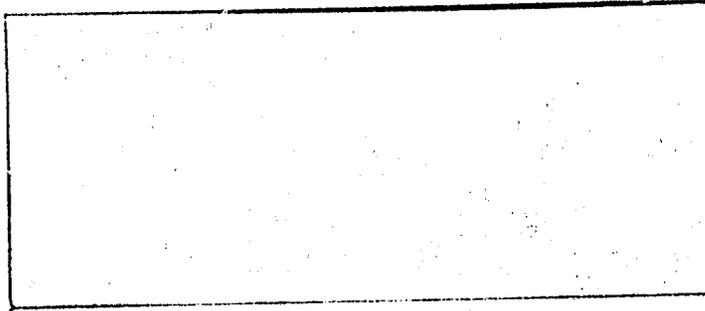


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REPORT
ASSESSMENT OF THE AGRICULTURAL
INPUTS SUPPLY SYSTEM AND
POLICIES IN
EGYPT

Submitted to the Agency for International Development
in Fulfillment of Work Order No. 6 under
Contract No. AID/SOD/PDC-C-0218

June 4, 1980

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Attention: Mr. R.B. Morrow
Near East Bureau
TECH/Agriculture

SUBJECT: Submittal of Report, "Assessment of the Agricultural
Inputs Supply System and Policies in Egypt"

Gentlemen:

In fulfillment of Work Order Number 6, Contract Number AID/SOD/PDC-
C-0218, we are pleased to submit the Report identified above.
Dr. Newberg of our staff served as leader of the three-person team,
which included Drs. Ogren and Sharples (provided by the U.S.
Department of Agriculture). MASI staff typed and edited the final
report.

As required in the Work Order, thirty copies have been prepared
for USAID/Cairo and twenty copies for AID/W. Because of a late
AID/W request, we are submitting an additional seven copies for
your use.

We appreciate the opportunity to serve the Agency again.

Very truly yours,

Gaylord L. Walker
cjm

Gaylord L. Walker
Director

GLW:aid

Enc.

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PREFACE

This report was prepared by a team composed of three agricultural economists, Dr. Richard Newberg, Multinational Agribusiness Systems Incorporated, and Drs. Kenneth Ogren and Jerry Sharples, of the U.S. Department of Agriculture.

The team spent approximately 1-1/2 months in Egypt in February-April, 1980. Midway in the assignment they were joined for 10 days by Dr. Theo Watson from University of California, who is a specialist in pest management.

The scope of work called for the team, working with assigned Ministry of Agriculture officials, to produce a consolidated team report consisting of:

1. An assessment of basic policies and programs affecting access to inputs, farmer's use of inputs, and needs for improvements in the system.
2. Those recommendations for policy and program changes which are currently supported by adequate research and analyses or are readily apparent from existing data. The interrelationships of recommendations will be highlighted, e.g., results of a free fertilizer market with higher cotton prices.
3. Recommendations for a program of economic analysis and technical studies (including efforts at improving the data base) which will, over time, assist national planners to better

rationalize the use of scarce agricultural resources and generally address agricultural policy analysis for the economy. The report should cover the need for additional analysis and:

- a. Identify in general terms the nature, need and expected results from major types of assistance - e.g. sector analysis and modeling, data base or agricultural statistics improvement, and institutional development. Identify in specific terms the type and organization for USAID project assistance should the analytical and institutional needs require that type of effort.
- b. Outline the need, purpose, nature and expected outputs from specific studies.
- c. Outline the scope of work for specific studies and indicate type of skills, counterpart entities, financial resources and estimated time required to complete studies.

Unfortunately the Government was unable to assign Ministry of Agriculture officials or other professional personnel to work with the team. However, Ministry of Agriculture and other official personnel of other agencies were very accommodating in arranging meetings and in discussing problems and issues. The team was handicapped also by its inability to use Arabic language publications and non-availability of a centralized repository or bibliography of relevant materials in English and in other languages it might have more easily used - French, Portuguese, Spanish.

The data limitation encountered precluded the depth of analysis it was hoped could be completed in the time available. The team feels, however, that the data, time and helpful counsel were sufficient to pinpoint principal investment and policy areas for priority attention in accelerating agricultural development. Some of the major data deficiencies constraining more adequate policy analysis have been noted and priorities suggested for relevant data collection, analysis and training of agricultural economists to better meet needs for improved information in investment and policy decision making. However, given the information and government co-worker limitation, the team did not feel it could do a proper job on 3-C and opted to devote more time to other elements.

The team wishes to express its especial appreciation to the personnel of the agriculture staff of USAID/Egypt and the Office of the U.S. Agricultural Attache in Cairo who were very helpful in supplying data, arranging meetings and otherwise assisting the team in its assignment.

CHAPTER I

SUMMARY

A. Background

The Egyptian economy is going through a major transition. Political decisions have been made to place greater emphasis on the market place and on private enterprises. This transition, however, is just beginning in the agribusiness serving the agricultural sector. Although most of the on-farm production resources are privately owned, Government, through a combination of allocation, price fixing policies and public agribusiness operations directs, or at least strongly influences, virtually every aspect of agriculture.

This present network of government control of agriculture has evolved over the years and has habitually taxed the agricultural sector indirectly to pay for investments in other sectors. This policy was consistent with the conventional development wisdom of the time which equated development of non-agricultural sectors, and consequently reduction in importance of agriculture, as a principal means of overall development.

These agricultural policies are major contributors to the present state of agricultural stagnation, inefficient and often destructive resource use and low investment in agriculture. Major distortions exist in the market signals to farmers. Although farmers appear to be making economically sound decisions based upon farm-level prices and government constraints, production is greatly distorted when viewed in

terms of world prices, social costs of inputs and output opportunities foregone.

Taxing much of the surplus from agriculture has taken its toll on the agricultural sector. During the 1970's agriculture contributed about 30 percent of Egypt's domestic product but received only about 8 percent of public gross fixed investment. Very little of the agricultural investment came from private investors, since earnings -- and consequently savings -- were very low in the sector, and investment incentives weak. Further, there is considerable doubt about the priority and returns of public investments which were made.

The most visible evidence of investment is in new orchards, some mechanization and increase in livestock numbers. Effective dis-
investment is large and clearly evident in deterioration and loss of land due to waterlogging, salinity, urban sprawl and use of soil for brick making.

The overall picture of agriculture in the 1970's is one of slow growth, depreciation of the most valuable productive resource -- arable land -- and labor migration to urban areas which offered higher income potential. On the other hand, the surplus extracted from the agricultural sector helped the industrial and service sectors grow, helped develop infrastructure and pay government expenditures and helped hold down prices of food and fiber for domestic consumers.

B. Time for a New Approach

Looking to the future, there appears to be strong justification for major revision of Egypt's agricultural policies. In part this is

because the role of the agricultural sector in the Egyptian economy is rapidly changing, permitting a relaxation of these onerous demands on agriculture. In the 1980's agriculture will remain a major employer (at present about 40 percent of the labor force) but it will diminish relatively as a contributor to gross domestic product, as a source of government revenue and as a source of export earnings. Because of the rapid growth of the other sectors, agriculture is expected to contribute less than 20 percent to GDP by the mid-1980's, compared to 30 percent in the early 1970's. Agriculture's share of export earnings is expected to drop to about 10 percent by 1984, compared with over 50 percent in the early 1970's. By 2000 agriculture's share of GDP is likely to fall to 10%. Agricultural exports which earlier had been several times agricultural imports, by 1979 had dropped to the point where they only paid for about 30% of agricultural imports and by 2000 may pay for only 1-2% of agricultural imports.

The "bottom line" is that Egypt no longer needs to heavily tax agriculture in order to pay for growth in the remainder of the economy. Growth is well on its way in the nonagricultural sectors which now can and should pay their own way. In fact, other sectors need to help finance the rebuilding of the traditional backbone of Egypt - the agricultural sector. The need for this shift in investment priorities is recognized by the Egyptian government planners. The 1980-84 plan, for example, proposes substantial increases in agriculture's share of gross public investment.

Major questions are: Will the resources be there and made available to agriculture? Will the necessary measures be taken to identify opportunities and expand the absorptive capacity? How can drawdown of donor financing in agriculture be accelerated?

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If the Egyptian government would actually shift its policies so that it no longer would need to obtain a net surplus from agriculture, then a major justification would disappear for the tight government control of agricultural prices, production and inputs. Relaxation in these contexts would be a major factor in revival of agriculture. Income earned by the agricultural sector could remain in the sector to be consumed or reinvested. Higher earnings and less controls could increase private production and investment incentives, initiative, and efficiency at the farm level. As a consequence, the economic activity in rural areas could increase and the rate of migration to urban areas could diminish. Further, the government could be relieved of some of its heavy administrative and operational load in the sector, thereby permitting it to concentrate on those services and infrastructure which must come from government.

Since Egypt is so heavily dependent on foreign assistance for its development financing, this probably would require that the government take the initiative in presenting a comprehensive plan which clearly spells out its scheduling of actions for:

1. Gradual disengagement from its extensive system for control of crop rotation, input allocations, output price, and adoption of measures to improve production and investment incentives.
2. Divestment of those production operations and services not clearly demonstrated to be essential and unfeasible via other organizational forms.

3. More adequate support and improved operation of services for which non government alternatives are not feasible, e.g., research, extension, roads, major irrigation infrastructure, essential regulation, inspection and collection of information.
- 4 Increase in supply of credit funds to help foster essential investment in production, marketing, processing and storage of agricultural products.
5. Gradual disengagement from its extensive and costly system of consumer subsidies and price controls and substitution of a program targeted to low income groups.

With such a program in hand, the government should approach the international donor community, from which most of its development resources come, requesting more flexible and more rapid disbursing loans and grants required to undertake and carry out this more ambitious and expansive agricultural development plan.

We think that if the government were to propose a well-defined multi-year sectoral development program stressing policy and program improvement, greater investment, government disengagement from all but clearly essential operations and regulations and stimulation of greater individual initiative in production and marketing, the international donor community would respond positively by increasing its commitments to the sector and making resources available more quickly and flexibly.

C. Investment Priorities

Based on our analysis of agricultural production problems and probable returns, we recommend highest priority be given to full development of the production capacity of old lands principally by:

- Integrated programs of drainage and efficient water management involving maximum feasible individual and collective initiative by farmers.
- Plentiful supply through domestic production, import, and improved distribution of principal inputs: improved seed, fertilizer, pesticides, improved livestock and poultry breeding stock and feeds (hopefully with both feed and livestock products being sold without administered or government fixed prices or subsidies). To this might be added gradual mechanization in ways which will avoid labor displacement while contributing to increased crop intensity and output per feddan and per animal unit.
- Improved research and extension which emphasizes cropping systems, soil fertility including minor elements, pest resistance in major crops and summer/winter forage combinations.
- Expanded credit, especially to small farmers.

(Other investment candidates are suggested in Chapter III.)

Too little of present public and private resources and efforts are given into all areas relative both to nonagricultural sectors and to "old new" lands and new lands.

Much lower priority should be given to improvement in productivity of "old new" lands and development of new lands since, at the moment, the economics are less favorable for such investments. But Egypt probably cannot afford to make all its decisions on all investments or resource conservation and development measures using strictly benefits/cost criteria. The energy crisis is teaching many lessons on economics of resource use and conservation. Given Egypt's vast solar potential for development of energy and the crash programs worldwide likely to be undertaken for increased efficiency in capturing solar energy, it is quite possible that solar energy may eventually provide the lift necessary to move water to areas where now it does not appear to be economically feasible. Egypt might start now to create the informational, institutional and personnel experience bases necessary to capitalize on such developments when they occur. Further, the conditions that Egypt faces, some investment in development of new lands appears justified in the interest of food security, even if a favorable benefit/cost ratio cannot be demonstrated at this time. The investment is higher risk but it has the potential for high long-run payoff. Such high risk investments clearly should be limited to a small part of the total amount invested in the sector.

In summary, we feel that much more resources, both public and private need to be directed to agriculture. Within the agricultural sector a much larger share of the pie should be directed to improvement in production on old lands while a still substantial but considerably smaller share than at present should be directed to old new and new lands.

D. Redirection of Price and Allocative Policies

We suggest the Egyptian government disengage itself in phases from its present dominating role in agriculture and focus more on the classical functions of research, extension, regulation, inspection, credit, and investment in areas not likely to attract private funds such as major irrigation, drainage, and roads. Three stages are suggested:

PHASE 1

1. On the farm front

- a. Eliminate official quotas and price controls on all commodities except cotton. This has essentially been done for wheat with no adverse effects. Rice has practically disappeared as an export commodity. Quotas and controls are not very important on others.
- b. Raise the price of cotton by about 50% to restore farm prices to the 1978 relationship to world prices or a little higher.
- c. Raise prices of fertilizer by 50% (the amount of cotton price increase).
- d. Make fertilizer available without restriction as to quantity, crop, or location, with sufficient imports programmed well in advance to assure a plentiful supply.
- e. Eliminate land (feddan) allocations or rotation by crops now imposed on farmers.
- f. Provide adequate credit to finance fertilizer purchases for all crops.
- g. Substantially reduce subsidies on feeds of all types including imported feed grain.

h. Establish a floor price for rice and wheat somewhat above the current price.

2. On the consumer front

- a. Modify rice rations to reduce the total ration. For example, eliminate the family allocation, leaving only the individual ration.
- b. Tighten controls on very highly subsidized bread and flour to avoid misuse and wastage. Resort to rationing at reasonable levels per capita, if necessary.
- c. Attempt to check the increase in levels of import of meat, poultry, dairy products, vegetable oil and sugar. That is, restrict levels in 1980-81 to about 1979 levels.
- d. Adjust prices of cotton fiber to mills to reflect higher seed-cotton prices.

PHASE II

- a. Announce the future intent to further rationalize prices and reduce subsidy costs, for example, by reducing the high level of imports of luxury consumption goods of agricultural origin or taxing them, and by indexing food prices upward based on increases in real income per capita or some such formula. Then carry out this intent on schedule.
 - b. Impose a needs criterion on ration and other subsidy food programs in order to direct benefits increasingly to the lowest income groups, both rural and urban, eventually eliminating benefits to the more affluent.
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- c. Eliminate subsidies on all seed, pesticide and feeds (except possibly for emergencies).

PHASE III

Make further adjustments in prices and imports based upon: (a) an evaluation of Phase I and II, and (b) other economic analysis.

Foreign Assistance

First, we think Egypt needs to improve its management of total foreign assistance, particularly placing more stress on major programs, financial and other essential policy changes to improve the development climate and placing less emphasis on small and scattered projects.

Beyond this, our recommendations for aid programming are divided into two parts: (a) changes in amount and direction of donor assistance for agriculture, and (b) a research program that focuses on agricultural economic policies. We suggest that Egypt be prepared to go forward with new concepts and proposals to the donor community.

The U.S. assistance effort has been directed primarily to development of an institutional base and technology required for accelerated and sustained sectoral development. That essential early effort should be seen through to fruition.

Our observations lead us to conclude that there are serious and growing problems with the current overall donor assistance orientation, especially to the agricultural sector. These are:

- Slow, uncertain rates of disbursement of funds in the pipeline.
- Heavy, possibly unmanageable, demands on Egyptian administrative machinery and staff.
- Unbalanced requirements for local currency relative to foreign exchange.

The Egyptian government has taken on a heavy administrative and financial burden for managing a complex and growing system of public companies and controls that pervade the agricultural sector. Recently the climate which led to this continued growth seems to have changed. The role of agriculture in the economy also has changed and this change is likely to accelerate, as discussed earlier. We interpret recent plans and statements to indicate that the Egyptian government is interested in starting to dismantle much of the public control of agricultural production. This task would be greatly facilitated if adequate resources were available to the government for agricultural investment including import of intermediate production goods. In recent years the agricultural sector has been starved for investment capital and intermediate production goods rationed.

Recognizing these investment needs, the government's 1980-84 strategy calls for a significant increase in investment in agriculture. Great demands will be placed upon the government bureaucracy in planning and implementing the additional investment as well as trying to deal with the serious structural and policy issues. It is unlikely it can be done without:

- considerable improvement in supply of local currency and foreign exchange liquidity,

- more rapid drawdown of foreign assistance funds, and
- fewer demands, or a least a reduced rate of growth in demands being placed upon the administrative machinery to plan and implement large numbers of relatively small and scattered projects.

Given these problems, we suggest an expansion and redirection of foreign assistance to the agricultural sector. Specifically, we recommend that the donor consortium be prepared to make available a major sector assistance package that can be used with flexibility and be drawdown rapidly. The package might include part of the food aid plus up to say 15% of the total other consortium funds for Egypt planned over the next 5 years. These latter funds should be made available for purchase of goods and services with minimum restriction on source (including some use for local cost financing) in support of an aggressive expansion of Egypt's agricultural sector. Hopefully, most major donors would contribute in this effort. These additional resources, available with greater flexibility from those contributing, should enable Egypt to proceed with investment and policy changes which are essential for a much accelerated rate of agricultural growth. The commitments Egypt should be able and prepared to make might include as a minimum:

- Increase in investment in the agricultural sector to about 20-25% of total investment.
- Shifting to a policy that encourages private investment and initiative and reduces dependence on direct government operations and controls. A start has been made, but disengagement of government from inefficient operations and costly, unnecessary commitments should be much accelerated.

