INVOLVEMENT IN MARKETING

1. Lack of Government Monitoring of the Marketing Sector

Constraint:

As in many other countries, the agricultural marketing function has long been neglected in Egypt. Little research has been done regarding marketing problems, either technological or economic. Nor has much been done to set standards, inspect facilities or regulate performance. Further, the activities conducted are

fragmented between various ministries, including the Ministry of Health, the Ministry of Agriculture, the Ministry of Supply and the Ministry of Industry.

Recommendations:

Two groups should be established within the Ministry of Agriculture to overcome this lack of monitoring in the marketing sector.

A Research Institute for Agricultural Marketing should be established to parallel other Ministry Institutes and to work closely with them. The primary responsibilities of this Institute should include:

--conducting marketing and economic research to demonstrate the economics of alternative marketing methods, to investigate the functioning of marketing channels, and to promote efficiency throughout.

--conducting physical and biological research to determine the reasons for which crop losses occur (i.e. as a result of handling practices, insects or diseases) and publishing reports on proper precautions and controls to be exercised.

--the study of optimum storage procedures, including temperature and insect controls, and providing this information to the public.

Secondly, a functional marketing group (the Marketing Service) should be established within the Ministry of Agriculture under the Undersecretary for Marketing and Cooperatives. This group would have primary responsibility for:

--developing adequate marketing facilities for both public and private sectors. This would include the formation of new markets, storage and refrigeration facilities, slaughterhouses etc. Adequate marketing facilities are lacking at all levels of distribution in Egypt. It is not intended that

new facilities be installed by the government, but rather that the government use its leadership to focus attention on current needs to help in making designs and selecting locations, and otherwise assisting the private sector to accomplish desired results.

--arranging for the publication of information on marketing margins, prices and volumes sold. Farmers need this information to select time and place of sale.

--working jointly with the Marketing Research Institute to develop grades and standards, as well as good marketing practices, and then seeing that the information is disseminated.

--administering regulatory functions which promote consumer protection.

--developing plans and strategies for reducing post-harvest food losses.

It is essential that the Marketing Research Institute and the Marketing Service work together; well-defined lines of communication must be established. In addition, an office within the Marketing Service should be set up for the purpose of coordinating efforts among responsible officials in all pertinent Ministries.

CHAPTER 4

STRATEGIES FOR ACCELERATING AGRICULTURAL DEVELOPMENT

In Chapter 2 we described what we perceived to be the significant potential for expansion of the Egyptian agricultural sector. We emphasized the need for expansion on the basis of the substantial gap between domestic production and utilization of many agricultural commodities (Figure 2.7). We also stressed the possibility of developing significant export markets for certain commodities in which Egypt appears to have a comparative advantage.

While we believe in the reality of Egypt's potential for agricultural development, we recognize many problems that act as constraints to growth. These must be removed to whatever extent possible if Egypt hopes to realize its agricultural development potential. In Chapter 3 we considered these constraints and set forth out recommendations for dealing with them.

The various constraints we discussed differ in terms of relative importance and priority. Accordingly, we attempt in this chapter to integrate the various recommendations into a meaningful plan of action assigning to each the priority which appears warranted.

Strategies related to the principal areas of constraints discussed in Chapter 3 are considered in the following sections [I-V]; these are followed by some general strategies aimed at reducing the gap between production and utilization of major agricultural commodities.

I. COMMODITY PRICES AND INPUT SUBSIDIES

To realize the technological potential discussed in Chapter 2 it will be necessary to realign agricultural prices. The maturity of Egyptian agriculture and the knowledge of its farmers bode well for sustained long-term increases in productivity, provided appropriate incentives exist. However, unlike the so-called "green revolution" in India and Pakistan where increased water supplies, improved seeds and fertilizer were sufficiently productive to generate the necessary incentives, improvements in the domestic terms of trade will be necessary to stimulate private investment in improved technology.

As a result of increased productivity, long-term growth should be sustainable with an accompanying increase in food and agricultural output such as to improve life for the majority of Egyptians. In the short-run, however, there will clearly be gainers and losers. Political reality dictates that those losing should be helped to adjust to short-run difficulties. The shifts in relative prices within agriculture and between agriculture and the nonagricultural sectors of the Egyptian economy will require some compensatory actions to minimize the distributive effects of policy adjustments.

While the direction that policy adjustments should take is clear, it is difficult to gauge the precise impact of changes in relative prices of agricultural commodities and of the removal of production subsidies. This is particularly true given the distortion of Egypt's economy in which tracing the incidence of taxes and subsidies through to the household or production unit is extremely difficult. As a consequence, the strategy for effecting policy changes must be highly adaptive, and it will be very important to create a mechanism through which the impacts of each adjustment can be systematically assessed before undertaking the next step. Information on the adjustment process must be gathered and carefully interpreted for use by policy-

makers as barometers of the effects of changes. Without an adequate monitoring system, it would be difficult for policy-makers to hold a steady course until the ultimate goals--increased output and improved welfare for all--have been achieved.

The strategy then, is

--to move agricultural prices toward a set of relative prices such that correct signals for the efficient allocation of resources both within agriculture and between the agricultural and the nonagricultural sectors are given,

--to provide compensatory measures in order to minimize the adjustment difficulties of various groups in response to the distributive consequences of relative price changes, and

--to set up an information-processing system such that the impact of adjustments on different segments of the economy are monitored and policy formulated in ways that accommodate the adjustment process.

Initially it will be most productive to focus attention on producer prices. The policy dialogue in Egypt has dwelt frequently on this matter, and it is likely to encounter the least resistance. Probably the best commodity for initial price rationalization is rice. Its technological potential is more impressive than that of most other crops. Moreover, the government wishes to regain the status of a major producer and exporter of rice. A first step, therefore, in the liberalization of agricultural prices would be to cease the compulsory procurement of rice. As long as acreage controls on cotton are maintained, this step would not generate undesirable expansion in rice production in the transition zone between cotton and rice lands. Increasing the price of rice would also dampen the effects of uncontrolled livestock prices by providing an alternative to summer fodder.

Developing an appropriate pricing policy for wheat is complicated by the large resource transfer carried out through the imports of PL 480 wheat. The 1.5 million tons imported by the government in 1981 under highly concessional terms have made it possible to establish an issue price (price to millers) for wheat and flour that is substantially below world-market price.

The immediate impact of subsidized wheat to consumers is to create false signals to producers both in allocating land to wheat and in applying high levels of purchased inputs. Indeed, because of the distorted ratio of grain-to-straw prices, the use of the dwarf high-yielding varieties has been inhibited. It must be admitted that in the long-run the availability of cheap food grain has permitted Egypt to maintain a high level of consumption with certain concomitant benefits. However, by providing inexpensive food to the majority of the population, this policy has created expectations of lifestyles which can only be maintained by substantially depending on foreign imports, a situation exacerbated by the failure to confine the benefits of PL 480 to disadvantaged groups or to use them as in-kind payments to productive investment.

However, calling for the reduction of PL 480 imports on the grounds that it creates disincentives to agriculture would be naive. Egyptian planners do not consider PL 480 dollars to be "hard" currency, and this is probably correct. Given this situation, what can be done to offset the disincentive effects that concessional imports have on domestic producers?

Aside from targeting in-kind assistance in the form of food-for-work or food stamp programs, an approach dealt with in greater detail in Annex B, it will be useful to explore the possibility of pursuing a more positive policy of domestic procurement. The logic of commercial purchases at world-market prices instead of a more conventional, two-tier domestic system appears to rest on the belief

that purchasing a small amount internationally that will in turn, require a high subsidy is less costly than obtaining a large amount of local wheat at something over the domestic issue price. Whether this is true depends in large part on the supply response of wheat farmers. If small increases in price produce rather substantial increases in available wheat the costs of developing an effective distribution system would be offset by declining dependence on outside imports. Increasing the remittances for rice and wheat to producers is relatively easy since there is no system of acreage control to dismantle.

A third possibility for price rationalization is cotton, a key element in any plan to ultimately dismantle government procurement of agricultural commodities. Initially we do not think it desirable to remove government controls on cotton acreage. Existing knowledge regarding comparative advantage among crops in different parts of Egypt is insufficient to permit prediction of what would happen. However, as the price of cotton approaches the world level, the government can remove the various components of the acreage and procurement system which will then be redundant. (It is well to note here that efforts to get farmers to plant contingous acreages of cotton for the purpose of pesticide application are not contingent upon acreage requirements.)