- Allowing investment decisions to be influenced primarily by short-and long-run cost/benefit analysis, less by ease of project documentation or by particular donor requirements.
- Implementing major reforms in the consumer price and subsidy programs to reduce the burden on both farmers and on the treasury.

We suggest the program be implemented by a package of donor loans or grants to the Ministry of Finance (or other appropriate body) with a specific understanding as to investment allocations and specific policy adjustments the Egyptian government plans to make such as those outlined earlier. The funds would be tranced probably on a quarterly basis. The second tranche would be released on the basis of initiation of the first quarterly evaluation. Release of subsequent tranches would be dependent on specific progress in allocation and use of resources and execution of policy adjustment measures as described in the terms of the agreements. The terms might follow rather closely Egypt's 1980-1984 strategy. The idea is not to elicit a totally new plan but to provide the means for insuring implementation on schedule of the investment plans and bringing about changes generally recognized as needed in prices and related interventions which now adversely affect the supply and demand balance for agricultural products and adversely affect incomes of rural people.

Policy Research Strategy

We recommend that GOE and USAID support a series of research studies directed to priority issues, some of which are suggested in this report. The most urgent research needs are for studies that provide a

better understanding of the basic economic relationships. Input/output data are needed for crops and livestock, particularly micro data. What is the complex relationship among food and power demands for livestock, livestock feed, and the cropping pattern? An understanding of the "big picture" is also needed. For example, how does a ton of wheat or other commodity get from the ship or the Egyptian farmer to the consumer and what are the real costs and value added along the way? What subsidies or taxes are imposed along the way? What is the real incidence of costs and benefits of different subsidies and price controls? How do they affect output and investment? An illustrative list of studies of this type are attached in Chapter III.

We recommend that at this time formal systems analyses or sector modeling not be encouraged. The scarce human and financial resources available for policy research need to be concentrated on more fundamental issues. Also, these more sophisticated techniques require a long-term commitment of research resources. To utilize these techniques, a continuity of personnel, research objectives, and financial support would be needed, i.e., a stable institutional structure dedicated to agricultural policy research and in touch with policymakers. That does not now exist and we do not think it expedient at this time to attempt to mobilize the personnel and financial resources and deploy them for such use.

To further assist the growth of agricultural economic research capability, support should be provided to the teaching-research program in the agricultural economics (and/or economics) departments at the universities. Their libraries are very poor. Textbooks, reference books,

journals and data books (data on Egypt, world trade, agriculture around the world) are needed. Visiting professorships might be sponsored as well as Egyptians going abroad and U.S. professors going to Egyptian universities. Emphasis should be on teaching and research related to the more "applied" issues.

We further recommend that the GOE and AID support the improvement in the collection of agricultural statistics, as discussed in the Koffsky-Henderson Report.

CHAPTER II

EGYPTIAN AGRICULTURE:

NEW POLICIES FOR A NEW ERA

Modern Egypt is in a new era of economic and political development. Beginning with the 1952 Revolution, the Egyptian economy has been going through significant transformations. With new leadership in the 1970's has come new political and economic developments such as the "open door" policy of 1974, and more recently a first but very important step in the direction of peaceful relations with Israel.

The thesis of our report is that in this new era, agriculture has a new and different role to perform in the optimum development of the Egyptian economy. The agricultural policies of the last thirty years are not appropriate for the future development and growth of agriculture. A reorientation and redirection of agricultural policies will be necessary to give the revitalization to agriculture to permit it to perform its crucial role in the overall development of the economy more effectively.

In our discussion we found virtually unanimous recognition of an urgent need for reorientation of present agricultural policies. The same conclusions were encountered in various analyses and reports available to us.

In the last section of this chapter we make some recommendations for policy and program changes that we believe would represent a useful

beginning in this needed policy reorientation. These recommendations are based on the basic facts and information and analysis which we present in the first three sections of this chapter: The Past Thirty Years; Trends and Developments; Egyptian Agriculture Today; and A Look Into the Future, in which we examine the implications of a projection of current trends into the next two decades.

In the second part of this report, Chapters III - IV, we present in greater detail some of the important policy issues that we suggest receive top priority in the development of a program of economic analyses needed to assist national planners to develop new policies and programs that will promote a more optimum use of Egypt's scarce agricultural land resources. Also presented in this second part of our report are recommendations for specific research studies and suggestions for changes in assistance programs that could better assist Egyptian decision makers in their development of improved agricultural policy and program analysis and implementation. The appendix contains a discussion of purchased production inputs and related issues.

A. The Past Thirty Years: Trends and Developments ^{1/}

In a country where farmers have tilled the Nile River Valley and the fertile delta lands for millenia, the past thirty years are but a dot on the time scale of Egyptian agriculture. Indeed, some of the crops

^{1/} See Table 7 "Some Indicators of Agriculture's Changing Role" for much of the basic data underlying the discussion and analyses in this section and the following sections of Chapter II.

tilled in pharaonic days are still tilled today and in much the same manner using the indispensable waters of the Nile. Nevertheless, within the short space of the last three decades, the initial period of Egypt's emergence as a modernized economy, changes in agriculture, and especially in its role in the overall economy, have been more dramatic and revolutionary than in its entire recorded history.

The Land Reform Act of 1952 and subsequent land reforms have transformed Egyptian agriculture into one characterized by large numbers of small land holders with a few large government units; there are now about 2.8 million land owners, of which about 2.3 million (82%) own three feddans or less. Only about 2% of all land holders own more than 10 feddans, together accounting for about 18 percent of total area.

With the completion of the Aswan High Dam which became fully operational in the year 1968, for the first time in Egyptian history the immense watershed of the Nile River was harnessed so that its waters could be made available for continuous irrigation, and the annual flooding of the lower Nile Delta was eliminated.

Probably the greatest impact on agriculture and its role during the last three decades has been the rapid rate of population increase and policies which stimulated per capita food consumption. This increase in population has added more mouths to be fed -- 23 million -- than there were in total in 1950, an estimated 19 million. Most of this increase found its livelihood outside of agriculture in government, trade, service, industry and importantly in foreign employment. Rapidly increasing demands were placed on agriculture, not just to

feed and clothe, that is, better feed and clothe this burgeoning population, but also to contribute more in the way of intersectoral transfers of resources out of agriculture for investments, to finance government operations and to contain inflation in consumer prices. Agriculture was not up to this entire task.

Agriculture imports have skyrocketed in recent years under the combined impetus of agriculture price controls to contain consumer price inflation which stimulated consumption, starvation of agriculture for both investment funds and short-term funds for intermediate production goods which constrained production.

1. Resources: Land, People and Capital

To summarize the salient features: An arable land area extremely limited in relation to Egypt's population, with severe physical and economic constraints on its expansion; a population currently increasing at the rate of 2.5 to 2.9 percent or 1.0 to 1.2 million per year; and an agriculture that has received low priority for public capital investment together with very little private investment and very little incentive to expand output of basic crops.

Land: Total area now in cultivation is estimated at 6.0 million feddans. Taking account of multiple cropping (usually two crops), the total area available for crops on a yearly basis is increased to 11.0-11.5 million feddans. Since 1950, this cropped area has increased by about two million feddans or about 20

percent. All of this increase came from increased double cropping and reclaimed or "new lands" while a significant part of the old lands was lost to urban development and other non-agricultural uses. With loss of the annual flood borne silt, brick makers are drawing on unreplaceable silt deposits further reducing the production base.

Increased population pressure on land: The increase in pressure on the land is even greater than is suggested by a statistical comparison of people per feddan (4.0 in 1950 and over 7.2 in 1979) when the low productivity of the "new lands", is taken into account. These new lands, now 15 percent of the present arable land, account for only an estimated three percent of total agricultural output. Adjusting for the lower production of these new lands would give an effective decline in land per person of 0.25 feddans in 1950 to about 0.12 in 1979.

Rural-urban migration and shifts in employment: Employment in the farm sector has dropped from around two-thirds of the total to 40 to 45 percent. Despite the continual large rural-urban migration, especially to the Cairo area where almost one-fourth of the population lives, the population living in rural areas has continued to increase since 1950. Many of these rural people are under-employed and must depend on non-farm sectors for employment.

Low capital investment in agriculture in relation to its overall contributor to the economy: Except for the investment in the Aswan High Dam, public investment in the 1950's and 1960's was

concentrated on the industrial sector. In the 1970's increased emphasis has been placed on public investment in social services, especially housing and education. Agriculture's share in the 1970's has ranged from 5 to 10 percent of the total. Private investment has been small, mostly it appears in new orchards, mechanization and increase in livestock inventory and some new land development. Offsetting this has been a heavy desinvestment in the form of loss of productivity due to waterlogging and salinity and urban sprawl.

2. Agricultural Output and Productivity

The agriculture of Egypt is two-thirds to three-fourths crop production (depending on relative prices used). Historically, large farm animals have been kept primarily as a source of power in tilling the soil, lifting irrigation water and for transportation of produce and for milk production. There are virtually no natural grass lands or pastures in Egypt. Most of the animal feed comes from irrigated forage crops, mainly berseem clover, crop residues and grain, and oilseed milling by-products.

Cropping patterns: In Egypt there are three seasons: winter, summer and nili (fall), with winter by far the most important until the Nile water began to be controlled by barrages and dams. Prior to Aswan, winter crops accounted for 46 to 47 percent of the crop area; summer crops about a third, and nili crops, one-fifth. Since the Aswan High Dam, the Nili crops have dropped sharply in importance to about seven percent of total cropped area and summer crops increased most rapidly. The area in summer and winter crops is now about equal.

Principal crops: Principal crops in terms of area are berseem for animal feed, maize, wheat, cotton, rice and vegetables. Of lesser importance are fruits, sugarcane and pulses, mainly broad beans and sorghum. About 325,000 feddans (six percent of total arable land) is in fruit orchards, approximately half in oranges. Winter crops ranked by area in recent years are clover, wheat, broad beans, vegetables and barley. Maize covers the largest area in the summer followed by cotton, rice, vegetables, and sorghum. Sugarcane and orchards occupy the land throughout though some of the area may be interplanted at times. The big shift in seasons after the Aswan High Dam was for maize, changing from almost totally a nili crop to about 75 percent summer season crop. Of the area now used for nili crops, maize still accounts for the major share, with vegetables another important nili crop.

Shift in cropping pattern: Despite inherent rigidities in the crop rotation, important shifts have taken place since 1950. The most dramatic increases were in vegetables, an increase in area of more than 3.5 times (700,000 feddans) raising the percentage of cropped area from three to nine percent, and for winter clover, which increased by about one-third (an increase of 700,000 feddans) since the early 1950's. Area in fruit orchards and sugarcane, while less in total importance, increased at the same rapid rate as vegetables, with an increase in each of about 200,000 feddans. Area in rice which doubled, from 500,000 to over one million feddans in the late 1960's (in large part, attributable to additional water available from Aswan Dam) has dropped off slightly in recent years. On the negative side, the largest drop in area was in Egypt's traditional high-valued export crop, cotton, from 1.8 million feddans in 1950 to only 1.2 ³⁰

million in recent years. Wheat, another traditional crop dropped both in area and importance, as have the lesser cereals and pulses -- barley, lentils and beans. Maize, while relatively constant in total area, has declined in importance relative to total output.

Overall productivity growth lags in 1970's: Following the 1952 Revolution, when many of the economic and social programs were directed specifically at improving the productivity of the agricultural sector, total output grew at an annual rate of 3.5 to 4.0 percent. In the 1970's, however, growth rates fell to less than 2.0 percent in most years. The index of agricultural production in 1977 was only about 18% above the 1961-65 average, according to U.S. Agricultural Attache estimates. ^{1/} After a negative growth rate of 0.7 percent in 1977, estimated growth rates of 3.0 and 2.6 were obtained in 1978 and 1979.

Yield changes: Slowdown in yield increases in 1970's, were major cause of mediocre productivity growth (Table 1). Wheat yields in 1979 were only two percent higher than in 1972, following a 68% gain in the two decades 1952-72; likewise, maize yields were up only two percent in 1972-79 compared with a 79% rise in 1952-1972; yields of sorghum, lentils and sugarcane show similar patterns, with yields of the latter two crops lower in recent years than in 1952. Rice yields increased rapidly in the 1950's with the introduction of the new NAHDA variety, but has shown

^{1/} Egypt: Agricultural Situation Report. Report No. EG-0002 of 1/25/80, USDA, P. 33.

TABLE 1AREA, PRODUCTION AND YIELD OF MAJOR CROPS - 1950 to 1979WHEAT:

<u>Period</u>	<u>Area</u> (million feddans)	<u>Production</u> (million tons)	<u>Yield</u> (tons/ feddan)
1950-51	1.571	1.318	0.84
1955-59	1.501	1.464	0.98
1960-64	1.387	1.504	1.08
1965-69	1.268	1.362	1.07
1970-72	1.297	1.620	1.25
1973-75	1.337	1.918	1.43
1979	1.391	1.856	1.33

MAIZE:

<u>Year</u>			
1950-54	1.746	1.568	0.897
1955-59	1.84	1.624	0.877
1960-64	1.727	1.823	1.055
1965-69	1.510	2.269	1.502
1970-72	1.519	2.384	1.569
1973-75	1.746	2.550	1.460
1979	1.884	2.938	1.559

PADDY RICE:

<u>Period</u>			
1950-54	0.519	0.834	1.59
1955-59	0.654	1.385	2.12
1960-64	0.799	1.785	2.23
1965-69	1.033	2.177	2.10
1970-72	1.142	2.549	2.23
1973-75	1.034	2.313	2.24
1979	1.037	2.507	2.42

TABLE 1 (cont. page 2)

SUGARCANE:

<u>Period</u>	<u>Area</u>	<u>Production</u>	<u>Yield</u>
1950-54	96	3,306	34.5
1955-59	111	4,186	37.7
1960-64	122	4,726	38.7
1965-69	145	5,635	38.9
1970-72	194	7,475	38.6
1973	198	7,349	37.1
1974	208	7,018	33.7
1979	250	8,488	34.0

COTTON:

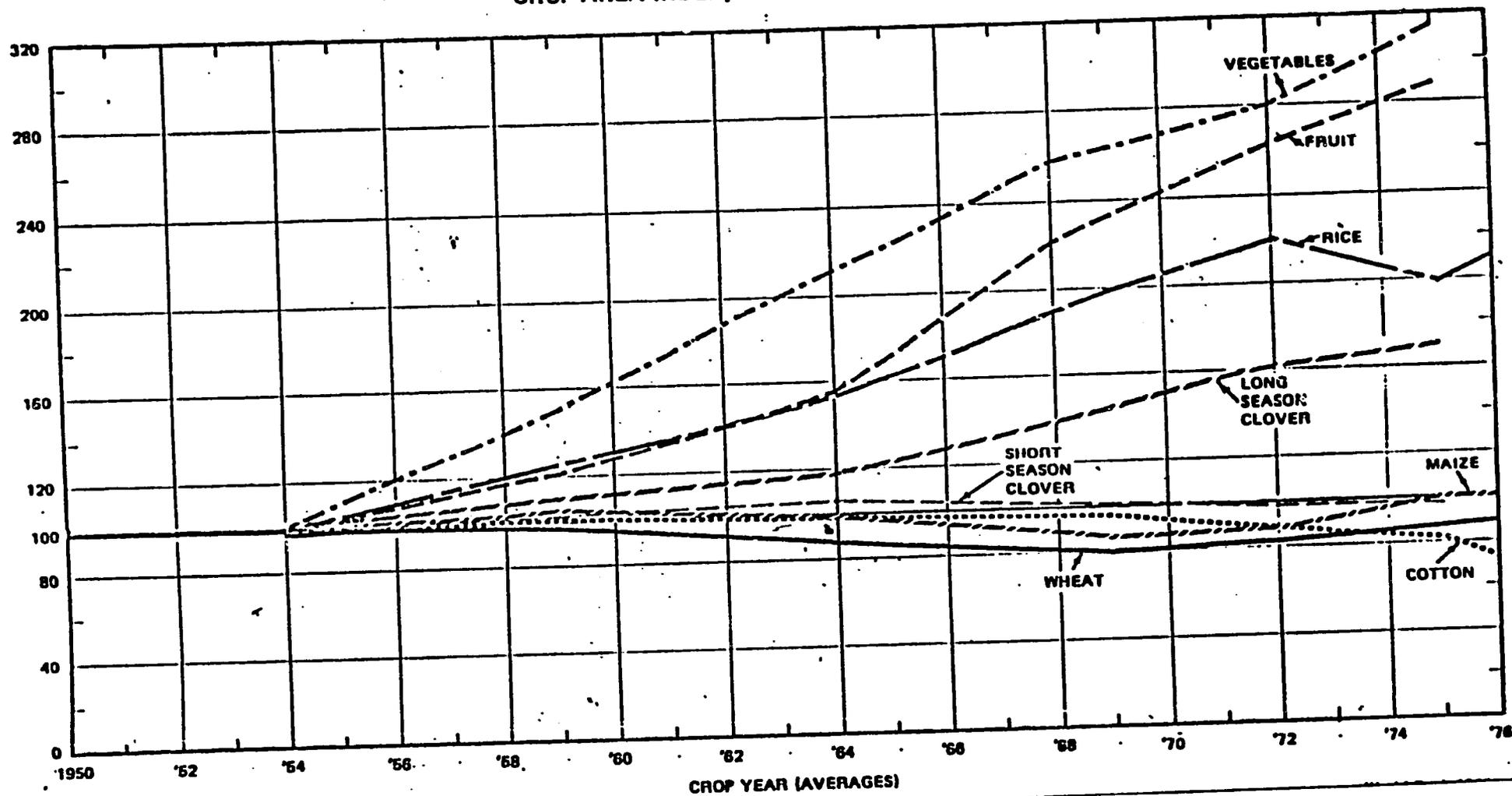
<u>Period</u>	<u>Area</u> (million feddans)	<u>Seed Cotton</u> (million tons)		<u>Seed</u>	<u>Yield</u> (tons/feddan)
			<u>Lint</u>		
1950-54	1.765	1.073	.371	.702	.608
1955-59	1.791	1.146	.393	.753	.641
1960-64	1.751	1.278	.443	.835	.729
1965-69	1.694	1.322	.478	.844	.784
1970-72	1.568	1.414	.511	.904	.901
1973-75	1.466	1.211	.437	.761	.823
1979	1.196	1.256	.471	.785	1.005

<u>Yield Index</u>	
<u>Year</u>	<u>Yield</u>
1950-54	100
1955-59	105
1960-64	119
1965-69	128
1970-72	148
1973-75	135
1975 /a	129
1976 /b	142

Source: Computed from Ministry of Agriculture data, as reported in Volume III IBRD report 1815-EGT, May 1978 PP 10, 13, 18, 21, 26. USDA EG-0002, Jor. 1980 P 30

/a Single year figures for comparison.
/b Estimate only.

CROP AREA INDEX, MAJOR CROPS, 1950-1976



34

Source: IBRD 1816 - EGT May 1978, P. 7

little improvement since then. Among major crops, cotton is the only really bright spot recently, with record yields in both 1978 and 1979, following mediocre performances during 1973-77.

Animal and animal-products in increasing importance: Even though secondary to crop production, dairy, livestock and poultry production now account for about 30 percent of total value added. This sector has been increasing in relative importance, both because of increased production and because of rising product prices relative to crops. The increased area of berseem clover reflects in part the growing emphasis on livestock production by Egyptian farmers. In recent years attention has been placed on increasing poultry production, mainly with government-owned poultry farms, chick hatcheries, and government supplied feed. Because of limited land for grazing and forage production, poultry is generally thought to be the best way to increase domestic production of meat protein.

3. Food and Agricultural Policies

The fundamental aim of Egypt's food policies since the 1950's has been to provide an adequate supply of basic food commodities at low prices to a rapidly-growing urban population. To achieve the objective of an abundant food supply at low prices, the government has imposed a complex set of government price controls and other regulations, including marketing quotas, at the farm level. On the marketing side, farmers face a range of situations that go from direct government purchase of all cotton at a fixed price to a relatively "free market" situation for berseem and for most

fruits and vegetables (notable exceptions are oranges and onions which are controlled). In-between situations exist for some products where certain quantities must be sold at controlled prices and additional production can be sold at market prices. Wheat recently has been freed from the requirement that a quota be delivered to the government. *but all is.*

Low fixed farm prices: Most farm prices are low in relation to "free market" and change only infrequently; in general, the controlled prices have lagged further and further behind prices in international markets. Illustratively, in 1979 when the Egyptian Pound was devalued from \$2.56 to \$1.43 and later effectively \$1.25, prices of controlled commodities were increased by one-third or less of this total devaluation. Producer prices for crops like wheat, rice, and cotton recently have been only 40 to 50% of international prices at free exchange rates.

Production input subsidies: To offset some of the adverse effects of the controlling farm prices at below "free market" prices, the government has introduced subsidy programs on input items including some seeds, fuels, some pesticides and fertilizer. Most inputs rose (in LE) by the full 1979 increase in the LE cost of foreign exchange of over 100%. In some instances, input quantities are limited by restriction on imports and subsidy budgets and allocations are made by crops. Irrigation water and drainage of excess water are provided without direct charges. Water use by farmers is restricted only by supply available and cost of low lift from canals to fields which commonly must be arranged and paid by the farmers. Over-use and wastage of water,

along with inadequate supplies of inputs are major production constraints.

Consumer subsidies and food rationing: On the consumer side, a food rationing/subsidy system has been established to meet the objective of low food prices. In the 1960's the cost to the government of this program was relatively low. But the cost of this program in direct government subsidies and indirect taxes on agriculture (through low controlled producer prices) has escalated in the 1970's, especially in the last 2-3 years. Estimated direct budget costs is expected to be well over LE 1 billion in 1980, with subsidy on wheat, flour and bread accounting for a major part. This sharp rise is the direct result of a government policy of sharply restraining price increases to consumers for basic consumption goods -- bread, flour, rice, sugar, vegetable oils, some animal products, and textiles despite the large increases in international price levels of these products beginning in 1973. ^{1/} No needs or income criterion is applied in allocation of funds and subsidies, consequently the higher income groups benefit as much or more compared with low income groups. Urban people benefit more than rural.

4. Food Consumption Trends

Egypt's low-cost food policy has tended to accentuate the rapid rise in food consumption levels and shifts in relative importance

^{1/} Costs of a significant number of other consumer goods are constrained by controls and/or subsidies including utilities, fuel, rentals, transportation, education, including room and board.

of individual foods and food groups already occurring as a result of rapid growth in population and rising per capita incomes. Total food utilization in recent years has been increasing at the high rate of about four percent compared with the population growth of 2.5 percent. (Some estimates put population growth in 1979 at 2.9%).

Overall, the Egyptian consumers are well fed both in terms of total caloric intake and nutrient composition, even though some malnourishment exists among the lowest-income groups.

Consumption of all foods combined increased rapidly from 1950 to 1979. The sharp increase in the importance of fruits and vegetables is the most notable change in the diet composition. Oils and fats also increased in importance while meats, milk and other dairy products declined in relative importance.

On a per capita basis, average caloric intake per day has increased from an average of 2,300-2,400 in the early 1950's to the present level of about 3,200.

Cereals remain the main source in the Egyptian diet for protein as well as caloric content -- contributing over 70% of proteins and calories. Wheat is the principal cereal, followed by maize and rice. Animal products provide only about 15% of total protein intake.

5. Trade in Agricultural Products:

Of all the changes in the various elements of the agricultural situation, the most dramatic shifts over the last 30 years have taken place in trade patterns in agricultural products.

It is said that in the early 1950's Egypt was on a "cotton standard" in its foreign trade. Cotton was the main (and almost only) source of export revenue. Egypt accounted for 80 to 85 percent of the world's trade in long-staple cotton.

Raw cotton is still Egypt's principal agricultural commodity export, but its importance in the total commodity exports has dropped sharply in the 1970's to only 14 percent in 1978 and 1979. It is estimated that in 1980 its importance may be less than 10 percent as Egypt's oil revenues continue their steep rise. Egypt's share of total world trade in long-staple cotton has likewise declined, to around 55 percent.

When exports of other agricultural products, principally rice and oranges, are added to cotton, agricultural products made up slightly over a fifth of Egypt's total commodity exports in 1978 and 1979. The value of cotton yarn and textiles exports in recent years have about equalled or exceeded those of raw cotton.

On the import side, the combined effects of Egypt's large increase in total food consumption and the slowing down in the growth rate of agricultural production has transformed Egypt from a net exporter of agricultural products to a large importer of

many foods important in the consumers' diet. In the three-year period, 1977-79, imports of nine basic food groups (excluding fruits and vegetables) ^{1/} made up 42 percent of the total supply (on a quantity basis). More than 70 percent of the wheat was imported, 70 percent of the vegetable oil, and 87 percent of lentils.

For other food products normally exported, e.g., rice and oranges, increased demands domestically have restricted export availabilities. Although traditionally a rice exporter, Egypt may become an importer in the next year or two because of rapidly rising consumption stimulated by artificially low prices and relatively stable production.

Import of substantial quantities of foods (e.g., wheat and flour, and vegetable oil) have been concessionally financed by programs such as PL 480, the Commodity Export Program, and other food-aid programs. About 70 percent of total food and agricultural product imports from the U.S. were through U.S. government financing programs.

Tobacco is also a major agricultural import because Egypt prohibits by law its domestic production even though it is a potentially very profitable crop for Egypt, offering high employment prospects.

^{1/} Wheat, rice, corn, beans, lentils, vegetable oil, sugar, red meat and poultry meat.

B. Egyptian Agriculture Today

Until the last three-four years agriculture was the major source of employment, foreign exchange earnings and tax revenues and savings for investment as well as supplier of the food and fiber needs of the population. It is apparent that the role of agriculture on most of these counts will continue to decline.

Farm employment as a percentage of total employment is dropping at a steady rate, although still the largest single sector accounting for about 40% of the labor force. In 1950, agricultural exports in value were three times agricultural imports. In 1979, agricultural exports were a third of agricultural imports. About 40 percent of Egypt's food needs are now imported. With respect to foreign exchange earnings, agriculture has dropped from 90 percent of total merchandise exports in 1950 to 14 percent in 1979. If non-merchandise sources of foreign exchange are also included, agriculture would be closer to 5% of the total. The agricultural sector, however, still contributes a considerable amount to overall government revenues and unbudgeted subsidies to other sectors, certainly a level out of proportion to its share of national income. Much of the transfer out of agriculture is hidden in the discriminatory pricing systems for export products like cotton, and rice and the artificially depressed prices which are effectively taxes on other products.

On the consumer side as well, the rationing and pricing system differs for each product (Table 2).

These policies aimed at keeping prices to urban consumers from rising with general price inflation and at overall "management" by government of agricultural production have had some far reaching and probably unintended results.

On the production side, farmers have shifted to a remarkable degree their crop and livestock enterprises, considering the cropping regulations imposed by the government and the inherent inflexibilities of crop rotations in Egypt. As noted in the "Trends" section of this chapter, farmers have greatly increased their area in fruits and vegetables and berseem clover (fed to livestock) -- products for which their prices respond to market conditions while the cropped area of several controlled price crops, especially cotton, has dropped sharply. Attempts to persuade farmers to grow more cotton through input subsidies and fertilizer allocations appear to have been notably unsuccessful.

Overall, these shifts in crops and livestock have been in the direction of enterprises in which Egyptian agriculture does not necessarily have the greatest comparative advantage based on world price patterns. At the same time, because of subsidized prices, consumers have been encouraged to use more cotton, eat more wheat products, rice, sugar and cooking oils which has reduced export availabilities of cotton and rice and increased import requirements for wheat, sugar, and vegetable oils.

For three products -- wheat and wheat products, lint cotton, and sugar -- we compared world prices and Egyptian farm prices and estimated the impact on farmers and government expenditures for the year

1980. These calculations are based on approximations of 1980 world prices based on available current price quotations. But even if the average prices for 1980 are markedly different from our estimates, these data indicate how the system works to produce high subsidy costs and large transfer payments from farmers to government and consumers. (Tables 3-5).

Bread and flour prices are the most highly subsidized of any product, and are not subject to any quantity limitations. Consumers pay the equivalent of LE 37 per ton, or less than PT 4 per kilo for the lowest priced bread.^{1/} (At this cost it is generally believed that several hundred thousand tons are fed to livestock and unknown but large quantities wasted by consumers). Farmers' prices received for wheat on the other hand are less than one-third of the estimated cost of imported wheat (Table 3).

In an attempt to lower or at least keep in check the escalating cost of the flour and bread subsidies, the government on February 1, 1980, restructured its system of flour and bread products and prices by introducing a "new" lower quality bread made with a flour of higher extraction rate (Table 3). As a result, the product pricing structure of flour and bread is even more complex than before and likely subject to more evasion and product substitution than ever before. Despite this restructured system, the 1980 budget costs estimate is LE 700,

^{1/} The low cost of bread, the food staple of Egypt, was forcefully pointed out to us by comparing and showing that a skilled construction worker can buy more bread with his day's wage than can his counterpart in the U.S.

compared with LE 588 in 1979. The transfer from wheat farmers to consumers amounts to about LE 200 million/year.

For sugar, world prices thus far in 1980 are running well above 1979. The fixed price to sugarcane producers is well below the world price. Based on recent prices, the implicit tax on Egyptian producers -- the difference between the equivalent value of their product at world price and payments to farmers made by the National Sugar Company -- equals about LE 195 million pounds (Table 4). At 2/3 current world prices the transfer would amount to about LE 100 million. This tax in effect permits the Egyptian government to make sugar available to consumers with relatively small losses to the government even at the present high world market prices.

Cotton producers in 1980 likely will receive not much over a third of equivalent world prices for long-staple cotton (Table 5). This difference represents an implicit tax extracted from cotton producers that is only to a small degree offset by government subsidies of pesticides, seed, and fertilizer to cotton producers. The estimated total tax of LE 650 million is divided three ways: for the lint cotton exported, government revenues are enriched by LE 200 million; for the quantity used in domestically produced and purchased textile products, the cost of cotton to textile mills is reduced by LE 360 million which is presumably passed on to consumers in the form of lower prices; for the quantity used in exported textile products, the cost of cotton to mills is reduced by LE 90 million.

In summary, the total "costs" for these three products -- wheat, sugar, and cotton -- in either implicit taxes on producers or in-

creased government cost of subsidies for 1980 are an estimated LE 1,500-1,600 million. The transfer out of agriculture would be in excess of LE 1,000 million for these three commodities. To this we could add another LE 200 for rice bringing the total to over LE 1,200 million -- about 10 times the transfer to agriculture for inputs -- fertilizer, pesticides, seed, gypsum used for these and all other crops. There are additional transfers from agriculture via administered prices for other commodities.

TABLE 2. Inventory of Government Interventions in the Production, Processing, Distribution and Consumption of Major Crop and Food Products

WHEAT AND WHEAT PRODUCT ^{1/}

Wheat producer

- Administered (fixed) prices.
- Marketing quotas up to 1979 crop.

Trade

- Imports wheat and flour to make up large domestic deficit. (About 70% of total consumption is imported).

Processing and distribution

- Regulates flour production and distribution, two different extraction rates (82.0% and 93.3%) from domestic milled wheat and an imported flour of higher extraction rate (72%).
- Specifies which flour should be used for different products.
- Regulates profit margin for bread bakers by setting fixed prices for flour and bread.

^{1/} See also Table 3.

TABLE 2. Inventory of Government Interventions, Cont., P. 2

-
- Sets prices for flour to different users and for different products, ranging from PT 2.5 to PT 15.2 per kg.

Consumer

- Fixed prices for four different quality breads and two different quality flours.
- Unlimited quantities available.

SUGAR ^{2/}Sugarcane producer

- Fixed price
- Government-owned sugar company only outlet.

Trade

- Government makes most of imports which account for 40% of consumption
- Beginning in 1979, private sector also allowed to import sugar.

^{1/} See also Table 4

TABLE 2. Inventory of Government Interventions, Cont., P. 3

-
- In 1979, because of low level international prices, government imposed consumption tax on private sector sugar importers to equalize import prices with fixed domestic price levels.

Processing and distribution

- Fixed price paid to sugar company for refined cane sugar.
- Subsidy paid to company to make up deficit between price received for sugar and cost of sugarcane plus processing costs.

Consumer

- Ration of 3/4 kg per person per month at PT 10 per kg. (About 25% of the world wholesale price).
- Unlimited quantity at fixed retail prices from PT 30 to 35 per kg depending on type and packaging (60-70% of the world wholesale price).

TABLE 2. Inventory of Government Interventions, Cont., P. 4

RICERice producer

- Fixed price for marketing quota.
- Additional quantities could be sold at free market prices which are greatly depressed by government monopoly on export.

Trade

- Rice purchased by government and private traders for domestic distribution.
- About 7% of total production is exported by government at world prices which are 2 to 2.5 times domestic prices.

Consumer

- Ration of 3/4 kg per person per month at PT 5 per kg.
- Additional quantities of packaged and higher quality rice available at PT 15 per kg, up to 5 kg per family (about 40% of the world wholesale price).

TABLE-2. Inventory of Government Interventions, Cont., P. 5

VEGETABLE OILOilseed producer

- Seed cotton and other oilseeds bought by government (only buyer) at fixed prices much below world price for cotton but at about the world price for soybeans.

Processing, distribution, and trade

- Oil processed from cottonseed and small quantities of other domestically produced oilseeds in government owned mills.
- Government imports additional quantities required for domestic market.

Trade

- 60 to 70% of the vegetable oil is imported.

Consumer

- Ration of 450 grams per person per month at PT 5 per kg. (About one-tenth of world price).
- Additional quantities (often limited by availability) at PT 34 per kg (about two-thirds the world price).

TABLE 2. Inventory of Government Interventions, Cont., P. 6

TEATrade

- All tea imported by government.

Consumer

- Ration of 80 grams per person per month at PT 11.
- Additional quantities available at PT 63 for 100 grams.