Improving cotton prices will have a positive effect on the allocation of acreage to berseem grown in winter for livestock and hence dampen the effects of uncontrolled livestock prices. Similarly, in cotton-growing areas, it will raise the opportunity cost of summer fodder and feed. Changing the price of cotton will have immediate and long-tun distributive effects that need to be considered. In the short-run, it will have a negative impact on government revenue. It will also raise the price of raw materials to textile industries; this in turn will mean a rise in the price of domestic cloth.

Given the diminished role of agriculture in foreign exchange earnings, it is possible, in the interests of increasing efficiency, to consider offsetting revenue losses with exchange earnings from petroleum, remittances, the Suez Canal and tourism. A decade ago such a suggestion would have been inconceivable. Now the size and composition of the Egyption economy have changed so dramatically that it appears the treasury costs of moving to a more efficient allocation of land resources can be absorbed by other primary sources of foreign exchange.

In the long run, pricing cotton at its opportunity cost to the textile industry should be a goal of government industrial policy. In the short run, however, it would be desirable to give the industry time to adjust to a more competitive market situation. For example, over a period of three years, the government might provide a limited subsidy on raw materials used by the sector. (The possibility of using the flexibility of the Commodity Import Program and other budgetary assistance to ease this transition period should be explored by the government of Egypt and USAID.)

Altering food grain prices raises one particularly sensitive issue--the impact of rationalizing agricultural prices on the size of food subsidies in the government budget. This issue in turn leads to the question: Where will the government find sufficient revenues to cover such subsidies if a major part of the previous revenues from cotton are returned to agriculture, and the domestic wheat procurement prices are raised to the prevailing issue price?

Certain measures that can be taken are obvious. For example, if revenues in the agricultural sector are increased, the subsidies for inputs such as fertilizer, feed concentrates, pesticides, energy etc., should be re-examined. The tactic for maximum impact in each case might be to first announce the increases in output prices, then to follow shortly thereafter with increases in input prices.

The most obvious prices to address are those of fertilizer and livestock concentrates. In the case of the former, the rationale for subsidies is diminished by proposed increases in product prices. For the latter, increased output prices are not required for its elimination. The argument for concentrate subsidies stems from the fact that cottonseed cake has been procured at prices much below those on the world market; the subsidy then is seen as a means of returning income in an alternative form to farmers. The fact that farmers who grow cotton are not necessarily the ones who benefit casts doubts on the logic of the argument.

In the long run, of course, pricing of inputs such as energy, water and capital are crucial to rationalizing the relationship between agriculture and the rest of the economy. Currently, these subsidies encourage the use of inputs in ways which are detrimental to both the economy and environment.

As prices are adjusted to reflect the scarcity values of outputs and inputs, it may be necessary to further adjust the level of revenues extracted from agricultural producers, if for no other reason than that crucial public-sector investments in rural areas will require government resources, and these must come from somewhere. However, once relative prices have been properly aligned, additional revenues should be generated by lump-sum devices such as land or income taxes.

In summary, the approach we recommend for bringing about a rationalization of agricultural prices proceeds as follows:

A. Raise cotton and rice prices, in order to improve producer incentives and to offset uncontrolled livestock prices.
B. Consider the domestic procurement of wheat to ascertain if a least-cost option exists for commercial purchases. Set wheat procurement prices as high as budgetary considerations will allow.

C. Remove input subsidies as rapidly as possible, beginning with those of fertilizers and feed concentrates.

D. Establish a well-qualified unit within the Ministry of Agriculture to monitor the policy adjustment process. (This could be an extension of the current Agriculture Data Collection and Analysis project, as discussed below.)

E. Explore alternative forms of lump-sum taxation so that agriculture would pay its share of infrastructural investments without the disincentive effects associated with using the price system for income transfers. Based on quantitative estimates, begin to articulate the need for transition to an alternative form of agricultural taxation.

A major recommendation of our report relates to proposed adjustments in agricultural price policy. Several suggestions on how to proceed have been added to the substance of this proposal. Proposed policy adjustments should be undertaken in several steps with sufficient time taken between moves to assess the impact of the preceding step before undertaking the next.

Such a strategy can be expected to generate considerable opposition from individuals and groups hurt by the distributive consequences of adjusting relative prices; their dissatisfaction will probably be expressed through the political process. If the Minister is to be prepared to argue against the complaints of various vested interests, having an independent source of information on the general impact of policy changes will be important; lacking this, he will be vulnerable to anecdotes told by and for individuals who have been disadvantaged by the decisions.

Along with the recommended policy adjustments, we propose that a group be set up within the Ministry--either in the Agricultural Economics Research Institute or as a staff function of the Minister's

office (preferable), to analyze and monitor the impact of policy changes during the "transitional" period. Such a unit should have the capability to do field work of a limited, but highly mobile sort. It should be equipped with sufficient technology to make data available almost immediately after collection. The group's purpose is not research, rather they should combine the services of pollster and policy analyst. The idea is to arm the Minister with knowledge regarding the impact of his policies so that he might deflect the predictable negative representations of certain vested interests hurt by adjustment decisions.

PUBLIC-SECTOR INVESTMENT IN AGRICULTURE AND RURAL AREAS

In addition to private investment, substantial investments in the public sector will be required for the sustained development of Egypt's agriculture. The list of programs and facilities that farmers will be unable to provide for themselves is substantial and includes physical infrastructure such as roads, marketing facilities, household electricity and safe water supplies, institutions for agricultural research and extension and social programs in the fields of education and health especially directed towards women and children. A dynamic agricultural sector, geared to assimilate modern agricultural technology is as needful of these facilities and services as are the usually more favored urban dwellers.

In view of the vital role which improved technology must play in the future development of Egyptian agriculture, we believe a major investment in upgrading agricultural research and extension organizations is greatly needed. We recommend that donor organizations such as USAID give high priority in the immediate future to programs of financial assistance aimed at strengthening programs in agricultural research and extension.

Given the immense number of possible programs and projects that could be assigned to public-sector investments commenting on other priorities is beyond the scope of this report. What is disconcerting in the case of Egypt is the dearth of information regarding potential rates of return which might be expected from even a limited number of alternatives directly related to agricultural production. The "project shelf" of reasonable feasibility studies regarding drainage, irrigation, marketing facilities, roads, rural electrification and so on is extremely limited. Indeed, with the exception of reclamation, the evidence available to us suggests that capital is not the binding constraint on expansion of public-sector investment in rural areas, rather such development is at present restrained mostly by the lack of knowledge on how best to proceed. If this diagnosis is correct, obviously high priority should be accorded to developing the capacity to accelerate project identification and feasibility studies.

There are apparently few activities within the agricultural sector for which adequate feasibility studies exist. For example, in the field of livestock, very few projects address the need to increase the availability of red meat, provide for increases in animal fodder, solve certain major disease problems etc. Most ideas in the minds of technical personnel are just that--ideas. What is needed is to combine these ideas with rigorous inputs from engineers and economists in order to develop projects that could be presented to various agencies for funding. Until such a shelf of at least partially developed projects exists, agricultural development, at least from a public-sector point-of-view, will not be helped by additional commitments of capital. The situation in the Ministry of Land Reclamation appears to be no better.

Additional resources need to be devoted to this absolutely critical task. This function could be located in the Project Monitoring and Evaluation Unit already established in the Ministry

or in the Undersecretariat for Planning and Budgeting as suggested in the proposed restructuring of the Ministry of Agriculture.

PROJECT MONITORING AND EVALUATION

The Minister has, from time to time, expressed concern about the difficulties the Ministry has in keeping track of the large number of development activities that it supervises. Many of these activities, organized along project lines by various aid agencies, have attempted to integrate technology transfer, research and extension within their own boundaries. Although individually commendable, the sum of these efforts has been to produce considerable overlap and duplication and, at times, unintentionally to frustrate the efforts of the Ministry in its own efforts at program integration.

One method by which the Ministry could achieve a more effective integration would simply entail having more detailed knowledge of what is actually happening within the various projects both from a substantive and financial perspective--a monitoring function. A second aspect in consolidating information on the plethora of projects that now exist has to do with independent evaluation of each with regard to methods of operation and impact on beneficiaries. It is generally realized that agencies need such independent review and that internal "evaluation" conditions which are written into project contracts or result from a review by peers from within the funding agency are no substitute.

A monitoring and evaluation unit currently exists in the Ministry under World Bank funding. A Ministerial decree has entrusted this unit with the responsibility of monitoring and evaluating all projects under the auspices of the Ministry, not just those associated with the World Bank. This is an important positive development. However, the unit will need additional resources if it is to

undertake this larger task. It is our recommendation that this unit be strengthened in order to accomplish its greatly enlarged function.

II. INSTITUTIONS

Establishing a Deputy Prime Minister for Agriculture and Food Security would have certain implicit effects on both Egyptian and donor governments. The visibility of agriculture and food security would be enhanced, attracting the attention of the government and the populace. The government's ability to plan, evaluate and carry out holistic agricultural sector policies would be facilitated. Furthermore, communication among the involved Ministries would be improved as each became more knowledgeable regarding the problems and programs of the entire agricultural sector.

Their representatives should then more easily be able to speak with one voice on agriculture and food security in the Council of Ministers with the consequence, hopefully, being the allocation of larger investment to the agriculture sector as related to other sectors, an action that is long overdue. Donor agencies also should find it easier to obtain cooperation and coordination between and among Ministries with the result that such organizations become less concerned with specific projects and more involved with overall program planning and coordination.

To encourage and facilitate interministerial coordination and cooperation, it is suggested that a set of Memoranda of Understanding (MU's) be developed between MOA, MOI and MLR. Each Memorandum would identify areas of land and water use and management for which coordinated and complementary actions by the concerned Ministries are vitally important. Each MU would provide a policy justification for a set of Work Plans which would set forth in detail the specific tasks and activities to be executed by designated units and/or

personnel from each participating Ministry. When approved and authorized, such Work Plans would constitute Ministerial commitment to fully and effectively execute the designated set of activities in accordance with the jointly developed plan of action.

Given the overlap in domain of the Minister of Agriculture and the Minister of Irrigation, we suggest the establishment of an Inter-Ministerial Work Group to enhance cooperation between the two Ministries on problems of mutual interest in order that duplication of activities where it exists can be reduced and that joint planning on current and new activities can be facilitated. With such a process, certain problems and disagreements that currently exist--some of which are long-standing--may be solved. Matters such as water requirements of plants, timing and amounts of water to be delivered to farms, removing of drainage water and maintaining canals and drainage systems are just some of the items of common interest to both agencies and indicate the kinds of areas where actions of one Ministry might affect actions or achievements of the other. Joint planning and agreement on many such problems could have far reaching effects on conservation and effective use of soil and water resources of Egypt. Likewise, donor agencies should find it much simpler to obtain cooperation and achieve desired results in matters relating to these two ministries if communication and cooperation between them are improved.

Assisting farmers in raising and straightening meskas and in providing for water control should probably be provided by the MOA. Both financial and technical assistance will be necessary if the job is to be completed in any reasonable period of time. Probably no investment in the irrigated agriculture sector would provide more dividends more quickly than improving the irrigation and drainage systems at the farm level. The technical input could come from the Director Generals for Soil and Water Management and Land Amelioration. Assistance in construction, land-leveling etc. could come from the

Director General for Land Amelioration. Financial assistance could come from subsidies through the Director General for Land Amelioration or low-interest loans from the Principal Bank for Development and Agricultural Credit.

The establishment of an Inter-Ministerial Work Group between the Ministry of Agriculture and the Ministry of Reconstruction and Land Reclamation could have the same general implications for these two Ministries as indicated for the Inter-Ministerial Work Group for Agriculture and Irrigation.

Underlying the recommendation for the establishment of a research and demonstration farm on "new" areas to be developed for irrigation (horizontal expansion) was the assumption that the MOA would have primary authority for determining and selecting the best land to be developed. Irrigation water would have to be made available by MLR for the farm site some five to ten years in advance of full development of the area. The MOA would provide scientists, farm equipment, supplies etc. for the needed research. Obviously, funds would have to be made available for these purposes, but this cost should be considered as part of the construction price in developing the area.

The recommended restructuring of the MOA should assure that the agency can focus on essential functions and services in an effective and nonduplicatory manner. At the same time as many as is feasible of the nonessential functions should be removed from the Ministry. The suggestions made constitute only one example of how the Ministry could be restructured. If it is restructured either along the lines suggested or in some other manner that enables it to better focus on essential functions and services, the efficiency of the Ministry should be greatly improved with the corollary results of better services to farmers and, in turn, of greatly increased productivity of Egypt's agricultural land.

The ultimate objective of restructuring ministerial and inter-ministerial units and activities should be to provide the farmer with those goods and services which will enable him to exercise the maximum management control over the critical factors of production affecting his farming operations.

III. RESOURCES

SOIL AND WATER

Water is the natural resource that will ultimately exert the greatest constraint on Egypt's agricultural production system. At present, however, the amount of arable land is the primary resource constraint.

Completing the High Dam was a major step in improving the control of the Nile River system. The 55 milliard cubic meters of water released annually to Egypt from Lake Nasser represent 2.3 meters of water for each of the roughly 6 million feddans now under cultivation; this is approximately 150 percent of the annual open-pan evaporation for the area. The amount of water required by a fully established, vigorously growing crop normally approaches the open-pan rate as an upper limit and is well below that value during much of its growth period. It is clear, therefore, that adequate water is now available to increase the cropping intensity of land now under cultivation and to substanitally increase the total area being farmed. The Water Master Plan (WMP) indicates that with improved management of the Upper Nile basin, the annual release at Aswan can be increased by at least 10 percent by 2000 A.D. Such augmentation, coupled with the groundwater of the Nubian sandstones, indicates even greater potential for significant expansion of the area available for agricultural production.

Realizing the increased water-use efficiency necessary for capitalizing on the above potential will require major improvements both in the physical structure of current drainage and irrigation systems and in their operation and maintenance; groundwater and drainage water must also be used. However, such recycling must be sufficiently constrained so as not to interfere with adequate flow-through for salt management. Such recycling also calls for improved on-farm water management.

To increase the effectiveness of water use in Egyptian agriculture, there must be an integrated strategy which encompasses the total system--from Aswan to the 0.20-feddan plot of beans. It is not enough to recognize, as stated elsewhere, the degree of complementarity among production inputs and to provide, through extension or other means, information at the farm level for establishing integrated farming strategy; the government structure also must reflect the need for integrated water management, so that the objectives of decision makers currently in MOA, MOI and MLR are mutually compatible and supportive. For example, raising a meska to permit efficient water delivery to a field is nonproductive unless water is available to supply the meska. Attempts to follow sound and profitable irrigation schedules are stymied if government workers shut off the pump at 2 p.m. and go home.

As stated throughout this report, the productivity of the Egyptian arable land base can be increased in two ways--improving the productive capacity of land now under cultivation and increasing the cultivated area. Each alternative could significantly increase agricultural production and enhance national food security.

The development strategy for increasing the productivity of Egyptian land resources should arise from a holistic analysis of the total production system. This should lead in turn to the selection of a dynamically phased set of investments which together will maximize

their immediate and long-range contributions to attaining national goals.

Although sufficient production technology is currently available to greatly increase crop yield and the intensity with which "old" lands are cropped, full potential can not be approached without the concurrent improvement of on-farm soil and water manangement practices. Thus, a high degree of complementarity exists between improving the land and managing water and the adopting of the technology that will lead to augmented crop production. For example, the benefits of installing tile drains are minimal if main collector drains are nonfunctional because of faulty design or lack of maintenance. If the tile system functions properly, the potential increase in crop production will not occur if the crops are poorly planted, fertilized, weeded, protected from insects and diseases and improperly harvested. Thus, practices to improve the productive capacity of on-farm soil and water resources are necessary, but alone they are not sufficient to bring about attainment of higher crop yields.

Because of the interaction between land and water resources and all factors or production, it is critically important to develop, in the field, the capacity to diagnose and analyze production systems of individual farms or villages in a holistic manner. This should lead to the formulation of site-specific sets of remedial practices tailored to the particular conditions to be corrected. Such "fine-tuning" of the production system is the key to sustaining an accelerated increase in national agricultural production.

Expanding the area under cultivation is the second way to accelerate agricultural production in Egypt. Basically three different land types are available for such expansion:

--the low-lying generally fine-textured soils on the seaward edges of the Delta,

--the deep coarse-textured soils at higher elevations which can be irrigated by water pumped from the Nile River gravity flow system and
--the land beyond the practical reach of Nile water which can be irrigated from groundwater.