OTHER FOOD PRODUCTS (MEAT PRODUCTS, LENTILS AND BEANSProducer

- Fixed prices for oranges and onions at levels considered attractive to growers.
- Fixed farm prices for lentils and beans plus marketing quotas which are not always strictly enforced. Production is declining.
- In general, no prices fixed for animals and animal products. In some cases where farmers received low cost feed from the government, all or a part of the animals (poultry and fattened young cattle and buffalo) must be sold to the government at lower prices.

TABLE 2. Inventory of Government Interventions, Cont., P. 7

Consumer

- In general, these items less strictly rationed.
- Prices of rationed products fixed at low levels but quantity per family depends on supply and often is limited.
- Additional quantities of meat products depending on supply available at "free market" prices.

Trade

- About 30% of meat supply is imported (combined red and white meat). About 25% of total pulses are imported. Small exports of oranges and onions.

COTTON^{3/}

Cotton producer

- Fixed priced for seed cotton at about one-third the world price.
- Government only buyer.
- Area quotas for planting.

TABLE 2. Inventory of Government Interventions, Cont., P. 8

Processing, distribution and trade

- Seed cotton processed in government owned mills with price based on low internal price to farmers.
- Cotton lint to domestic textile industry (nearly all government owned).
- Remainder exported at world market prices.
- Exports of about 20 per cent of domestically produced textile products.
- Nearly half the cotton is exported as raw cotton, or yarn or textiles.
- Some imports of short-staple cotton.

Consumer

- Certain qualities of textiles available at low fixed prices.

PRODUCTION INPUTSFertilizer

Fertilizer is produced or imported by Government (almost 100%) and sold at PT 18-20/kg of Nitrogen and about PT 16.2 per kg. of Phosphate (P2O5). Allocations are made to different crops which may be bought on credit. A small extra amount may be purchased for cash.

3/ See also Table 5.

TABLE 2. Inventory of Government Interventions, Cont., P. 9

Beyond that, farmers go into the black market where prices often are 60% above the subsidized price. Private import of fertilizer is at free exchange rate, without subsidy.

The subsidized price which is about 50% of the CIF price, is expected to cost LE 80 to 90 million in 1980.

Seed

Most commercial seed produced by the government directly or by contract and sold at subsidy. Cotton seed is most heavily government controlled (it buys and gins the cotton and holds the seed. Seed is supplied for PT 2.5/kg or LE 25/MT at a rate of 60 to 70 kg per feddan planted.

Vegetable seeds are imported without subsidy. The total seed subsidy (other than cotton) for 1979 was estimated at LE 1-2 million.

Pesticides

Cotton pesticides are applied by the Ministry of Agriculture (MOA). Up to 1979, the subsidy accounted for 40-60% of the costs. In 1979 the the farmers share was increased to about 65% of costs. For 1980 the subsidy likely will be LE 30-40 million.

TABLE 2. Inventory of Government Interventions, Cont., P. 10

Pesticide imports up to LE 75 million will be made under MOA auspices at LE 0.7 to the dollar. Private imports will be based on a cost of about LE 0.8 to the dollar. Implicit subsidy about LE 3 million. Of the LE 75 million the Egyptian Agricultural Organization and Horticultural Union may be allocated about LE 30 million at the lower exchange rates.

Gypsum

Gypsum has been subsidized at LE 3.10/ton. With the increase in gypsum cost, the farmers share will rise sharply. Total 1979 subsidy LE 1.7 million.

Machinery

Subsidized in some cooperative operations. Credit and fuel are subsidized.

Feed

For ruminant livestock

Wheat bran, LE 40/MT

Mixed ration, LE 34-42/MT

Yellow maize, LE 55-60/MT

55

TABLE 2. Inventory of Government Interventions, Cont., P. 11

Quantities short and sharply rationed. Priorities on supplies are first government farms, then farmers supplying the government, then insured farmers (larger units), and last small farmers. Farmers sometimes have a commitment to sell cattle to government at lower prices if subsidized feed is used. These prices are under 50% of world wholesale prices, even less for mixed rations. Heavy, effective subsidies on by-products (cottonseed meal, wheat and rice bran) hidden by price policies on raw materials and principal products.

Poultry

Feed rationed at 2 kg per broiler with price about LE 180/MT. Price may be lower if producer agrees to sell birds to the government at a lower price.

Credit

Credit (mostly short-term) is available to cover part of production inputs such as fertilizer, seed, some feed at subsidized rate of interest. Medium- and long-term credit seldom available. Interest is subsidized.

Water

Water is delivered free of charge to or near the farmer's field. Generally, he must arrange for a low lift from the irrigation ditch to the field, but in some areas it is gravity-fed to the field.

TABLE 3. WHEAT AND WHEAT PRODUCTS: Sources and Cost of Supply, Prices to Consumers and Other Users, Subsidy Costs, and Implicit Tax on Farmers. 1980 Estimated

<u>Source of Supply</u>	<u>In 1,000,000 MT</u>	
Domestic production of wheat	2.0 (27%)	
Imports (wheat equivalent)	<u>5.3</u> (73%)	
Total:	7.3	
<u>Cost of Supply:</u> ^{1/}	<u>In LE 1,000,000</u>	
Payment to producers of PT 6.4 per kg	128 Imports	
at world price CIF of PT 20 per kg	<u>1,060</u>	
Total:	1,188	
<u>Flour Prices by Intended Users:</u>	<u>PT per kg</u>	
<u>LE/MT</u>		
Bread bakers:		
For standard "balady" (93.3%)	2.5	25 ^{2/}
For all other breads (82.0%)	6.3	63 ^{2/}
Macaroni producers (72%)	11.1	111
Pastry producers ((72%)	15.2	152
Household consumers (retail)		
82% extraction rate	6.5	65 ^{2/}
72% extraction rate	12.0	120

^{1/} Cost to the government of locally procured wheat is weighted average of government fixed prices for local and high yielding varieties. World price based on estimated U.S. wheat prices in Gulf ports plus transfer costs to Egypt.

^{2/} The price of standard "balady" flour at LE 25 per ton (\$31/MT) is about 12% of cost and other breads at LE 63 about 25% of cost based on imported wheat. The relevant consumer price of flour at about LE 65 also is about 25% of cost, based on imported wheat.

TABLE 3. WHEAT, AND WHEAT PRODUCTS, Cont., P. 2

<u>Bread Prices to Consumers (for unlimited quantities):</u>	<u>PT per kg</u>
Standard "balady"	3.7
Special "balady"	5.9
"Shamy" & European	6.8
<u>Subsidy Cost ^{3/} (1980 budget estimates):</u>	<u>LE 700 million</u>

Implicit tax on farmers

Approximately LE 120/ton on 1.8 million tons
equals LE 200 million^{3/}

^{3/} Actual cost is determined by receipts subsidized flour sales to various users minus the cost of wheat and flour to the government. When deemed necessary, the gross margin allowed to the bread baker is adjusted by changing the price of flour in relation to the established bread prices.

^{4/} Difference between estimated average of private and quota sales prices and C&F price. (Little is now sold to government).

TABLE 4. SUGAR: Sources and Cost of Supply, Consumer Rations and Pricing, and Implicit Taxes on Farmers, 1980 Estimated

Item	1,000 MT	1,000,000 LE
<u>Source of Supply:</u>		
Domestic production	658 (61%)	
Imports	<u>412 (39%)</u>	
<u>Cost of Supply:</u> ^{1/}		
Payments to producers at PT 9.5 per kg		62
Imports at world price of PT 40 per kg		<u>175</u>
Total:		237
<u>Consumer Rations and Pricing:</u>		
3/4 kg per month at PT 10 per kg	378	38
Unlimited quantity at PT 30-35 per kg	<u>692</u>	<u>221</u>
Total:	1,070	259
<u>Implicit Tax on Sugarcane Producers:</u> ^{2/}		195

^{1/} Payment to producers based on price of LE 9.8 per ton for sugarcane of 10.3 percent sugar content. World price based on estimated price of raw cane sugar FOB Caribbean ports. Since the table was prepared, the price of sugarcane was raised to LE 13 per ton; however, the world price of sugar has increased by about as much.

^{2/} Based on the difference between the value of the domestic production of refined sugar at world import price adjusted for estimated cost of transport, processing and handling (LE 10 per ton) and the payments to the producers of sugarcane (LE 9.5).

TABLE 5. LINT COTTON: Uses, Prices and Implicit Taxes,
1980 Estimated

<u>Utilization of Domestic Production</u>	<u>1,000 MT</u>
Exports	160
Domestic textile industry	360
For use in Egypt	(288)
For export	<u>(72)</u>
Total:	520
<u>Prices</u>	<u>PT per kg</u>
Received for exports	200
Paid to producers ^{1/}	70
<u>Implicit Tax on Cotton Producer:</u> ^{2/}	<u>LE 1,000,000</u>
Quantity exported	200
Quantity in domestic textile products	360
Quantity in exported textile products	<u>90</u>
Total:	650

1/ Equivalent price for value of lint content of price received by producer for seed cotton.

2/ Based on difference between export price of LE 2,000 per ton minus price to producer of LE 750 per ton (adjusted for estimated LE 50 per ton cost of transport and handling to ocean port).

C. A Look Into the Future: Projected Production, Consumption and Trade for the Year 2000

As shown in the preceding sections of this Chapter, both production and consumption patterns have been heavily influenced in recent years by the extensive system of price controls, subsidies and quotas for a broad range of consumption goods, farm products and production inputs. Future consumption and production and consequently agricultural trade balance, will be heavily dependent on decisions with respect to these subsidies, quotas and price controls, and other measures that may or may not be taken to increase agriculture's production capacity.

It may be possible to continue these consumption stimulating and agricultural production depressing policies for a considerable period of time because of the rapid growth in non-commodity import earnings such as Suez Canal tolls, worker remittances, tourism and petroleum, plus a major foreign assistance inflow. However, this course would appear to be risky both economically and politically. Each of these sources of foreign exchange is fraught with its own set of uncertainties and risks. The current very high level of foreign assistance, in particular, must be seen as transitory in view of Egypt's relatively high per capita income relative to other LDC's competing for development aid and Egypt's rapidly growing earnings from the other four sources mentioned.

In looking ahead to the year 2000, there will almost certainly be increased strains on Egyptian agriculture to provide the food needed for a burgeoning population without a further large growth in food imports. This situation will focus even greater attention than now on

both the economic and political aspects of the food security questions.

To get an approximate measure of the possible "food gap" in the year 2000, we made projections of consumption needs and then developed two different scenarios for how much of these needs might be met by domestic production -- by using two different sets of assumptions on land use expansion and productivity growth. (The data shown on Table 7 should be treated as indicative of trends not as estimates.)

Assumptions on Consumption Estimates

1. Population growth will be at about current levels in the 1980's tapering off slightly in the 1990's to reach about 65 million in 2000 which is about the middle of the range of current projections.
2. Real income per capita by the year 2000 will be double the 1979-80 level. That is, real income per capita grows at a rate of about 3.5% per year. Real gross national product will need to grow at a rate of about 6%.
3. The distribution of income will be about the same as 1979-80.
4. Rural-urban migration will continue, though more slowly.
5. Availability of foreign exchange will not impose widespread non-price rationing of high "value" foods such as animal products, fruits, vegetables, fats and oils, and sugar.

6. Income elasticities of demand:

- a. Low group -- tubers, cereals, for direct food use -- 0.1,
- b. Medium - sugar, fruits and vegetables, pulses, edible and inedible fats and oils, tobacco -- +0.4,
- c. High - meat (red and white combined), fish, milk, eggs and nuts and textiles and, indirectly, feed grains -- +0.7.

7. Poultry, which will go down in real cost while red meat will go up, will provide an increasing part of total meat and fish.

8. Based on the above, the following multipliers are used in estimating quantities demanded in 2000.

Group a 1.40

Group b 2.17

Group c 2.63

This is, population factor of 1.55 times income/income elasticity factors of 0.9, 1.4 and 1.7 respectively. In the case of the grain for feed, seed and waste category, adjustments were first made for reduced amount of seed and waste expected as a part of the total. This latter element may be substantially underestimated because of lack of information on current feed use.

9. Total food intake per capita per year would increase from about 560 to 660 kg, with about 100 kg per capita increase in low calorie foods such as fruits, vegetables and milk, about 10 kg decrease in high calorie foods including sugar, fats and oils,

and cereals and a 12 kg increase in fish and meat. Thus, total per capita calorie intake would be up only a small amount, but intake of animal protein and vitamins would be up substantially. The diet should on balance be very good.

Price Assumptions and Projections

The production projections are predicated on substantial relaxations of the price constraints on major commodities such as wheat, rice, cotton and increased input prices to the point where subsidies are relatively small or non existent. On the consumer side the achievement of these inputs and consumption levels are likely to have the following impacts:

- Red meat prices probably will rise in real terms by 25 to 50% above current levels.
- Chicken and egg prices will decline somewhat relative to current non subsidized prices.
- Fruit, vegetable and pulse prices are likely to remain about unchanged in real terms.
- Rice, sugar, and vegetable oils will rise above present controlled prices to near world prices. Prices of bread especially "baladi" and "shami" will rise substantially.

The current non selective system of food subsidies and quotas will need to be rationalized with benefits increasingly directed to low income people in both rural and urban areas or substituted by some other system which provides food security for the poor in contrast with food subsidies for all.

Production Assumptions (Set A)

1960-80 trends continued to 2000, thus:

- a. Cropped area increases about 10% to 12.4 million feddans.
- b. Yields increase about 20%.
- c. Total output increases by about one-third.

This might be accomplished by:

- a. Addition of 1.0 million feddans of new lands with 1.0 cropping intensity and average yields of 0.75% of the 1978-79 national average, or some combination thereof.
- b. Increase in productivity of old new lands to 0.9 times 1979 national average, cropped at an intensity of 2.0.
- c. Old land decreases to 4.8 million feddans, cropped at an intensity of 2.0 with yields 35-40% above the 1979 national average.

Production Assumptions (Set B)

A major increase in investment, and incentives with:

- a. Cropped area increases from 11.2 to 14.0 million feddans.
- b. Yields increase by 50% on the average.
- c. Total output increases by 85-90% above 1978-79.

This might be accomplished by:

- a. Two million feddans of new lands added which have a cropping intensity of 1.8 and average yields 75% of 1978-79 national yields.
- b. Old new lands of 0.9 million feddans have a cropping intensity of 2.0 and yields equal to the 1978-79 national average.
- c. Old lands decline to 4.8 million feddans with a cropping intensity of 2.0 and yields increase by 70-75% above the 1978-79 national average.

A big question, of course, is whether old land losses can be held to about 200,000 feddans over the next two decades. The present rate of loss is much higher than 10,000 feddans per year.

Land Use and Yield Assumptions

For simplicity, it was assumed that approximately uniform yield increases were possible. Cropped areas were allocated on the assumption that certain crops such as fruits and vegetables would be the highest claimants on land, and, in a general way, priority would be given to meeting domestic needs over export. The exception is tobacco where it is assumed Egypt will continue to prohibit production despite the attractive possibility for domestic production.

Results of Projections

Overall, the projections for the year 2000 show large increases in the deficits for cereals (Table 6, Figure 1). Using the Set A production assumptions, consumption requirements exceed estimated cereal production by 12 million tons. Even under the quite optimistic assumptions (Set B) which call for production increases of 85 to 90 percent over current levels, the deficit in cereals would be 8 million tons. These could be considerably larger if the option to produce more livestock products and import less is selected.

To feed Egypt's population projected for the year 2000 will require large foreign earnings in other sectors to pay for the needed food imports. It is estimated that with the lower production projections (Set A), agricultural imports would rise to \$4,200 million (1980 prices) and exports would drop to only \$50 million, or a deficit of \$4,150 million. Under Set B assumptions, the deficit would be about \$2,650 million with imports of \$3,150 million and exports of \$500 million.

Other indicators of this change in the food supply, agriculture and its role in the economy are estimated (very roughly) and shown in Table 7.