The high cost of lifting water and the technical limitations of conventional surface irrigation methods on the deep coarse-textured soils seriously constrain land development projects based on pumping. In general, it is necessary to develop a whole new system of water and crop management to make such projects economically viable. Production systems that have evolved on the fine-textured alluvial soils of the old lands with a surplus of water available at very low unit cost are not transferable to the coarse-textured soil areas served by high-cost pumped water. For the latter, the economic return per unit of water used by the production system becomes the dominant criterion of performance.

Reclamation of fine-textured soils in low topographic positions represents a different set of problems. Such areas can normally be supplied with water by gravity flow but the drainage discharge must be pumped. In addition, many of these areas have highly saline groundwater at shallow depth. In some instances hydraulic gradients of the highly saline groundwater aquifer act to continuously add salts to the root zone. Thus, salt management is a major consideration in the reclamation and water management of low-lying areas with alluvial soils.

The problems of bringing new areas into production are highly site-specific. It is imperative, therefore, that detailed multidisciplinary studies be made of the soils, topography, and hydrogeology of each tract in the predesign stage. In addition, a representative pilot area should be selected and used to study the performance of alternative systems of soil and water management and to evaluate

on a field scale the operation of alternative systems of cropping. Such studies should be initiated at least ten years before the final project design is formulated and the development work started. The focus should be not only on what practices might be used to manage the production systems in the project area but also on how to perform them.

In the later stages, the pilot areas will serve as bases for the "hands-on" training of extension workers and other support personnel who will supply the infrastructure of the project area. The objective of such training would be to have in place the organizations and personnel needed to serve the farmers who begin to operate farms in the "new" area.

Thus, the strategy recommended for developing the water and land resources to the fullest calls for:

- Improving water management in the whole Nile system by simultaneously creating an organizational pattern to foster close cooperation among the involved parties regarding water conveyance, water delivery and farm water management; and by providing the necessary funding for operation, maintenance and further development.
- Improving soil-water-crop management by encouraging teamwork among research and extension workers and farmer organizations in the process of implementing appropriate technological practices.
- Strengthening research organizations and activities; these are needed to backstop active implementation plans and to insure that sound and practical packages of practices are at hand.
- Establishing multidisciplinary research and development units within or attached to MOA to develop technology specifically suited to the various conditions found in proposed "new" lands developments.

- Postponing final planning and especially construction of land development schemes until an adequate data-base has been established to guide design and decision-making.

INPUTS

A major factor influencing the realization of Egypt's agricultural potential is the availability and efficient use of major agricultural inputs both technical and human. The strategy to achieve goals for major inputs requires coordinated policies that promote more effective extension activities, expanded research and development, and more realistic pricing. It also requires modernized credit practices and improvements in the inputs delivery system.

1. Modernized Credit Practices

The role of the Principal Bank for Development and Agricultural Credit (PBDAC) is vital in the revitalization of Egyptian agriculture. It is the major distributor of agricultural inputs and the major source or credit for production loans, farm machinery and soil amelioration, livestock and poultry production, establishment of orchards and other farm enterprises.

The major emphasis in PBDAC's lending activities has been on short-term loans mostly make in-kind. However, if the needs of a growing and dynamic agriculture are to be served, other kinds of short-term credit are needed. While longer term loans have been made, the demand in some cases far exceeded both the bank's capacity to process loan requests promptly and the supply of loan funds. Since the reorganization of the agricultural credit system in 1976, the PBDAC has established a fine record of on-time repayment of [illegible]ction loans and rapidly growing private deposits from ru[illegible]eas. It is now in a good position to move prudently to adopt more liberal lending policies regarding small farmers, women in income-generating enterprises, and associated village enterprises.

2. Improvements in the Input Delivery System

The PBDAC, as the major distributor of farm inputs, has a vital role to play in improving the delivery system. Improved facilities and improved procedures are required. For example, sizeable losses now occur in both the quantity and quality of fertilizers because of inappropriate packaging, handling and storage. There is also a need to provide a greater variety of inputs to better meet the needs as seen by the farmers.

3. Linkages Between Input Delivery and Extension

Extension workers are very important in encouraging the more effective use of inputs. First, they should act to effectively link credit services of the PBDAC and the needs of the farmers. Farmers need to be made aware of loan programs available to them, and they must learn how to qualify and apply for them. Extension personnel can help the PBDAC become aware of farmers' credit needs and assist the lending institution to devise sound policies.

Extension activity should also be encouraged in the area of farm mechanization. The lack of preventative maintenance by owners of tractors and mechanical pumps is a serious problem in many areas. Education programs would help to reduce this problem.

Finally, problems exist in the on-farm use of agricultural chemicals. Fertilizers are broadcast by hand and additional losses occur through over-irrigation. Extension programs promoting improved on-farm practices could reduce this waste.

4. Research and Development of Improved Inputs

Expanded research and development efforts are essential to determine appropriate mechanization for Egyptian farming conditions.

Improved machinery is required especially in the areas of fertilizer and seed placement, improved pesticide application, and crop drying so that harvest-time can be reduced and crop rotations intensified. These efforts should draw on the experience of other countries where agricultural conditions are similar to Egypt's.

The Ministry of Agriculture should undertake continuing research on the current and future availability of agricultural labor, including unpaid family work, and household production. To this end cooperation with the Central Agency for Public Mobilization and Statistics would be advantageous.

IV. TECHNOLOGY

> "In view of the extreme pressure on land and the critical role of water, Egypt is particularly dependent on a continuing stream of improved technology if its agricultural development is to match its general aspirations. Its major hope lies in developing a high technology agriculture. Capital expenditures cannot compensate for lack of technology."

This statement from the 1981 report of the USAID-BIFAD team[1] emphasizes the extent to which the improvement of Egyptian agriculture is dependent upon the development and application of improved technology. Because of its unique circumstances, Egypt is perhaps more dependent upon such technology than any other country in the world.

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[1] "Increasing Agricultural Production Through More Effective Use of Technology--Recommendations for a Strengthened Agricultural Extension Program in Egypt.: USAID, November, 1981.

Accordingly, any strategy for improving agricultural output must give very high priority to removing whatever constraints limit the effectiveness of programs concerned with the generation and application of improved technology. To be specific, developing the strongest possible programs in agricultural research and extension is absolutely essential.

RESEARCH

In the case of research, the basic organization and a core of qualified personnel are, for the most part, already in place. The present program, however, is greatly limited by

--the lack of support funds,
--the failure to utilize fully the resources of university faculty members in agriculture and
--the need to organize research personnel into problem-oriented, interdisciplinary teams to address specific problems or objectives.

In Chapter 3 all of these issues are addressed. Recognizing that the process of strengthening and improving the agricultural research program in Egypt is a long-term, continuing effort, we recommend that steps be taken immediately to begin to implement these proposals.

In the research program priority attention should be given to organizing interdisciplinary teams and carrying out whatever research is needed to support national "campaigns" aimed at increasing the production of major agricultural commodities discussed elsewhere in this section. Initially attention should be focussed on major technological constraints that limit production of specific commodities (e.g., the problem of white rot in onions.)

In implementing the interdisciplinary team approach, attention should be directed toward certain major commodities that are not being investigated by current AID (or other donor) projects. Expatriates might make useful advisors to the Director of Research and to the proposed commodity teams.

The advisor to the Director of Research should be someone with experience in research administration and organization. The advisors to the commodity team leaders should be capable scientists, experienced with their respective commodities, who have demonstrated the capacity for leadership in interdisciplinary research. Budgetary support should cover the essentials of equipment, supplies, travel, and salary incentives.

Over time Egypt's agricultural research programs should continue to focus on problems for which solutions might generate more immediate payoffs in terms of increased production. At the same time, however, research efforts should focus on more basic issues which, in the long run, might provide the basis for significant breakthroughs in plant and animal production.

EXTENSION

It is increasingly apparent that one of the principal constraints to a revitalized and more productive agricultural sector is the absence of an effective extension service. This problem was addressed in November, 1981 by USAID-BIFAD team[1/], and Minister of Agriculture Wally already has approved the suggested basic organizational and structural recommendations.

[1/] Ibid.

A second extension team has just issued a report[1] setting forth specific guidelines for implementing these recommendations. Topics covered include position requirements and job descriptions, suggestions for a major training program, proposals for the creation of interdisciplinary teams to help formulate plans and give leadership to the major production campaigns discussed earlier etc.

In view of these circumstances, it appears that there is now the basis to move quickly to reorganize and strengthen the extension service along the lines proposed, and we recommend that prompt action be taken to do this.

Following are a few specific suggestions concerning efforts to build a strong, effective extension program:

An expatriate should be sought who has experience comparable to that of a State Extension Director in the United States; this person would serve as advisor and counselor to the Director of the Agricultural Extension Service. Assistance could be provided for the development of the new organization regarding mission and philosophy, relationships to other agencies and to the various governorates.

Other foreign professionals whose competence to serve as extension subject matter specialists has been proven should also be recruited. They should be trained in the sciences and have experience in developing national (or statewide) educational programs at institutions where research and extension are well integrated. These responsibilities would include helping to identify Egyptians with the potential for assuming similar roles. Budgetary support should cover the essentials of equipment, supplies, travel and salary incentives.

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[1] "Implementation of a Strengthened Extension Program in Egypt." Report of an AID Team, 1982.

It is assumed that most of the expatriate professionals would be short-term employees; however, their employment should be long enough to assure the establishment of the new program. Long-term donors should fund short visits in other countries so that Egyptian subject matter specialists have the opportunity to observe successful programs. In addition, the education of some outstanding young scientists willing to study for advanced degrees should be financed.

V. MARKETING

Very little attention has been given to marketing in Egypt; as a result, its development has lagged. In Chapter 3 many constraints were delineated, and recommendations for improvement were made. The most efficient strategy for rectifying the limitations inherent in the marketing sector entails the private sector. The Egyptian government has demonstrated its inability to adequately handle the massive amounts of food marketed in Egypt, but at the same time, it has discouraged all help. Private marketing has been made largely unprofitable. Different policy steps should not be initiated to reverse this, and encouragement of marketing enterprises should be undertaken.

As mentioned in the recommendations, a first step to limiting government involvement in marketing is to contract with private firms for the handling and distribution of government-purchased commodities. This would encourage improvement in the handling of food, because accountability would be added to the system. The logical second step then is allowing these private distributors to become actual traders, first buying their goods from the government, and then reselling them to private retailers. Here competition would encourage the investment in new equipment and the adoption of improved handling techniques; still, a price-control system could be maintained by selling marketing margins. The final step in eliminating government marketing would be to allow full private

purchases of agricultural goods, both domestically produced and imported, with the government still being able to control prices through a system of import restitutions of the type used in Saudi Arabia.

These changes would encourage competition that we believe will lead to improvements in the marketing sector. In addition, the Egyptian government needs to undertake other policy changes to foster technological upgrading. Foremost among these are changes in controlled pricing so as to permit greater quality differentiation. Setting different price levels for different quality products is an initial step; eventually all price controls should be removed and the market allowed to set the margins. A system such as this would encourage producers and wholesalers to provide higher quality products in order to take advantage ot top prices.

If these major policy changes are made, the motivation to upgrade marketing facilities will be provided. It should then be facilitated, as discussed in Chapter 3, by providing financing and tariff incentives for the importation of needed equipment.

STRATEGIES FOR REDUCING THE GAP BETWEEN DOMESTIC AGRICULTURAL PRODUCTION AND UTILIZATION

The crux of the problem addressed by the Mission is the rapidly widening gap between the production and utilization of major food commodities, as shown in Figure 2.7. This gap translates into an expenditure of $4 billion for agricultural imports (mostly food commodities) in 1981--up some 20 percent over the 1980 level. The rapidly escalating costs of agricultural imports could have serious economic consequences, if something is not done to change current trends.

Figure 4.1 indicates what would result if current trends in both production and utilization were to continue. By the year 2000 in current monetary terms, the gap would be almost LE 12 billion--three times the present disparity between the value of major food commodities produced and consumed. If current rates of inflation were to continue, the value of this deficit would be many times this amount.

Two major factors contribute to the rapid increase in demand or utilization:

--the rapid increase in per capita utilization of food commodities,

--the high rate of population growth.

For many reasons, we do not believe that current rates of increase in food utilization will continue--especially if the government of Egypt takes immediate steps to deal with the problem.

It appears that both the rate of increase in per capita utilization of food and the rate of population growth were abnormally high in the 1974-80 period. For example, the birthrate in Egypt increased from about 2.3 to 2.9 percent in that 6-year period--and is not likely to continue to escalate at that rate. Furthermore, the capacity of the human stomach should prevent a continuation of the rapid rates of increase in per capita utilization of food which have occurred in recent years.

If these assumptions are correct, the rate of increase in food utilization would not be as great as shown in Figure 4.1. Nevertheless, utilization levels must continue to rise and the gap will continue to widen unless positive action is taken to curb growth in demand as well as to increase levels of production.

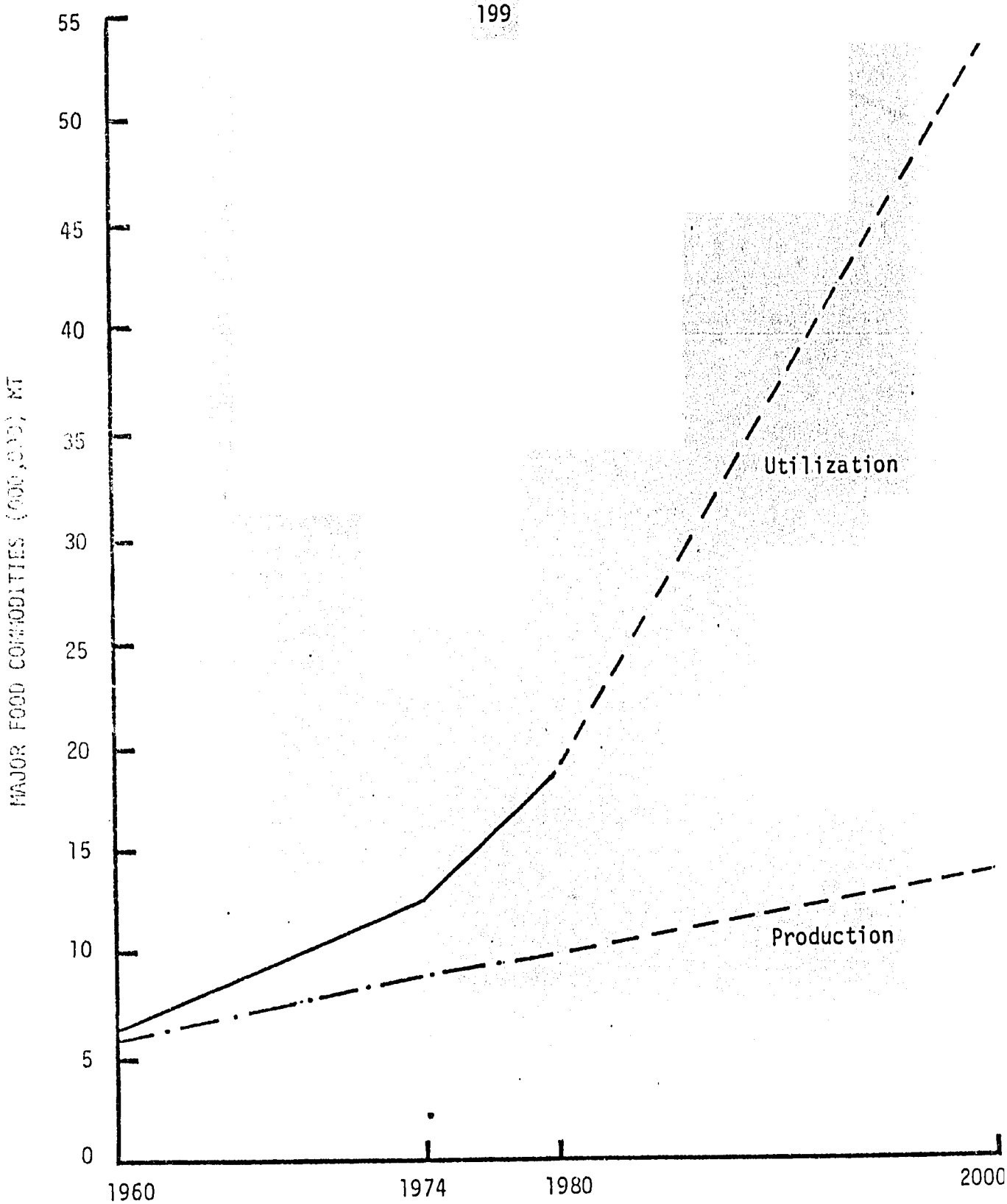

FIGURE 4.1 PRODUCTION AND UTILIZATION OF MAJOR FOOD COMMODITIES IN EGYPT: 1960 - 1980 AND PROJECTIONS TO YEAR 2000, ASSUMING A CONTINUATION OF CURRENT TRENDS.