Agriculture is expected to continue to be a major employer, but its contribution to GNP is likely to decline to about 11% and the deficit in agricultural trade will grow rapidly. Agricultural exports may drop to only 1% of total foreign exchange receipts unless a higher agricultural export and higher agricultural import option is chosen

TABLE 6

Consumption, Production, Balance for Agricultural Commodities, Year 2000 ^{1/}
(1000 MT)

	Consumption		Production		Balance	
	I	II	A	B	A	B
Tubers	1227	1351)13931)12931)+250)+250
Vegetable	7828	11330				
Fruits	3131	4177	4377	4377	+200	+200
Pulses	658	833	658	658	-175	-175
Nuts	81	89	89	89	0	0
Veg. fats & Oils	NA	868	150	190	-718	-678
Sugar	1818	2170	-	-	-638	-638
Tallow	NA	391	0	0	391	391
(Edible)	NA	(37)	0	0	(37)	(37)
(Inedible)	NA	(354)	0	0	(354)	(354)
Tobacco	NA	72	0	0	-74	-74
Cotton Fiber	NA	506	506	690	0	+184
<u>Animal Products</u>						
Red meat	989	932	480	600	-452	-332
Poultry	407	675	630	630	-45	-45
Fish	307	381	?	?	?	?
Total Meat, Fish	1703	1607				
Milk	3788	5600	3000	3750	2600	1850
Eggs	138	208	-	-	0	0 Forced
<u>Grain (direct consumption)</u>						
Wheat	9535	9800	1188	3450	-7612	-6350
Barley	13	230	0	236	- 230	0
Maize	1879	2800	1620	4600)	-4309	-2129
Sorghum	1115	867	720	920)		
Rice	2627	2240	1200	2160	- 80	+ 520
Subtotal	15168	15937				
Feed Seed, Loss	NA	3982	Maize, Sorghum Balance Combined above			
Total	NA	19919	5688	12160	-12231	-7959

^{1/} Consumption I from projections by Arab Organization for Agricultural Development. All other data in Table based on projections developed for this report (Chapter II,-C)

TABLE 7: SOME INDICATORS OF AGRICULTURE CHANGING ROLE 1930-2000

	Unit/Year $\frac{f}{/}$	1930	1940	1950	1960	1970	1975	1979	1984	2000
Population										
- Total	million	14.2	15.9	19.022	26.0	33.3	36.8	41		65.
- Rural	"		11.9	12.6	16.1		20.6	21		25
- % Rural	Percent		75%	66.5%	61.8%		55.9%	50		40
Employment										
- Agriculture	million	3.5	4.3	4.2	4.4	4.3 ^E	4.2	4.1	4.0	4.0
Production										
Cultivated area	1000 feddans	5,300	5,281	5,761	5,844		5,865	6,100	6,200	6,500
Cropped area	"	8,000	8,358	9,167	10,370	10,750	11,163	11,148	11,500	12,500
Cot yields	Tons/feddan			.608	.729	.901	.788	1.05	1.11	1.26
Wheat yields	Tons/feddan			.84	1.08	1.25	1.43	1.33	1.40	1.60
Output index	Index		100	108	146	159 ^E	167 ^E	187	208	249
Value added (1952 prices)	(p. 5, Vol III-WB)			252	311	393				
Fertilizer used										
- Nutrient tons	thousands	45	30	135	210	370	460	550	800	1,500
GNP										
- Total	million LE		250 ^E	963	1,446	3,086.3	3,949	12,497 ^{5Y/}	20,497 ^{5Y/}	40,000
- Agriculture	"			387	559	877		3,500 ^{5Y/}	4,114 ^{5Y/}	4,400
- % from agriculture	Percent		60	53	57		26 ^E	28	20	11
Exports										
- Total	Million LE		35	175	198		1,600 ^E	2,920 ^{5Y/}	5,415 ^{5Y/}	
- Agriculture products	" "				76		530 ^E	400 ^{5Y/}	482 ^{5Y/}	
- % Agriculture	Percent		90	90	75		34	14	9	less than 1%
Value of Ag. exports										
exports ÷ Ag. Imports	Ratio		9.0	3.0	2.0			.31	.27	.01
Grain production per capita	Kg		237	170	183	196.2	184.0	180	150	85
Grain consumption per capita	"		225	185	218	258	281.2	310	310	310-330
Deficit per capita	Kg		+7	-15	-35	-62	-97	-130	-160	-225 -245
Public investment										
- Total	million LE					355.5	863	2154	4000/yr (1980-84)	12,000 ^E
- Agriculture	"					27	93	113	-13%	
- % Agriculture	Percent						11%	5%	-18%	
Livestock										
- Cattle			1,000	1,230	1,524	2,114		2,587		
- Buffalo			1,000	1,330	1,580	2,010		2,540		

Sources: 5Y/ 5-year plan of GOE
 USDA Agriculture Att. Report
 Hansen and Marzouk, Development and Economic Policy
 E Extrapolation
 f/ Sometimes nearby year data or multiyear averages were used.

and that seems uncertain of success at this time. The ratio of agricultural exports to imports which was 2 to 3 in the 1940's and 50's and .31 in 1979 well could drop to only .01 in 2000.

To keep the agricultural trade deficit within the range indicated above will require in addition to more realistic price incentives, a major increase in investment in agriculture over the next 20 years.

For detailed data on our projections of consumption and land use patterns, see Appendix Tables II-1 and II-2. The results of two Egyptian projections from earlier studies give food balances for the year 2000 for products they considered. Overall they tend to be similar to those given in Table 6 (See Appendix Tables II-3 and II-4).

Special Notes on Projections

Special difficulties were encountered in dealing with livestock feed requirements. Subsidized feeds are available for different livestock in a variety of quantities at different prices, with supply at the village cooperative the major constraint. It is not certain how much would be used if it were available in unlimited quantities. Further, there are reports of widespread feeding of subsidized bread to poultry, since the price is well below the price of feed.

Feed requirements are simply projections. It is likely, however, that feed, seed, and waste for 1979 was much higher than the base estimate. Higher estimates would suggest for the year 2000 an estimate of 5 to 6 million tons for feed, seed and waste, bringing total grain consumption up to 21-22 million tons. Considering the likelihood of

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greater milk output, the higher figure is more likely (than the 16 million shown in Table 6).

Livestock production is likely to be higher than projected. It is likely, for example, that high producing dairy animals will be brought in and most of the required 5 million tons of milk will be produced locally. This would result in a somewhat higher demand for feed grain.

Fertilizer is projected to rise rapidly as a result of two factors: (a) the rapid increase in nitrogen use as a "vertical" increase becomes increasingly important and (b) phosphate and potash previously derived from Nile river silting must increasingly be supplied by chemical fertilizer. A minimum of 1.5 million tons of nutrients might be made up of 60% nitrogen, about 25-30% P_2O_5 , 10 to 15% K_2O , or applications in kilos per feddan of 70-30-15 depending, of course, on fertilizer response for different crops and rate of soil exhaustion, in the absence of the Nile silt. Considerably higher levels of P and K could be needed and more nitrogen responsive varieties could result in higher nitrogen applications. The amount of nitrogen will be importantly influenced by the percentage of crop area in forage legumes in both summer and winter.

D. Policy Recommendations

Government's Role in Agriculture: New Approaches Needed

Looking to the future, there appears to be strong justifications for a major revision of Egypt's agricultural policies. Agriculture's role

in the development of the national economy is changing rapidly. Agriculture cannot, under present policies and programs, make its maximum contributions to the overall development of the economy. Present policies result in major distortions in the market signals to farmers and consequent inefficient use of agricultural resources as well as escalating government costs.

The new policy directions needed to fit agriculture's new role can be summarized as follows:

1. Move toward world prices on agricultural inputs and for agricultural commodities. *what are world prices for Egypt?*
2. More efficient targeting of consumer subsidies, toward those in greatest need.
3. Shift methods of taxation of the agricultural sector away from implicit product price taxation toward more equitable property and income taxation, and
4. Increase investment in agriculture, both public and private (through increased incentives) and improve the prioritizing of investments.

It appears to us that these needed policy reorientations resulting from agriculture's changing role can be accomplished only if there are changes in the role of the government institutions, especially in the Ministry of Agriculture and other ministries directly involved with formulation and implementation of policies affecting agricultural

resources. These ministries need to reorient their approaches to concentrate on providing basic and essential services to farmers and agribusiness (e.g., research and extension) rather than "supervise" agriculture through restrictive controls and dissipating resources and scarce management talent on farm production and agribusiness operations.

A redistribution of policies will require the Ministry (or ministries) which represents the interests of agriculture to have a strong voice in the policy-making councils of government -- one that initiates policy recommendations as well as implementing agricultural policies. For this role, a stronger base of policy research is essential, and hence a strengthened capability for this research should be developed. See Chapters III and IV for our discussion of suggested priority research issues on agricultural policy and recommendations for specific research studies. It is not within the purview of our study to make specific recommendations for how this reorientation of government's role toward agriculture can be accomplished. We do, however, emphasize its importance in the overall approach to new directions in agricultural policies.

Recommendations for Phased Revisions in Price and Allocative Policies

It is not operationally difficult to identify policy changes which will bring increased benefits to the society. The problem is to devise an economically feasible and politically acceptable plan for making changes needed to bring about more economic use of resources and reduce the escalating burden on the treasury. We do not have such a plan in hand and considerable work will be needed to evolve a

suitable plan. We would suggest a strategy of a phased disengagement from the present complex system of administrative pricing and allocation.

We suggest the following:

PHASE I

On the farm front

1. Eliminate official quotas and price controls on all commodities (except cotton). Practically, this has already been done for wheat with no adverse effects. Quotas on rice are not very important since it has practically disappeared as an export commodity. On most other products quotas and their effective enforcement are of minor importance.
2. Raise the price of cotton by about 50%, to restore farm prices to the 1978 relationship to world prices or a little higher.
3. Raise fertilizer prices by 50% (the rate of the cotton price increase).
4. Make fertilizers available without restriction as to quantity, crop produced or location. Program sufficient imports well in advance to assure a plentiful supply, in case of unforeseen increases in demand or procurement delays.

5. Eliminate land (feddan) allocations or rotations by crops.
6. Provide adequate credit to finance all fertilizer purchases on all crops.
7. Substantially reduce subsidies on feed grain and mixed feeds of all types.
8. Establish a floor price on rice and wheat about 25 percent above current prices.

On the consumer front

1. Modify the rice rations to reduce the total ration. For example, continue per person allocation of .75 kg per month at the current price of PT 5 per kg, and eliminate the family allocation now sold mostly at PT 15 per kg. (Sometimes, lower quality rice is available for the family allocation at PT 5).
2. Tighten controls on the highly subsidized bread and flour to avoid misuse and wastage. Resort to rationing at reasonable levels per capita, if necessary.
3. Attempt to check the increase in current levels of import of meat, poultry, dairy products, vegetable oil and sugar, that is, restrict 1980-81 imports to 1979 levels.
4. Adjust prices of cotton fiber to textile mills to reflect higher seed cotton prices (in line with the proposal to raise prices to farmers).

Impact on government costs and revenues

1. The proposed adjustment in cotton prices should leave the government with substantially more income from cotton than, say, before the large 1979 LE devaluation and the relatively small farmer cotton price increase.

Considering the higher world cotton prices, the government should net more in 1980 than in 1979. The cost of cotton exported raw or as finished products would increase by about LE 70 million, while the value on the world market of this amount of cotton has increased by about \$100 million (LE 80 million).

If the change were announced early enough in the year, some increase in yield should be possible in 1980. If acreage increased only 10% in 1981, as a result of the higher incentive price, exports of an additional 50,000 tons of fiber should be possible which would provide well over \$100 million additional foreign exchange and nearly half that much in additional government revenue after paying farmers (LE 40 million).

2. The rice saving from a reduction in rations we are unable to estimate for lack of data. Increases in exports of \$20 million, at current prices should be possible. The savings on the subsidy we would hazard a guess to be in the LE 20-50 million range.
3. Fertilizer sales receipts should be increased by LE 50 million from presently projected sales. Some additional subsidy, probably in the neighborhood of LE 5-10 million would be needed for

the increase in physical volume of sales at the reduced subsidy rate. Thus, the net savings would be LE 40-45 million.

4. Reduction in wheat, flour and bread misuse and wastage of at least 500,000 MT should be possible at a foreign exchange savings of \$100 million. To the extent that bread is, for example, diverted to poultry feed, it might have a feed value near that of maize, but still the government would be saved about LE 75 million on the bread subsidy, and could substitute lower cost maize for poultry feed.

Thus, the measurable internal savings to the government could be LE 140-170 million in the first year, increasing by LE 40 million in the second year to LE 180-230 million. The gain in foreign exchange should be about \$120 million in the first year increasing by \$100 million in the second year to \$220 million. These estimations do not consider savings from reductions in subsidies on feed distribution or on cottonseed meal, which also should be studied.

Other consequences

1. Some desirable adjustments will take place among crops and between crops and livestock.
2. Some feed shortages and early slaughter of young meat animals will occur especially if farmers are not warned in time to make preparations. Farmers should be encouraged with technical help

and planting materials to plant small plots of high yielding summer forage or a consortium of hot and cold weather forages in the same plot.

3. Most prices in real terms will rise some but not greatly in real terms. Oranges and onions will be up some in the short seasons. Rice and wheat prices would be near government support prices.

Meat and poultry prices should continue on about their present trends. Imported products might be rationed at prices somewhat below the free internal market as is done now. Vegetable oil and sugar prices which are subsidized would be virtually unchanged in the first phase.

PHASE II

1. Announce the future intent to further rationalize prices and reduce subsidy costs, for example, by reducing the high level of imports of luxury consumption goods of agricultural origin or taxing them, and by indexing food prices upward based on increases in real income per capita or some such formula. Then carry out this intent on schedule.
2. Impose a needs criterion on most ration and other subsidized food programs such as to direct benefits increasingly to the lowest income groups, both rural and urban, eventually eliminating subsidies to the more affluent.

3. Eliminate subsidies on all seed, pesticide and feeds (except possibly for emergencies).

PHASE III

Make further adjustments in prices and imports based upon: (a) an evaluation of Phases I and II, and (b) other economic analyses.

APPENDIX TABLE II-1: Consumption of Food and Cotton Fiber, 1975, 1979, 1980 and Projected 2000

	1975	1979 ^{1/}	1980	(1000 Metric Tons)	
				2000 II ^{2/}	2000 II ^{3/}
Cotton Fibres	230				506
Grain					
Direct Human Cons.					
Wheat	4,926	7,000	5,671	9,535	9,800
Maize	1,452	2,000	1,587	1,879	2,807
Barley	19			13	230
Sorghum	707	619	781	1,115	867
Rice	1,450	1,600	1,632	2,627	2,240
Total for direct consumption	8,554	11,219	9,592	15,168	15,937
Feed, seed, food		1,500			3,982
Total Grain Use		12,700			18,262
Tubers	540	965	898	1,227	1,351
Sugar	810	1,000	1,008	1,818	2,170
Pulses	369	384	422	658	833
Nuts and Oilseed	34			81	89
Vegetables Oil & Fats	369	370	422		868
Vegetables > 1 million Fd. Area	4,505	5,221	5,221	7,828	11,330
	885	1,000 ⁺			
Fruits (330 fd.)	1,798	1,925	2,026	3,131	4,177
Tobacco		34			74
Tallon		180			391
Edible		17			37
Inedible (For soap)		163			354
Red Meat ^{4/}	359 ^{4/}	450 ^{4/}	455 ^{4/}	989 ^{4/}	1,184 ^{4/}
White Meat	115	145	155	407	381
Fish	137	145	163	307	381
Total Meat, Fish	611	740	773	1,703	1,946
Milk (including butter)	1,873	2,000	2,289	3,788	5,260
Eggs	56	79	71	138	208

^{1/} U.S. Ag. Attache

^{2/} Source: Projections by the Arab Organization for Agricultural Development

^{3/} Source: Projections based on Production Assumptions Set A

^{4/} Excludes edible offal estimates at 20-25% weight of domestically produced red meat.

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APPENDIX TABLE II-2: LAND USE IN EGYPT; Selected Years 1952-79 and Projected 2000
(1,000 Feddans)

		1952-4	1955-9	1960-4	1965-9	1970-4	1975	1976	1977	1978	1979	2000		
												A	B	
	Winter	4,478	4,711	4,759	4,783	4,908	5,072	5,041	4,958	5,020			5,542	6,497
	Summer	2,883	3,174	3,594	4,723	4,876	4,863	4,868	4,930	4,720			5,100	6,100
	Mill	1,861	1,967	1,667	678	627	723	734	750	803			11,202	13,040
	Full Year													
	Orchard	94	114	147	208	255	285	311	321	325	350		748	595
	Sugar Cane	96	111	122	145	197	220	243	250	248	250		450	365
	TOTAL	9,412	10,077	10,289	10,537	10,855	11,163	11,198	11,111	11,148			12,400	14,000
	A. Winter Crops												3,500	3,500
	Clover	2,184	2,162	2,444	2,630	2,801	2,812	2,787	2,854	2,882				
	Wheat	1,571	1,501	1,387	1,268	1,302	1,394	1,396	1,207	1,381	1,391		662	1,500
	Broad bean	328	353	365	349	283	246	260	292	239	249		450	370
	Barley	122	135	128	110	81	100	104	95	114	107		0	100
	Lentil	74	80	77	65	64	58	64	48	36	22		40	32
	Onion	26	36	44	45	33	27	31	37	29			100	70
	Fenugreek	53	60	55	38	28	32	33	24	26			50	50
	Flax	8	14	27	30	33	54	47	59	60	69		140	105
	Other	42	66	83	78	94	146*	104*	128*	28			100	100
	Vegetables	70	104	149	170	189	203	215	214	225			500	395
	TOTAL	4,478				4,908	5,072	5,041	4,958	5,020				
	B. Summer Crops													
	Cotton	1,765	1,791	1,751	1,694	1,551	1,326	1,248	1,423	1,189	1,196		1,200	1,200
	Rice	505	641	791	1,028	1,093	1,053	1,078	1,040	1,031	1,037		1,200	1,200
	Maize	29	56	271	1,078	1,245	1,426	1,490	1,323	1,393	1,413		900	2,000
	Sorghum	386	393	414	462	465	469	446	409	414	370		400	400
	Sesame	37	43	45	32	37	33	31	40	23	35		77	62
	Groundnut	28	36	46	47	35	32	42	36	31	30		66	52
	Other	13	14	46	54	86	105*	90	107*	188			428	275
	Vegetables	120	200	260	328	356	419	443	452	461			1,012	810
	C. Mill													
	Maize	1,717	1,794	1,456	432	348	368	404	401	505	500		0	0
	Sorghum	52	58	55	45	29	20	28	15	20	20		0	0
	Other	23	24	18	31	33	72	42	86*	25*			0	0
	Vegetables	69	91	138	170	216	263	260	248	253			560	443
	Vegetables (Total)						723			803	940		2,072	1,648

Appendix TABLE II-3: FOOD TRADE BALANCE IN EGYPT IN 1975 AND PROJECTED FOR THE YEAR 2000 (QUANTITIES IN THOUSAND METRIC TONS)

<u>FOOD GROUPS</u>	<u>1975</u>	<u>2000</u>
Cereal Grains (total) of	-3514	-10386
which wheat	-3247	- 7232
maize	- 418	- 1639
Rice (Paddy)	+ 151	- 1062
Starchy roots & Tubers	+ 65	+ 101
Pulses	- 151	- 330
Oils and fats	- 265	- 446
Sugar	- 121	+ 355
Vegetables	+ 185	+ 118
Fruits	+ 195	+ 325
Meats	- 86	- 528
Milk & dairy products	- 97	- 84
Fish	- 39	- 114

Source: The Arab organization for Agricultural Development, The Future of Food in the Arab Countries, October, 1978.