While the primary task of our Mission is to address issues related to production and to recommend actions that might, over the next several years, increase the slope of the production curve, we recognize that production increases alone will not narrow the gap sufficiently to solve the problem or major food deficits. We believe, therefore, that it is imperative that the government of Egypt initiate immediate actions aimed at reducing the rapidly growing demand for agricultural commodities while continuing to meet the basic nutrition needs of the people. We believe both goals can be achieved.

UTILIZATION OR DEMAND

We shall not attempt to address the specifics of needed action in each area. The basic need, however, appears obvious: first, the rapidly increasing rate of *per capita* demand or utilization must be reduced.

The issue of an expanding rate of *per capita* utilization of food is not within the scope of our primary concern. It is influenced, however, by a wide range of government policies which do relate to our concern and, accordingly, are briefly addressed here.

Very cheap food made possible by extensive government subsidies has undoubtedly contributed very directly to increased *per capita* utilization. There have also been significant indirect effects such as excessive waste resulting from the availability of highly subsidized food commodities. We heard many reports, that highly subsidized bread sold for human consumption was being fed to poultry and livestock. In addition, highly subsidized feed has encouraged the expansion of the livestock industry and a rapid increase in the use of such grains as maize. It is also alleged that low fixed prices for wheat have resulted in some farmers feeding their own wheat to livestock and buying highly subsidized wheat, bread and flour for their own consumption.

These and other factors have contributed to an abnormally high rate of increase in per capita utilization of agricultural commodities in recent years. We shall not attempt, here, to discuss the policy changes needed to address this problem, but we do emphasize that such changes must occur if the rapid expansion in per capita utilization is to be curbed.

A second step that should be taken to limit the rapid increase in demand for food entails the establishment of effective programs of family planning to reduce the rate of population growth. It should be recognized, however, that even if such programs were initiated immediately, there would be a substantial time lag before they would have a signficant impact on reducing the rate of food demand.

PRODUCTION OR SUPPLY

The basic responsibility of our Mission is to recommend strategies which, if implemented, could substantially increase the production of agricultural commodities and thus help to reduce the deficit or narrow the gap shown in Figure 4.1.

In the following section we suggest a plan of action to achieve such a goal.

NARROWING THE FOOD DEFICIT GAP THROUGH INCREASED AGRICULTURAL OUTPUT

A major effort needs to be undertaken immediately to increase agricultural output and narrow the food deficit gap (Figure 4.1). Included in such an effort should be export crops such as cotton and rice (as well as others if they can be developed) which could generate the foreign exchange needed to pay for imported food commodities not fully accomodated by domestic production.

There are three basic means of increasing the value of agricultural output over the next two decades:

--increased output through greater productivity of current arable lands.

--increased output from bringing "new" lands into production.

--increased value of total agricultural output through the production and marketing of export crops of higher value than those which would otherwise be grown for domestic consumption.

Thus the magnitude of the gap reflected in Figure 4.1, expressed in monetary terms, can be closed through both increased production and by growing more high value crops for export.

REMOVING SPECIFIC CONSTRAINTS

In Chapter 3 and in the first part of Chapter 4 we considered in detail the problems or constraints which currently limit the further development of the agricultural sector in Egypt. We believe that a carefully conceived plan of action consistent with the recommendations set forth in this report needs to be developed by the government of Egypt to address and, to the extent possible, remove these constraints.

While it would be difficult to establish a set of precise priorities in terms of needed government action, a few crucial areas should be emphasized.

1. We believe that present government commodity price policies serve as serious disincentives to increasing agricultural output, and changes must be made before there can be hope for substantial improvement. These changes <u>must</u> receive priority attention.

2. With limited arable land and equally limited opportunities for expansion, Egypt is very dependent upon the development and application of improved technology. It is essential,

therefore, that the country have strong and effective programs of agricultural research and extension aimed at serving the type of high-technology agriculture which Egypt must maintain. High priority should be given to the development and maintenance of such programs.

3. Given Egypt's limited land and water resources, priority attention should be given to the management of these resources so that they might be used most effectively and efficiently. This will involve, among other things, better coordination of efforts among the various ministries concerned with soil and water management problems.

In addition to addressing such specific constraints as those set forth above, the government should explore and develop more fully the agricultural enterprises concerned with producing those commodities for which Egypt enjoys a significant competitive advantage and which offer opportunities for developing or expanding export markets. We believe that Egypt's agriculturally-related resources are sufficiently unique to suggest significant development opportunities in this area.

In terms of immediate action--and in addition to the areas of priority attention suggested above--we believe there is adequate basis to launch a series of major efforts to increase agricultural output through well-planned and executed production campaigns, suggestions for which follow.

MAJOR PRODUCTION CAMPAIGNS

We recommend that interdisciplinary teams in research and extension be formed to organize and carry out well-integrated programs involving "packages" of technological practices aimed at increasing productivity of principal agricultural commodities. These programs would constitute the basis for major national campaigns aimed at increasing agricultural output (e.g. an All-Egypt Rice Program etc.).

Similar campaigns have been remarkably successful in other countries and could contribute to a "Green Revolution" in Egypt in a manner similar to what has occurred elsewhere. For example, wheat yields in the Punjab in India were doubled in five years, and Philippine rice yields were increased dramatically in a short time as a result of major production campaigns.

The proposed campaigns involve many of the same techniques used on a more limited scale in demonstrations carried out in the Major Cereals, Rice and ADS Horticultural Projects by the Efyptian MOA with USAID assistance. The success of these large-scale demonstrations indicates something of the potential of such efforts, and these experiences should help facilitate the development of similar but larger country-wide campaigns.

In fact, we recommend that these USAID-supported projects be institutionalized as part of the revitalized research and extension programs proposed herein. It is obvious that personnel associated with these projects could contribute significantly to these revitalized programs.

We further recommend that USAID and other foreign donors, to the extent feasible, channel development assistance funds towards assisting the Egyptian government in carrying out the programs recommended herein. We also recommend that foreign assistance efforts continue to involve expatriate advisors where needed in planning and carrying out such programs.

We believe that such campaigns carried out in conjunction with efforts to remove specific constraints limiting increased agricultural production could contribute significantly to diminishing the food production/utilization gap suggested in Figure 4.1.

IMPLICATIONS OF RECOMMENDED ACTIONS

We have considered actions which we believe can alter the magnitude of the production/utilization gap during the next two decades. Because of the many variables involved, we will not attempt to precisely predict reductions in the disparity. However, in order to better appreciate the dimensions of the problem, we will examine the extent to which the gap could be reduced--based on certain assumptions regarding production and utilization.

We have made projections[1] to the year 2000 of Egyptian consumption and production of food commodities based on assumptions about population growth, income growth, productivity, and the availability of area on both old and new lands. The commodities included in the analysis are grains, beans, vegetable oils, sugar, meats and dairy products. The aggregate gap between consumption and production is expressed in values in constant 1980 prices--rather than in aggregated weights used in Figures 2.7 and 4.1.

CONSUMPTION

Projected consumption is based on certain income and population growth assumptions.

The rate of growth of total consumption was calculated using:

$$G = P + eY$$

where G = total rate of consumption growth
P = population growth
e = income elasticity of demand and
Y = rate of growth of *per capita* income

Real *per capita* income is assumed to grow at the rate of 2 percent per year to the year 2000. Our assumptions about population were

[1] These projections were prepared by Dr. Shahla Shapouri of the staff of the Economic Research Service, USDA.

based on CAPMAS estimates of 2.59 percent/year until 1990 and 2.25 percent/year from 1990 to the year 2000--levels significantly below the 2.9 percent growth in 1980.