Taken from: Goueli, Dr. Ahmed A., National Food Security Program in Egypt, "paper presented to the IFPRI-CIMMYT Conference on food security in Mexico, Nov. 20-23, 1978.

Appendix Table II-4

	<u>Production and Consumption in 2000</u>		(Mid Points)
	<u>Production</u>	<u>Consumption</u>	<u>Balance</u>
	----- million tons -----		
Cereals	7.3 - 12.9	16.6 - 23.0	- 9.7
Wheat	1.3 - 2.7	7.4 - 10.6	- 5.0
Maize	1.7 - 4.5	5.0 - 6.0	- 2.4
Rice	3.3 - 3.6	3.2 - 4.7	+ 0.5
Sorghum	0.9 - 2.0	0.9 - 1.6	+ 0.2
Barley	.043- .081	.145- .187	- 0.1
Sugar cane	9.6 - 14.0	12 - 19	- 3.7
Legumes	.423- .852	.8 - 1.1	- .3
Vegetables	8.2 - 8.6	6.5 - 9.6	+ .35
Fruits	4.7 - 5.8	4.5 - 8.7	- 1.35
Vegetable oils	.381- .783	.56- .72	- 0.06
Meat	0.6 - 1.2	.7 - 1.3	- 0.1
Eggs	.1 - .2	.092- .168	.02
Fish	.17 - .2	.175- .268	- .04
Milk	2.5 - 3.3	2.8 - 5.8	- 1.35

Assumptions: 1970-74 is base period (per capita consumption)

Income elasticities

- 0 - .5 Cereals, roots, tubers, fats and oils.
- 5 -1.0 Vegetables, legumes, sugar, milk
- 1.0 Meat, fish, eggs, fruit
- < 0 (inferior goods) sorghum and cereal flour

Income growth

3 alternatives: 1st - constant, 2nd 1% yr, 3rd 2% yr.

From base	32%	74%
From 1980	22%	49%

Population: Same as in the other study.

Production - area 1st 1.5 mil. new lands
2nd cultivated area will decrease slightly

Yield - all trends 1st 1950-75; 2nd 65-75; 3rd 75- 5-year plan

Livestock growth rate, eggs, milk, fish

log. and linear projections 1975 thru 5-year plan.

Source:

Demand on Agricultural Crops in the Formation of the Egyptian Agricultural Policy," MS thesis, Dept. of Agr. Econ., Zagazig (Univ. 1977.

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CHAPTER III

MAJOR DEVELOPMENT POLICY AND INVESTMENT ISSUES

We have identified twelve policy issues for special analysis. Though the list is far from complete, we think these are some of the issues that lie at the heart of the agricultural policy situation in Egypt. Some of these are discussed in analytical detail while others are only briefly described below; the decision of the detail of the presentation was based largely on whether we felt that in the time available we could add usefully to the definition of the issue. Following the discussion of these issues, a list of research topics are presented.

A. Mechanization, Livestock and Berseem

Production of livestock products, use of draft power and area in berseem are intertwined. One of the major concerns of policy makers in agriculture is the rapid expansion in the area planted to berseem. It encroaches on winter crops (especially wheat) as well as summer crops (especially cotton because of extended cuttings and delays in land preparation). The latter may result in either not planting cotton or in late planting, increased insect control problems and reduced yield.

Berseem area increased by about one third between 1952 and 1979 and by 18% between 1960-64 and 1978-79. Berseem accounts by far the largest part of the feed input for forage-eating livestock during the December-May berseem season. Livestock are well nourished during this season both in terms of energy and digestible protein. Output peaks during this period.

From June to November, feed is in short supply. Most of the feed is wheat straw and other crop residue which provide about 70% of the energy. Beyond this, major purchased inputs are government supplied mixed feed, wheat bran, cottonseed meal and small amounts of barley, rice bran and horse beans.

Livestock production per animal unit is low with cattle and buffalo females typically not producing their first calf until they are 3-4 years old, and averaging only about a 75% calving rate annually. Mortality rates for young animals of both species are high and rates of gain low. Sheep and goats also are slow in maturing, have low production rates, high mortality rates and slow rates of gain. One study estimates that feed available during May-November was only 38% of the indicated requirements ^{1/}.

The government supplies feed to livestock producers at subsidized prices with government farms receiving first priority, farmers committed to deliver to the government plants second, insured herds next and uninsured herds last. Smaller herds

^{1/} Kotb, Ra, et al Nutritional Status of Livestock in Egypt Agr. Res. Service, Vol. 52, 1974.

^{2/} Rations are made up as follows:

Cotton seed cake	42%	Which would be valued at about LE 100 ton. Hence the subsidy is 50-60%.
Wheat Bran	25%	
Corn	22%	
Rice Bean	5%	
Molasses	3%	
Limestone	2%	
Salt	1%	

Mixed ratios for milk were LE 42/ton and for fattening .34/ton.

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(below 4-5 head) are not eligible for insurance. Frequently there is not sufficient feed to go around. Rations change, but recently each milking buffalo or milking cow was eligible to receive 15 kg/month of mixed (Government) ration and each fattening calf 150 kg of ration and 50 kg of bran per month for 6 months. Mixed rations were sold at LE 34-42 per ton and bran at LE 40/ton ^{2/}. Maize was LE 55-60/ton (about 50% or less of cost). It is reported that some of the ration supplied by the Government is resold in the market at well above the price charged by the Government. Farmers complain that feed supplies, especially cottonseed meal are in shorter supply each year.

Red meat, poultry and dairy products are subject to a wide variety of pricing and import policies intended to moderate price increases, including subsidized import and sale of meat, poultry and dairy products. Subsidized feeds may be obtained for some poultry and ruminant livestock with a commitment to sell animals to the government at reduced prices. Prices of livestock sold at "uncontrolled" prices still are moderated by price controls and rationed commodities and by cajoling and threatening merchants to hold price rises in check.

Mechanization is subsidized by very low diesel, gasoline and electricity rates but machinery is expensive. Since cotton, wheat and rice prices are subject to price controls at very low levels (though wheat quotas are no longer enforced), their ability to compete is considerably restricted. In the case of wheat, farmers are said to gain more from the wheat straw than from the wheat grain and hence prefer higher straw yielding

varieties to meet their summer forage needs when forage otherwise is in very short supply. Planting of specialized summer forages is discouraged. Farmers strip maize leaves from the growing plants to feed their livestock. The effect on yields is much debated. Farmers prefer to delay uprooting berseem until a third and fourth cutting is made. Data indicate this pays much more than planting cotton early. With prices of cotton held low and livestock prices left fairly free, the last two cuttings of berseem, sold in the field, will bring LE 200-300 with virtually no additional cost. This probably exceeds gross receipts of many farmers for their cotton and is several times net returns on cotton.

Meat and milk production per head of cattle and buffalo is low and feed conversion efficiency probably is also very low. The future importance of cattle and buffalo as a source of draft power is likely to decline, but it is not clear how rapidly. Unlike many areas of the world, in Egypt male cattle and buffalo are not now kept for power, but usually fattened for slaughter. Adult females furnish most of the power, as well as milk and contribute to the meat supply. In 1970, there were about 2 million adult female cattle and buffalo or about one for each three cultivated feddans and one for each six cropped feddans. Recent data suggest that the number of female cattle and buffalo is going up rapidly despite the rapid increase in numbers of tractors and mechanically powered threshers and virtually unchanged area cropped. In 1979 there was almost one adult female for each two cultivated feddans. Some estimates place mechanically powered primary tillage and wheat and rice

threshing at nearly 50% of the total. Hence tillage and threshing power needs cannot explain the increase in numbers of large animals. Under existing price relationship and feed subsidies, it apparently is economical for the individual farmer to increase cattle and buffalo numbers to increase meat and milk production.

Available evidence indicates that the combination of milk, meat and power, provide an economic total though output of each is small. The preference for buffalo, which produce more milk per cow, compared with cattle indicate that, within constraints imposed by government policies and programs, farmers would be willing to improve the dairy potential of their herds even at the sacrifice of some power. Milk is highly valued for home use and enters very importantly into the family decision on keeping livestock.

These practices which adversely affect summer crop yield, such as delayed uprooting of berseem, planting of higher straw yielding wheat and prematurely stripping of maize leaves to fill the summer feed gap might be discouraged by including a quarter or half of a feddan of napier (or similar warm season grass) on each farm for summer forage. A superior forage would have a major positive impact on meat, milk and power production of existing livestock, but Government officials seem reluctant to promote summer forage.

Very tentative estimates of costs and returns to berseem and livestock are as follows: the 4.5 to 5.0 million head of

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cattle and buffalo produce about 265,000 MT of meat, carcass basis and about 1,800,000 MT of milk which averages out to a little over 100 kg of meat and a little under 1,000 kg of milk per adult female per year. At an internal value of the equivalent to about \$2,000 per ton of carcass and \$200 per ton of milk that would be a value of nearly \$900 million per year. In addition, \$100 million worth of lamb and goat meat is produced bringing the total value of meat and milk to nearly \$1 billion.

Beef and mutton can be imported for about 60% of the domestic cost (i.e., about LE 1,200/MT). Consumers generally prefer the home produced product to meat being imported at these prices, but readily take the imported product at the lower "government" issue prices. Surplus EEC-subsidized and New Zealand dairy products can also be imported at lower costs.

Value of primary tillage provided by female cattle and buffalo is probably about \$90 million per year (3 million feddan x 2 x \$15/feddan) and threshing of 2.5 million feddan of rice and wheat possibly \$30-40 million. Low lifting of water sufficient for the total area requiring such lifting probably could be supplied by 100,000-200,000 small low cost easily transported low powered pumps costing under \$100 million and requiring about \$20 million per year for gas, diesel and electrical energy. The same power units could be used for small threshers.

Hence, total contribution of cattle, buffalo, sheep, goats for meat, milk and power would, at minimum world import substitution prices be about \$750 million per year. Assuming a high

differential in value is placed on local meat and locally produced fresh milk, the total might be as much as \$1.15 billion. The input cost of this output is almost 3 million feddans of long and short season berseem plus some additional space for stalls, essentially all the locally produced cottonseed meal, the wheat and rice bran, some imported and locally produced maize and of course, locally available straw. These concentrates probably have a combined value of \$200-250 million at world prices. Hence, the return to the investment in livestock, labor and 3 million feddan used for berseem, and stall space probably is between \$550 million and \$900 million depending on price/quality and consumer acceptance assumptions. Disregarding investment in livestock and facilities, cost of labor and value of manure (and value of other animals like donkeys and horses) would appear to give returns on berseem of between \$200 and \$300 per feddan (the higher returns to farmers at internal prices).

Lower cost alternatives for providing these outputs should be sought. For example, at average yields per milk cow for California, Arizona and New Mexico, it would require 300,000 cows to produce an equal amount of milk and about 275,000 young stock per year, but this would require a concentrate-rich ration and summer forage and would produce no draft power. A gradual improvement process might be achieved by introducing high yielding European dairy breeds and high quality buffalo dairy breeds such as Murrah, from India.

We would advance the following hypothesis for some additional testing and action:

- Existing producer and consumer subsidies, investment and related policies have been major factors stimulating the rapid rate of increase in berseem and the keeping of large numbers of livestock for production of meat, milk and power. Land reform and fragmentation of holdings may also have contributed since most farmers keep some livestock. Hence, numbers tend to be affected by number of farmers on the same amount of land.
- Though economical for farmers under the existing price structure, the combination of the current levels of berseem, types of livestock and feeding practices is becoming an increasing economic burden on the economy.
- Greater mechanization of primary tillage, threshing and water lifting, a gradual replacement of present cattle and buffalo by high producing dairy breeds of cattle and buffalo for milk, and substitution of poultry and imports of red meat for domestically produced beef and buffalo would be a more economic combination for society.
- It would be socially and economically desirable to encourage production and help finance: (a) small threshers and low lift pumps with common power units (these units might also serve for light tillage, weeding and transport); (b) small tractors to provide custom tillage, spraying and threshing services; and (c) simple improved, highly efficient ground spray units such as that being developed by ICL.

- Conversion of government feed and livestock units to private operation would increase efficiency and output.
- Removal of subsidies on feeds for all livestock would not adversely affect poultry production and if coupled with a summer forage program would improve output from ruminant livestock.

Information Needs:

In this as in most other areas, the major information gap relates to the current farming practices and systems followed, current input/output relationships, principal factors influencing farmers' choices and consequently how different sets of relationships may affect the way he operates. These must, in the first instance, come from detailed study of a representative cross section of farmers.

Several specific enquiries that would shed light on the larger issue are:

- a. What are the production impacts, if any, that can be attributed to mechanization due to yield, cropping intensity and livestock breed improvement?
- b. What is the rural supply and demand for labor (discussed below as a separate issue)?
- c. What are the costs, problems and prospects of importing meat, poultry and livestock products?

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- d. What is the yield impact of stripping mature leaves from high yielding varieties of maize?
- e. What would be the impact on production, incomes and competing crops of introducing small amounts of high yielding summer forage?
- f. What is the impact of mechanization of specific tasks on the overall demand for labor?
- g. How many livestock are actually on farms and what is their output?
- h. What is the nature of demand for meat and milk for home use on farms (and associated nutrition questions)?
- i. What do livestock actually consume?
- j. Following on the above, what are costs and returns from current and alternative livestock production systems for small farmers?

B. Labor

One of the hotly debated topics relating to Egyptian rural development is, "Is there a labor shortage in Agriculture?". Aggregate-level evidence implies a "no" answer. The labor supply in the rural areas is growing rapidly while employment in agriculture holds steady at about 4 million workers. But

every year considerable numbers of workers migrate to the city or abroad, lured by the possibility of high paying jobs. The city also offers the potential of a higher living standard even if little work is found. Food, housing and services are likely more abundant and of higher quality than back in the village.

What about those who remain in the village? How does the reservation wage of the rural labor compare with what farmers are willing to pay? Would there be a major increase in the supply of rural labor if the wage were increased, i.e., what is the elasticity of supply of rural labor? This question relates importantly to the mechanization issue. For example, it could be the case that the labor supply is quite elastic. If the government substantially raised the prices paid to farmers for their crops, the farmers might offer higher wages and find a more abundant labor supply available. Farmers, and national policymakers, might at that point reassess their ideas about certain labor-saving farm technology.

Farmers believe there is a labor shortage. The study on "Further Mechanization of Egyptian Agriculture" ^{1/} found in a farm survey that "farmers and those who work closely with farmers believe Egyptian agriculture is today plagued with seasonal labor shortages..." (p.III.2.). Labor is especially short during peak farm demands in May and June. Farm wage rates have more than tripled since 1973. Faced with this labor

^{1/} Prepared by ERA 200, Inc. under AID contract, April 1979.

environment, the study found that farmers were strongly in favor of additional mechanization.

A more skeptical view about mechanization and the labor shortage is suggested by a recent study. It points out that the so-called labor shortage in agriculture may be temporary. The demand for workers abroad could diminish, the military needs could be reduced, government policy of the being the employer of last resort for college graduates could change, and the demographic forces could lead to a growing supply. The authors think the mechanization-labor issue should be more closely examined.

Economic theory suggests that the present system of controlled (depressed) output prices and subsidized inputs tend to reduce the demand for farm labor. Depressed prices of controlled crops reduce farm earnings and reduce demand for all inputs. Subsidies on pesticides and fuels encourage farmers to use relatively more of these inputs and relatively less unsubsidized labor. (Subsidies on energy encourages mechanization). If these government controls and subsidies are reduced, the demand for farm labor should increase.

Labor-intensive agriculture and rural small-scale industry must play a major role in employing the large number of additional workers in future years. In order to effectively plan for that future, the rural labor supply and demand must be better understood.