The following income elasticities were used for different commodities:

Commodity	Elasticity
Wheat	.25
Rice	.27
Corn	.10
Sorghum	-.2
Vegetable oil	.64
Red meat	.94
White meat	1.10
Sugar	.47
Dairy	.4
Beans	-.1

PRODUCTION

We made two production projections referred to as "low" and "high."

Low

In Figure 4.2 we assumed that production would increase in accordance with trends of the past twenty years. However, since yields of sugar and beans have been declining, we used the highest yields recorded during the last twenty years--sugar in 1969 and beans in 1972--as a base for production in the year 2000.

Area in production was based on estimates of the Egyptian government. Production increases from "new" lands were assumed to be 10 percent of total production. When compared

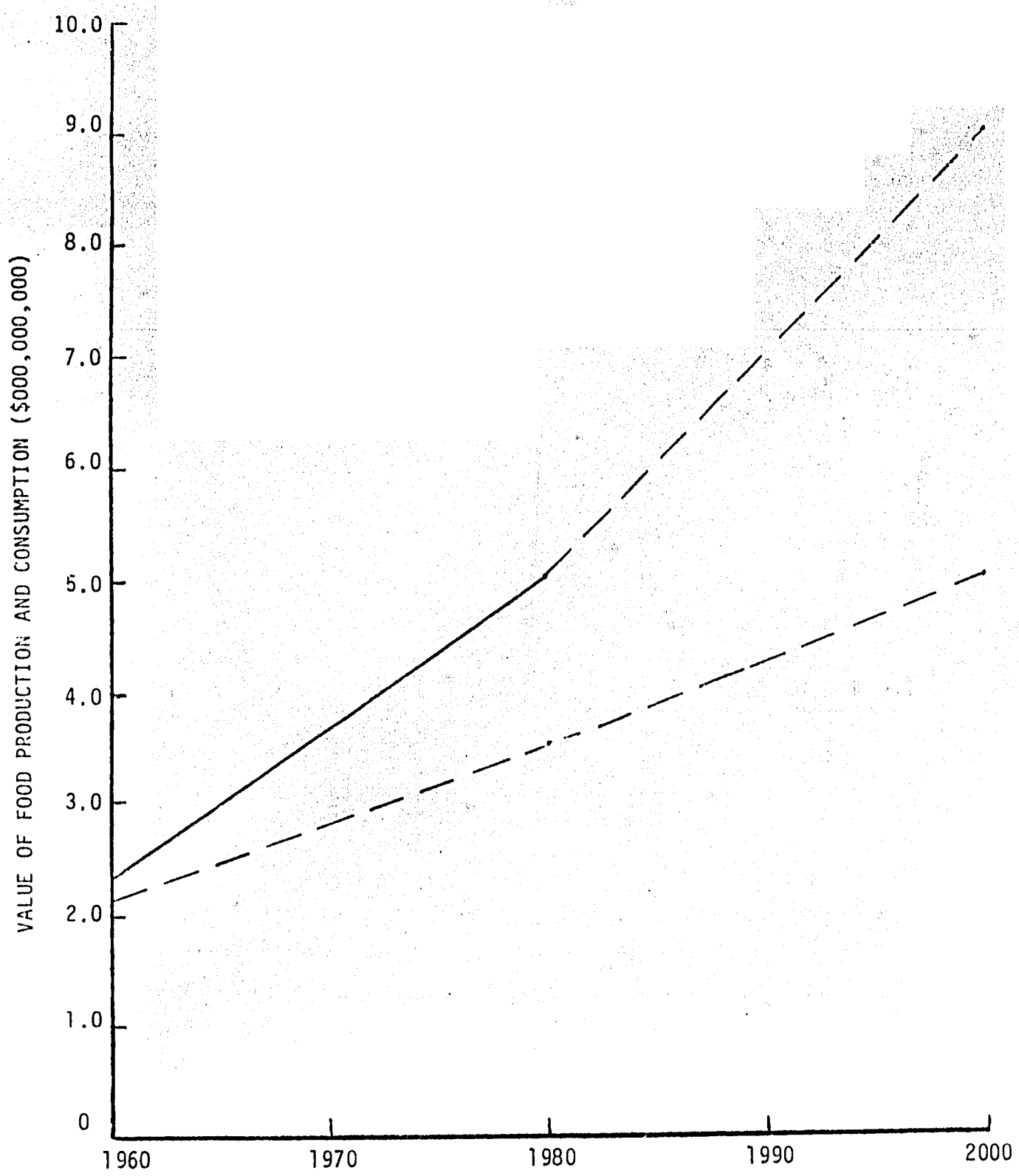

FIGURE 4.2 THE VALUE OF FOOD PRODUCED AND CONSUMED IN EGYPT FROM 1960-1980 WITH PROJECTIONS TO 2000 A.D., ASSUMING A CONTINUATION OF THE PRESENT RATE OF INCREASE IN PRODUCTION (REFERRED TO AS "LOW" IN TEXT).

with our consumption estimates, this projection resulted in a gap of $4.0 billion in constant 1980 FOB prices.[1/]

High

In Figure 4.3, production increases were based on the Egyptian government's estimates of production potentials. These estimates project yield increases of 60 percent by 1990 and 100 percent by 2000.

The projections of meat, dairy and vegetable oil production were based on the trends of the last twenty years. The production increase due to "new" lands reclamation[2/] was assumed to be 15 percent of total production. The gap which resulted from this projection is $1.4 billion.

The principal basis for the production increases shown in Figure 4.3 rest on the assumption that crop yields would double by the year 2000. We believe this is not an unrealistic assumption. Indeed, increases of this magnitude have been attained elsewhere in an even shorter period, but massive efforts were expended to achieve such growth. Furthermore, it should be recognized that the projected increases in Figure 4.3 could be attained through a combination of higher yields per feddan, increased production from newly reclaimed areas, and from a continuation of the trends in meat, dairy and vegetable oil production of the past twenty years. Although not a factor in these projections, the value of food produced could be further increased by shifts in production to high value crops for export such as horticulture. Obviously such crops have the potential for generating a higher monetary return per feddan than many crops currently being grown.

[1/] Expenditures for imports referred to in Chapter 1 were valued in CIF rather than FOB terms.

[2/] Including production from "old new" lands.