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C. Food Security

The "Food Security" issue has many dimensions. For any country the major long-run food security issue is how to provide a secure food supply for its population over time. In Egypt, like many developing countries, the major policy issue is whether to strive for self sufficiency or rely on international trade for food. Egyptian policy currently favors the latter. A popular definition of food security in Egypt is to strive for a balanced agricultural trade -- to have cotton and other agricultural exports pay for the imports of food. But this does not appear to be too realistic as Egypt looks to the future.

The 10-11 million tons (or more) of grain (mostly wheat) expected to be imported by the year 2000 is very large by international standards. For example, total annual wheat trade worldwide was 70 million tons during the mid-1970's. Demand for food grain imports are expected to rise rapidly in other countries as well as in Egypt; probably more rapidly than world supply. This implies an upward trend in the real price of foodgrains. Also, production variability in the major producing regions can be expected to lead to large year-to-year fluctuations in the world price.

This outlook has serious implications for Egypt. Wheat import volume will rise, real world price will likely fluctuate considerably around the rising trend. Implied is a rapidly rising demand on Egypt's scarce foreign exchange with potentially

large year-to-year fluctuations in requirements. Faced with this outlook, what are Egypt's policy choices and what research is needed to help make those choices? It is convenient to divide the policy issues and research needs into their long-run and short-run components.

Long-run food security issues relate to Egypt having guaranteed access to world supplies of food grains, having a growing export market for high value crops it might grow and sell to buy grain, expanding and efficiently using the land, and developing a rational consumption policy. Definition of policy alternatives in this context relate to other sections of this paper.

There are several other aspects to food security policy that relate more to the short-run. First, how should Egypt plan to cope with the large variability from year-to-year in world grain prices? In preparation for those years of short supply when she has to outbid the developed countries to obtain grain, should she plan to store a buffer stock, or should she plan to draw on financial reserves? What types of bilateral or multi-lateral agreements might be to Egypt's advantage in smoothing out the costs of grain imports? Would participation in a form of international buffer stock be to Egypt's advantage? Could Egypt's consumption policy be modified so that when world supplies are short and the world price is high, Egyptian consumers would also face higher prices and thus share in rationing the worldwide shortage? Such a consumption policy would relieve some of the pressure on the balance of trade in years of high world grain prices.

Another dimension of the short-run food security issue is to insure against unforeseen temporary bottlenecks in the food grain delivery system. Since Egypt will import ever growing quantities of grain, it would be in the nation's interest to provide protection against temporary interruptions. Interruptions could include a dock strike in a major grain exporting country, a breakdown in one or more of Egypt's port facilities, or blockage of a key rail or barge line. What level of inland storage facilities is needed to insure against the potentially disastrous consequences of such interruptions, i.e., what are the costs and benefits?

Information Needs:

Professor Goueli laid the groundwork in his paper "National Food Security Problem in Egypt." ^{1/} Further work is needed to assess food security needs, and the costs of alternative approaches to alleviating the various causes of insecurity in Egypt.

D. Inputs

There are three major problems with respect to agricultural inputs:

^{1/} Goueli, Ahmed A., "National Food Security in Egypt," paper presented at the IFPRI-CIMMYT Conference on Food Security in Mexico, November 1978.

- a. Continuing shortages of fertilizer, high quality seeds and feed and of some pesticides. A fertilizer allocation process is imposed which attempts to allocate fertilizer more or less equally though returns clearly point otherwise. Feed also is rationed.
- b. Output and input price controls and subsidies along with national shortages have led to distortion in resource allocation and black markets.
- c. Weakness in the distribution system for fertilizer, pesticides, feed and seed. The result is that many farmers are unable to obtain the types of inputs they need while others may have an excess. Trading on the black market is one of the methods by which the system (that is, farmers) attempts, albeit probably inefficiently, to compensate for the Government imposed rigidities, and allocative inefficiencies.

For fertilizer, current shortages are estimated to be in excess of 100,000 metric tons of elemental nitrogen per year. The new plants which were to alleviate this shortage situation currently are not expected to provide a real surplus at least until 1981 and quite possibly not until 1982, if an expansive policy toward inputs and agricultural production were pursued. As it is, it appears that over the next couple of years, the government will continue to follow a restrictive fertilizer supply policy. Even more serious, this policy could continue to be

pursued even where the domestic production of nitrogen is fairly abundant, if, because of budgetary limitations, the stabilization fund cannot meet local currency costs of the subsidy. One can visualize a situation in which nitrogen is exported, though needed in country, because of the lack of local currency to subsidize its internal use.

With crop returns (at international prices) from a ton of fertilizer of two to six times the cost of additional fertilizer, artificial shortages of fertilizer are an intolerable situation.

For most inputs, (particularly seed), licensing and authorization for key actions (e.g., import of parent lines, inspection and control) are commonly in hands of the same Ministry, Agency or individual, that also has a major role in management of competing government operations.

For livestock, feed inputs are made available at very low (highly subsidized) prices. This encourages feeding of very costly, often imported (or exportable) feeds to low producing ruminant livestock, especially during the non-berseem season (June-November). A black market in such feeds tends to compensate, at least marginally, for the worst inefficiencies.

On the positive side, this feed subsidy has been one type of subsidy which went at least partially to the small farmer and resulted in a positive impact on his rural income and nutrition. On small farms home produced milk products are almost all consumed by the farm family.

Non-animal sources of energy are highly subsidized. Diesel fuel and electricity are only a small fraction of world prices. The high cost of machinery and conservativeness of Egyptian farmers tend to slow what otherwise might likely be a rapid rush to mechanize, stimulated by these low energy prices.

Consequences of the current input policies need to be studied in more detail with estimates made of costs and benefits of alternative, more production oriented policies. (A more complete discussion of inputs is contained in the appendix.)

E. Consumer Subsidies and Demand for Food ^{1/}

Food subsidies are an integral part of a subsidy system operated by the government that dates back to the 1950's and covers a wide range of commodities and services. It was not until the 1970's, however, that the cost of these subsidies became a substantial share of total government spending.

The subsidies on food products, and especially those on bread and flour, are now the major component of the direct costs of this subsidy system to the government. Indirect costs of the subsidy system, while less easily measured, are pervasive in their effects on economic groups throughout the economy as well as on government revenues and expenditures.

^{1/} The report by Lance Taylor Food Subsidies in Egypt, Massachusetts Institute of Technology, October 1979, was especially useful in developing the background and conclusions for this issue.

Throughout the 1960's the direct cost of the food subsidies was relatively minor, rising from LE 9 million in 1961 to about LE 20 million in 1970. But since world prices of grain and other agricultural commodities began their steep rise in 1973, food subsidy costs have escalated sharply

Amount of subsidy
 In 1979 food subsidies cost the government an estimated LE 885 million, compared with LE 434 million in 1978. Of the total cost in 1979, two-thirds (LE 588 million) was subsidies on imports of wheat and wheat flour. The next largest item among the food subsidies was for fats and oils at around LE 200 million. The remainder was composed of subsidies for sugar, tea, rice, frozen meats, lentils, and beans. For 1980 the government has budgeted over one billion Egyptian pounds to cover costs of food subsidies, with LE 700 million allocated for wheat and flour.

A variety of systems are in effect for the various subsidized foods. Certain kinds of bread are available at subsidized prices without limits on quantity. The price of the lowest quality "balady" bread (higher flour extraction rate) is less than 4 PT per kilo. For other items -- rice, cooking oils, sugar and tea -- rationed quantities are available at subsidized prices and additional quantities at "market" prices. Meat products are loosely rationed on a "when available" basis.

The consumer price for bread, the most highly subsidized food item, is only a fraction of the cost of the wheat and flour to the government. In the case of the lowest priced "balady"

bread, the consumer price is equivalent to an estimated LE 51 for the quantity of bread made from one ton of wheat. The retail price of the bread covers only about the cost of receiving, handling, and milling wheat and baking and distributing the bread. At present world-market prices, a ton of wheat is equal to LE 150 or more per ton landed in Egypt.

In an attempt to put some controls on the sky-rocketing cost of the bread subsidy, the government on February, 1980 established new regulations and prices on flour and bread. Two "new" types of "balady" bread replaced the former standard "balady" loaf of 135 grams, made from flour with an extraction rate of 87.5 percent and selling for 0.5 piaster. The new standard "balady" loaf still weighs 135 grams and sells for 0.5 piaster, but it is made from flour with a higher extraction rate, 93.3 percent. The other, "special balady", is made of higher quality flour, 82 percent extraction, weighs about a fourth more, 169 grams, and sells for 1.0 piaster instead of 0.5 piaster.

The "new" lowest quality "balady" bread has increased the consumer price of the bread made from one ton of wheat about nine percent over the former standard "balady" loaf. In the case of the special "balady", the return is an estimated LE 68.80 for the bread made from one ton of wheat. This is still well below half the equivalent world price of wheat, not taking into account the costs of flour milling, bread baking and distribution.

Conclusions:

The rising food subsidy bill is not just the result of rising international price levels for wheat and flour and other imported commodities. The decision of the government to maintain internal price levels without even raising prices of subsidized foods in line with general rate of inflation has had other impacts that have pushed up the direct food subsidy costs and lowered price incentives to farmers for many basic crops.

As the "real" price of bread declined, the apparent consumption of bread increased from 1970 to 1978 by about one third. Because of these higher consumption rates and the growth in population, with domestic wheat production only marginally higher than in 1970, import needs have rapidly escalated and show no sign of slowing down.

The rapid rise in per capita wheat use is in part the result of some farm families shifting from maize, their traditional basic food, to bread because of the very low cost. Rice, formerly an important export crop, may need to be imported in 2-3 years if present consumption trends continue. Rice consumption has increased rapidly as rationed quantities are made available at about a third the cost to the government. Rice consumption is now general throughout Egypt while formerly it was confined mostly to the Delta regions.

The recent changes in composition and price of the "balady" bread may have some modest impact on subsidy costs if enough

consumers are persuaded to shift to the higher priced "balady" bread. But even this higher price returns only a small part of the total "real" costs of this bread. The lowest cost bread is so inexpensive that it is cheaper than unsubsidized livestock feed and cheaper even than subsidized poultry feed. A significant part of the increase in consumption of bread likely comes from demand for low cost feed for livestock. ^{1/}

As a part of the policy to maintain subsidized food prices at retail, the government has established a complex system of final farm prices and marketing quotas which have kept farm product prices of many crops at levels well below international prices. In effect, this policy has kept the cost of direct subsidies lower, but it has transferred a significant part of the "real" costs of a low food price policy to the agricultural sector. Even though wheat marketing quotas were removed in 1979, the market price of wheat is tied to the subsidized price of flour. In the case of cotton, Egypt's principal agricultural export and until recently its major commodity, domestic prices have been kept low in relation to international price levels to permit the government to obtain revenue. It also permits sales of lint at low cost to textile mills, holding consumer textile prices down. Similarly cheap cottonseed produces cheap vegetable oil and cottonseed meal. This policy stimulates greater domestic use of cotton and creates a disincentive to farmers to produce cotton.

^{1/} Some estimates put use at 300,000 to 500,000 tons of wheat -- mostly in the form of bread.

Everyone we talked to agreed that changes are urgently needed in a food subsidy system both because of its high direct costs to the government which are equal to about ten percent of gross national product and because of the effects on supply and demand. But how to bring about these changes is the big question, especially because of the probable adverse political consequences of raising food costs to urban consumers.

As a first consideration, assuming that some kind of a food subsidy system is needed, a shifting of the incidence of the cost away from agriculture to other sectors should be possible. In its changed role in the economy, agriculture no longer should be looked to as the major earner of foreign exchange and other government revenues. In turn, a lifting of some of the burden on the agricultural sector could slow the increase in import needs by stimulating larger domestic production as well as increasing output of export crops.

Some possibilities for checking the spiraling overall cost of the food subsidy system while retaining an objective of keeping food costs down for the lowest income consumers are:

- a. Institute a means of income test combined with strict rationing of all subsidized foods.
- b. Concentrate subsidies on foods for which the low-income consumers spend a large share of their budgets.

Information Needs:

Research studies are needed that would be directed at providing basic information on the consequences of making changes of the kind suggested:

- a. Micro studies of patterns of consumption and demand for subsidized versus non-subsidized commodities by income class, regions, rural/urban breakdown.
- b. From these data, estimates can be made of the impacts on total subsidy costs in the future of (1) restricting subsidized foods to certain income levels and to certain foods most important to low-income families, and (2) incorporating an indexing procedure to at least hold constant the real cost of food.

F. Loss of Cropland

Each year Egypt loses a significant part of her most productive agricultural cropland to urbanization and other non-agricultural uses, including use of silt for brick making. While this loss occurs in most countries this problem seems to us especially critical in a country where the land resource base per capita is so limited and is declining rapidly with the high rate of population growth. At present the land area is 0.15 feddan per person, compared with 0.50 feddan at the beginning of the 20th century. When account is taken of multiple cropping, the cropped area is now about 0.25 feddan per person compared with 0.75 in 1900.

The average loss of cropland to non-agricultural uses in the last five years (1975-79) is 25,000 feddans per year, according to estimates we received from the Ministry of Agriculture. In our discussions, however, we heard estimates as high as 60,000 feddans lost per year.

The projected loss to the year 2000 of 500,000 feddans (based on the estimate of 25,000 per year), is equal to a loss of over eight percent of the present arable land base. But in terms of present productive capacity, the loss of 500,000 feddans of land is very likely in the range of 15 to 20 percent. Overall, about 60 percent of Egypt's cropped land is in the Delta regions where average productivity is much higher than in the other areas. Most of the land loss to non-agricultural uses has taken place in the Delta or in the most fertile agricultural areas of the Upper Nile river valley. And even worse, within the Delta, urban encroachment has been concentrated in the governorates with the most productive agricultural land; those near Cairo and along the western branch of the Nile in the direction of Alexandria.

At a minimum another 20 to 25 million people will likely be added to the population of Egypt in the next 20 years. Where will these people live? On the most productive agricultural lands of the Nile river delta or on lands less suitable for agricultural production?

As noted elsewhere in this report, the investment costs of land reclamation and new lands are extremely high. Still it seems

essential that a major effort be made in this direction. But at the same time the costs and benefits of reducing the rate of loss of the most productive land already in production should also be given high priority. The value of the prevention of loss of valuable old lands should be figured into the benefits of the development of settlements on land not suited for crops.

The answers given to these issues could dramatically change the course of development well into the next century. The stakes for a country like Egypt are so critical that it would be worth putting the most imaginative and skilled human resources available to develop proposed long-term solutions. In the immediate future, a tightened system of controls could be placed on land zoning and other regulations imposed to limit the current losses of the more productive agricultural land.

G. Water Management

Although not widely discussed as a separate and distinct issue, water management or more specifically poor water management is one of Egypt's most critical problems. Apparently too much water goes into the system for the amount of land irrigated. Efficiency of water use varies considerably as do estimates of efficiency. It is likely that on the average less than half of the water entering the system is used for beneficial plant transpiration, unavoidable evaporation and essential leaching of salts. Because of the high quality (low salt content) of Nile water little leaching of salts is necessary.

It was estimated in 1974 that 6.2 million feddans of cultivated area required 26 billion cubic meters of irrigation water for evapo-transpiration but 51.2 billion cubic meters went into the irrigation system. Conveyance and on-farm losses were estimated to be over 25 billion cubic meters. ^{1/} Much of this loss went into the groundwater table creating a rapid increase in waterlogging and salinity problems. On a unit of area basis 8,000 cubic meters entered the system for each feddan (2 meters depth) where only 4,000 cubic meters was needed by both crops. About half the remaining water went into the ground raising the water table and increasing drainage investment requirements. Implicitly then, at 100% of efficiency there would be water enough available when the Nile waters are fully developed to irrigate and double crop about 14 million feddans or, at 80% of efficiency, to double crop 11 million feddans. While studies indicate that land suitable for development is a more severe constraint than water, this is not an adequate reason to delay major efforts to increase water use efficiency both in conveyance and on farms. The large reductions in yield due to waterlogging and salinity and the costs of drainage would appear to fully justify such efforts.

Estimates of increases in yields where drainage has been installed center around 30%, more for some crops and less for others. While drainage will be needed, the only efficient long-run solution is to improve water management to insure that

^{1/} Constraints pages 33, 89, 90.

only a small percentage of the water passes the plant root zone to build up in the water table.

Major requirements for improvement in water use efficiency appear to be:

- Research and training of farmers on precise requirements of different crops and optimal timing of applications.
- A system which penalizes both excessive application and wastage in on-farm distribution such as volume charges for water using some form of metering.
- Shift to a system of delivery on demand rather than continuous flow to permit farmers to draw water only in quantities needed and also to be assured of water when it actually is needed.
- Major improvements in the delivery system to reduce losses (especially into the soil) before the water reaches the farms.

The serious effects of excessive delivery and wastage are particularly evident in the enclosed system at Fayyoun. Here in-flow rates must be reduced and water rationed to correspond to minimum needs for evapo-transpiration and essential leaching. This would insure that no more water enters the system than is needed by the combination of plant use and evaporation in the entire depression. Measures such as those described above should not only greatly reduce the load on the drainage system but also greatly increase the yield potential of available land and irrigation water. The most difficult but

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the most essential part of the modifications needed in the system are those which would penalize excessive use and wastage of water and reward careful conservation of water. Present modest programs in improvement in water management need to be very substantially expanded, ultimately to cover the entire country.