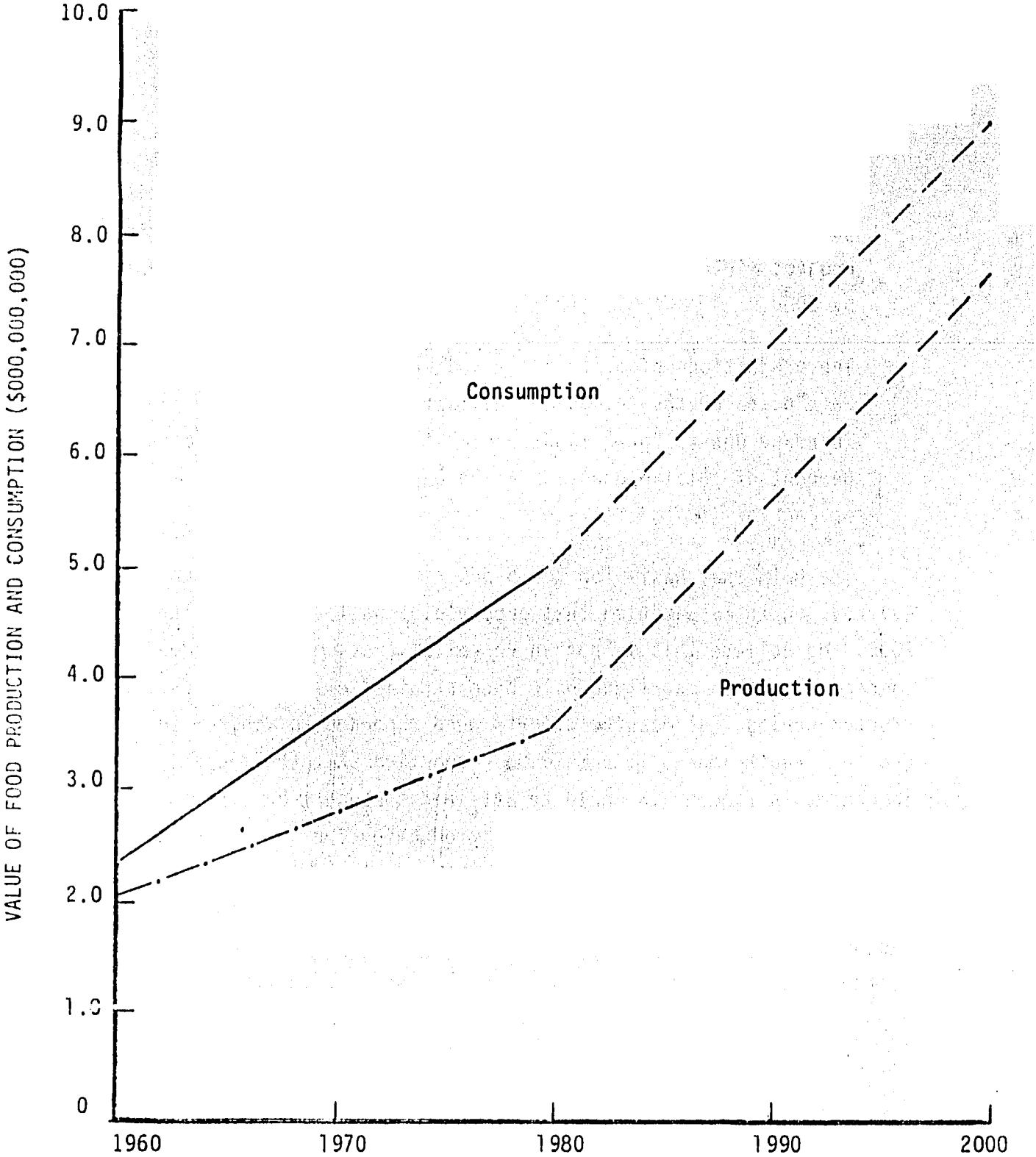

FIGURE 4.3 THE VALUE OF FOOD PRODUCED AND CONSUMED IN EGYPT FROM 1960-1980 WITH PROJECTIONS TO 2000 A.D., ASSUMING AN INCREASE IN OUTPUT OF APPROXIMATELY 100 PERCENT OVER 1980 LEVELS (REFERRED TO AS "HIGH" PRODUCTION LEVELS IN TEXT).

Many different scenarios could be developed to project ways for reducing the food production/utilization gap by 2000. We believe, however, that there is a realistic potential to reduce the production/utilization gap to manageable levels during the next two decades if the following efforts are given substantial endorsement policy-wise and financially:

1. A major all-out effort to increase the productivity of currently available lands and farming enterprises.

2. Further exploration of potential economic returns from agricultural operations on "old new" lands and "new" desert lands, along with development and use of such lands insofar as is economically feasible.

3. A concerted effort to explore fully the potential for developing significant export markets for high value horticultural crops.

4. Further exploration of the potential for producing significant levels of agricultural commodities for Egyptian use in the Sudan, and the development of this potential insofar as is economically and politically feasible.

Indeed, we believe there is the potential to completely close the production/utilization gap, as shown in Figure 4.4, through the above efforts to increase production along with related efforts to curb consumption or utilization. For example, the elimination of much of the waste and misuse of food commodities occurring under current food subsidy and price policies could reduce projected levels of food consumption shown in Figure 4.3. This would appear to be feasible without adversely affecting nutritional levels in view of the fact that per capita utilization of several major food commodities increased from 24 percent to 76 percent in a six-year period from 1974-1980. (Figure 2.3, page 79.)

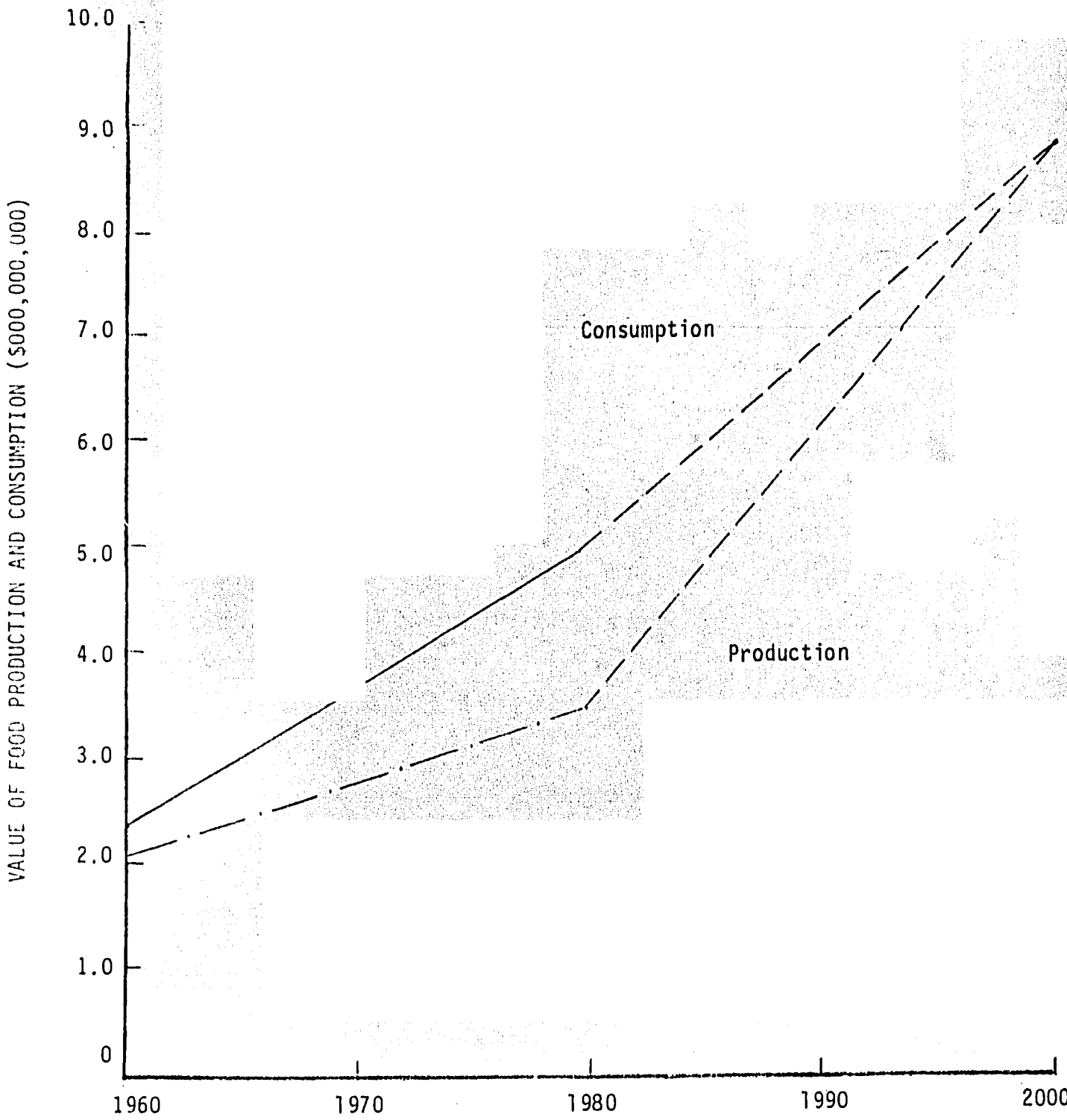

FIGURE 4.4 THE VALUE OF FOOD PRODUCED AND CONSUMED IN EGYPT FROM 1960-1980 WITH PROJECTIONS TO 2000 A.D., ASSUMING PRODUCTIVITY INCREASES SET FORTH IN FIGURE 4.3, SOME SHIFTS TO HIGHER VALUED CROPS FOR EXPORT, AND SOME REDUCTION IN PER CAPITA CONSUMPTION LEVELS BELOW THOSE PROJECTED IN FIGURE 4.3.

Production of cereals in the Sudan will not narrow the monetary gap since these commodities will have to be purchased; however, such production will provide a dependable source of cereals to help meet Egypt's needs.

The extent to which the production/utilization gap will ultimately be closed will depend in large measure upon the success by the government of Egypt in developing the well integrated and coordinated approach to accelerating agricultural development recommended herein. The longer action is delayed in implementing these efforts, the more difficult and complex the problems will become.

We conclude by expressing our strong optimism concerning the future of Egyptian agriculture. Few places in the world, in our opinion, offer greater potentials. However, if these potentials are to be translated into reality, a major commitment on the part of the people and the government of Egypt is essential. We fervently hope such a commitment will be made.