Recommendation:

It would seem desirable to make a major commitment of resources to a selected substantial pilot area with the objective of developing a comprehensive water management program for that area to be put entirely in place within a period of say 5-7 years. Fayyoun would seem to be an excellent candidate for such an effort especially in view of its apparent physical independence of other parts of the valley. Its size would seem to be manageable for a major effort of this type. Further, the consequences of poor practices and the benefits of improved practices should be fairly easily observed and measured. The area is large enough to have a real impact both on production and on people's views of the value of improved water management.

H. Marketing Infrastructure

Based on projections to the year 2000 the marketing system in the next 20 years will have to handle much larger quantities of food products and perform many more services than at present.

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These additional demands on the marketing system will come from several sources:

- a. An increase of perhaps 80 percent or more in the total quantity of food consumed, which is the combined result of a projected population increase of about 60 percent and a projected increase of about 15 percent in per capita food intake (measured in kilos, not calories).
- b. A significantly larger proportion of this increased quantity of food moving through the marketing system because a larger proportion of the population will live in urban centers more removed from direct supply sources, based on the assumption of a continuation of the rural urban migration. Volume of imports are expected to grow at least as rapidly as population and value more rapidly.
- c. If consumers' per capita incomes double by the year 2000, as projected, they will demand more services with their food such as more processing and other preparation of food outside the home.
- d. Farmers also will depend on the marketing system for a larger proportion of their inputs such as fuel, feeds, seeds, fertilizers, and services as they shift to more mechanization and adoption of more advanced cultural practices.

The combined effect of all these elements adds up to massive increase compared to the present marketing structure.

Special note should be made of the strain that would be placed on port facilities and related transport by the large projected increases in food imports, even under the most optimistic domestic production assumptions.

Conclusions:

A large rate of investments will be required in the next two decades for the marketing system to cope adequately with these tasks. The challenge is likely to be best met through a mixture of both public and private investment. Special emphasis should be placed on providing incentives for private investment at all stages of the marketing process from the farm gate or port to the consumers, both rural and urban.

One immediate opportunity for this investment lies in the food processing facilities that now exist which are owned and operated by the government. The government should explore means and benefits of divesting itself of ownership and control of food, feed and livestock operations. This should offer advantages of improved efficiency and free the government of a major administrative load and of primary employment commitments to large numbers of workers.

A reorientation of government policy toward private ownership now beginning could have significant benefits with little or no

political or economic "costs" to the government. If accelerated, it should help create a needed climate to attract investment capital from domestic and foreign sources. Considering the opportunities for growth, Egypt could draw much needed private capital and expertise from agribusiness enterprises domestically and from the more economically developed countries if the investment climate existed.

The importance of attracting more private investment capital has been stressed. However, an integral part of this development of an efficient marketing system (and basis for attracting capital) is government creation of certain institutions and facilities not likely to be provided by private capital. Examples are an adequate transportation network, dock facilities, some public storage and warehouses including refrigeration and wholesale market facilities, marketing information and communication, grades and standards. The overall objective of government participation in providing these elements of marketing infrastructure should be to facilitate and encourage the development of basically a private-enterprise marketing system not hampered by excessive government regulations and paperwork.

While the magnitude of investment capital and other resources may appear formidable, the opportunities for large contributions to the overall development of the economy through employment for the excess population in rural areas also are comparable in scale. It would be desirable if these new jobs were created largely in the rural areas to minimize the social and economic costs of rural-urban migration.

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Cooperative assembly and marketing should be encouraged to provide a more uniform and consistent source of supply and give producers an improved bargaining position vis-a-vis buyers. Another desirable element of government policy is encouragement of small-scale food processing (and other industries as well) at the village level, by farmer-marketing cooperatives and other private enterprises.

On the basis of reports available to us and our discussions, relatively little attention has been given to the alternative market structures to adequately satisfy demands of the next two decades and implications for policy and investment magnitude.

There are urgent priorities on the production side of agriculture, but an upgraded production system requires an efficient marketing system to maximize its benefits to farmers and society as a whole just as an upgraded marketing system cannot develop without an efficient system of production and assembly of agricultural products.

Information Needs:

To strengthen the base of information and analysis for the policy directions the following studies are suggested.

- a. An inventory of projected requirements in the development of marketing infrastructure based on the quantity of products and services to be performed by the year 2000. From this inventory, the investment requirements can be

estimated as a first step in developing the various policies and programs necessary to meet this objective, with special emphasis on policies to encourage the needed private investment from both domestic and foreign sources.

b. Additional research studies will need to be pointed at more specific problems and sectors. Among these we suggest first priority be given to:

(1) A study of marketing cooperatives directed at identifying problems and appropriate policies to encourage the development of farmer owned and managed cooperatives.

(2) A study of small scale rural food processing and other small scale industries to provide an informational base and analysis in developing policies aimed at encouraging their development. ^{1/}

Among the various agricultural products, we recommend that first priority be given to studies of marketing fruits and vegetables. The wastes and inefficiencies in marketing this huge volume of perishable produce appear to offer the most immediate and largest savings to the economy of any of the agricultural product groups. Our rationale and more specific proposals in this area are presented in the section of "Fruits and Vegetables".

I/ See also the Section on "Fruits and Vegetables".

I. Amounts and Types of Investment

Several facts stand out with respect to agricultural investment in recent years.

1. Total investment in agriculture has been low (about 7% of total investment), and considering net desinvestment associated with loss of good cropland to other uses and deterioration due to waterlogging and salinity, net investment probably has been substantially lower. IBRD estimated that for 1973 and 1974 total investment was only LE 58 million and 54 million. ^{1/} Annual cropland lost to other uses has been estimated at 20,000 to 60,000 feddans per year. (Probably worth in excess of a range of LE 40 to 120 million per year.) Deterioration of cropland due to waterlogging and salinity (now estimated to affect 60% of the crop area) is much higher. An appraisal which considered also loss of young workers to other sectors of foreign employment would raise the net disinvestment even higher.
2. Investment has been predominantly public. The IBRD report puts private investment at only 3% of the total. ^{2/} Further, considering that losses cited above are largely

^{1/} IBRD Report No. 1815 EGT, P. 44
^{2/} Loc. cit.

private, the net private investment must be highly negative despite reported increases in orchards and livestock.

3. Public investments have been heavily in public enterprises of relatively low priority, often losing money and displacing potentially more efficient private investment, e.g., development and operation of new land, poultry and livestock production, seed production, etc. In agribusiness, government investments have been heavy in input production and distribution, and processing and storage of agricultural produce. These are all areas where private enterprise has demonstrated strong capability worldwide. Some public investments also have been made in irrigation.
4. Most private investment has come in commodity production other than Egypt's major crops -- in increased livestock numbers and increased fruit orchards.

Major Investment Candidates

Major issues in programming large amounts of resources for agriculture relate to identification of investment candidates, rates of absorption, cost/benefit ratios, and prioritization.

Available evidence indicates that in most cases, rates and schedules of returns are most favorable on old lands, second on old new lands and least favorable on new new lands. Individual investment decisions need to be made on the basis of individual situations, particularly where the investment is very area

specific, e.g., land development. Many types of investments would not be area specific (e.g., fertilizer or other inputs) and if the right price signals are given to farmers, they can be expected to make appropriate decisions.

Below is a listing of some candidate agricultural investments (order of listing does not imply priority).

a. Production

(1) Drainage of cropland

Though accorded high priority by the government and international donors, the rate of implementation is very slow, leading to questions about Egypt's "capacity to absorb" additional investment in the area. The slow rate of progress appears to lie in the assumption that drainage must be carried out by the government with detailed design and continuing supervision of installations by trained engineers. Neither of these assumptions stands up to close scrutiny and other alternatives should be sought to overcome this limitation on rates of implementation, use of funds and benefit from improvement. Total investment costs of drainage required over the next 10-20 years is expected to exceed LE 3,000 million, at current prices. A major part of the drainage network must be installed on individual farms and might better and more rapidly be done by farmers if they had some help in design and staking of their individual drainage systems, help in connecting to

the area system, credit and possibly a small amount of incentive cost sharing. Work must pass advanced inspection as a condition for credit and cost sharing. This system has been successfully followed in Turkey with land leveling and in Pakistan in land leveling and water course improvement. In the latter case farmers supply much of the labor. This permits government to concentrate on the larger elements.

(2) Canal and water course improvement

Canal lining and water course improvement are needed to reduce losses to waterlogging and salinity and improve irrigation timeliness, adequacy of applications and crop yields.

(3) Gravity irrigation

Consideration should be given to raising many of the water courses above ground with the lining (or use of pipes), elimination of the costly low lifting and instituting a strict system of scheduling to individual farms and fields as a means of rationing water. These changes would be expensive, but would bring major improvement in water use efficiency and crop yields and reduce waterlogging and salinity, and, of course, would greatly reduce the costly low lifting.

(4) Bubble and drip irrigation

Installation of bubble and drip irrigation where feasible, especially in orchards (this is especially appropriate for sandy areas). Costs are estimated at LE 500 to 1,000 per feddan.

(5) Small tube wells

Installation of small tube wells in large numbers (wherever the the ground water is below say 2,000 parts per million of salts) to provide water supply security, increase cropping intensity, lower the water table, reduce the salinity problem and reduce drainage requirements. In some areas it may be possible to use water with higher salt content by mixing with canal water.

(6) Reclamation of some flooded areas in lower Delta

Installation of dikes and pumps to drain suitable areas in lower delta.

(7) Small seeders, fertilizers, sprayers

Produce and/or import and sell on credit sufficient small and medium size precision seeding and fertilizer application implements to make them available to all farmers through ownership or custom hiring from their neighbors or local coops. In addition to increased yields, this would

save thousands of tons of seed and fertilizer each year and reduce fertilizer pollution.

Develop, produce and sell, on credit, safe small scale manual pesticide application equipment sufficient to cover with precision all the cotton and most of the orchard and vegetable crops from the ground rather than by air. Benefits include major increases in yields and reduction in pesticide use and in environmental degradation.

(8) Low lift pumps

Where gravity irrigation (above ground water courses or pipes) is not feasible, credit for installation of more efficient low lift pumps should be provided.

(9) Livestock improvement

Introduce and finance (on credit) a major program of improved, higher yielding dual purpose (milk and meat) buffalo and cattle (and summer forage, shelters and fences), sufficient to produce up to five million MT of milk and 700,000 MT of red meat per year, by the year 2000. Amounts will depend on the trade offs over time of imports of feed versus imports of meat and milk.

(10) Poultry

Provide credit for a major expansion of privately operated modern poultry systems sufficient to produce up to 600,000 tons of broilers and 200,000 tons of eggs per year by 2000.

(11) Rural electrification

Electrification of low lift pumps, tube wells and small mechanical threshers.

(12) Land shaping

Although most of the land is in reasonably good shape, there is need in many areas to improve the land by more precision leveling, and reclamation of land from which earth has been taken for roads, brick making, and other land improvements.

(13) Overhead irrigation

In many areas overhead irrigation may be the most suitable type of irrigation though costly to install and operate.

(14) Land consolidation

Fragmentation is a major handicap to more efficient production with many farmers farming several scattered

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fields. Financing for consolidation of holdings should be provided.

(15) Agricultural credit

A full line of short, medium and long-term institutional credit at present production levels and prices possibly would require LE 3-4,000 million and by 2000 about double that level. The interest subsidy should be reduced as farm prices are brought to international levels.

b. Agriculture Related Industry

There are a large number of investment needs in the agriculture support and service industry including assembly, storage, processing, marketing, and export of agricultural products and production of inputs and provision of services.

Evidence indicates that major private initiative will be forthcoming if a reasonably attractive environment is created in terms of price relationships, credit, investment security, adequate government provision of essential information and regulatory services, and reasonable freedom of entry and of investment.

(1) Seed production and distribution

With the exception of cotton, the supply of quality seed is only a fraction of that needed to sustain a high output and efficient agriculture.

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(2) Fertilizer production and distribution

If Egypt is to achieve reasonable targets on production, it will need to increase substantially its supply of nitrogen fertilizer, and increase supplies of phosphates, potassium and micro elements several fold. It also will be necessary to vastly expand and improve the distribution system. Depending, of course, on policies with respect to pricing, incentives, and reduction in waterlogging, and of development of new land, it is quite possible that fertilizer demand will jump from about 550,000 nutrient tons in 1979 to over 1,500,000 nutrient tons in 2000.

(3) Pesticide production and distribution

Insecticide use probably will not grow rapidly but use of herbicides and fungicides may grow quite rapidly.

(4) Machinery and tool production and distribution

There is likely to be a rapid increase in demand for small scale machinery and improved tools as per capita incomes rise, e.g., small power units, small pumps, seeders with fertilizer and insecticide attachments, sprayers, hand tools, livestock equipment, etc.

(5) Feed production and distribution

A several fold increase will be required in capacity to produce commercial mixed feeds of various types.

(6) Production of animal breeding stocks

Demand will grow rapidly for baby chicks and breeding services for larger animals. A several fold increase in both by 2000 is to be expected.

(7) Pharmaceutical

Demand for pharmaceuticals will grow rapidly with a modern livestock industry.

(8) Assembly, processing and storage of farm products

Large investments will be called for to improve marketing efficiency and reduce storage losses for all types of products. This will include village milk collection stations, fruit and vegetable collection points, cold storage, efficient and sanitary wholesale produce centers, grain marketing, processing and storage, and assembly, marketing and processing of livestock and livestock products.

(9) Port receiving and storage facilities

A major increase is foreseen in import requirements for feed and food imports, especially grains (probably 12-15 million tons a year by 2000). This will require a major investment in port receiving facilities, storage facilities and in processing, transport and distribution facilities at various locations.

(10) Production of agroindustry supplies and equipment

There will be a need for major investments in production of a wide range of agriculture related industry supplies -- e.g., packing material (the lack is a major factor in marketing losses in more perishable commodities and constraints in export), canning and freezing containers, etc.

(11) Government services

Research, extension, appropriate regulation, statistical services, and grading and standardization all will require major investments in the next two decades.

Information Needs:

There undoubtedly are many other candidates. The major problem is programming and justifying a massive investment program when so little is known about needs, absorption capacity, and costs

and returns of alternatives. This should be subjected to intensive study.

J. Fruits and Vegetables

Two aspects of the fruit and vegetable economy are impressive. First, is the large and rapid rate of growth in production and consumption of vegetables and fruits in Egypt and, second, with the relatively large areas of Egypt's restricted land base devoted to the production of these crops.

The area has been increasing at a much faster rate than for any other major crop -- up to almost four fold since 1950. In 1979, vegetables occupied about one million feddans; this was nine percent of cropped area, as compared with three percent in 1950. The area in fruit orchards occupied three percent of total cropped area, making a total of 12 percent in fruits and vegetables ^{1/}. Since orchards occupy the land for the full year, they constitute the effective equivalent of 6% of the cropped area bringing the total to 15% for fruits and vegetables, excluding potatoes. Since yields of fruits and vegetables also have increased over this 30-year period -- but by a more modest range of 20 to 25 percent -- total production of fruits and vegetables is now approximately 5 times that of 1950. With the increase of something over a 100 percent in population since

^{1/} Includes onions, but not potatoes. If the potato area of 140,000 is included, the total area in all fruits and vegetables in 1979 is equal to 13 percent of area cropped.

1950, overall per capita supplies of fruits and vegetables have more than doubled.

We concluded from several discussions with Egyptian officials and from reports we read that oranges and several vegetable crops are looked to as high-valued crops that could help give Egypt needed export earnings to pay for imports of cereals and other basic food items that are less advantageously produced in Egypt. [At present, exports of fruits and vegetables are of relatively minor importance. Practically all of the large increase in production has been used domestically. Overall, only about 5 percent of total fruit and vegetable production is exported. About 20 different fruits and vegetables are exported in a typical year but three crops -- orange, potatoes, and onions -- account for nearly all of the export volume. In recent years, from 10 to 15 percent of the production of these three crops have been exported. However, exports of oranges were down sharply from their mid-1971 peak; onions and potatoes also were down in 1978 and 1979.

On the marketing side, fruits and vegetables are distributed with generally primitive methods and apparently have not changed markedly in this period of great expansion in production and volume marketed. Waste of produce from farm harvesting to the retail stores is reported to be high but data are very limited. Overall, post-harvest losses are estimated at 25 to 30 percent and up to 40 percent for tomatoes, a crop which accounts for over a third of the total area in vegetables. There is little cleaning, storing, or grading.

Much of the product moved through the marketing channels would be better left at the farm. These inefficiencies noted in the marketing of these products apply to that exported as well. A major penetration of export markets will require substantial improvements in marketing and quality and uniformity of production.

Conclusions:

The expansion of area in vegetables and fruits by Egyptian farmers reflects the relative profitability of these crops in relation to other crops plus the growing demand of urban consumers for these products. Because of the relative shortage and high cost of meat products, vegetables and fruits have given consumers variety in a diet that otherwise is very high in cereals.

It appears to us on the basis of available information that on the domestic side greater efficiencies in both production and marketing of vegetables and fruits could be achieved. If not, an ever increasing share of Egypt's limited arable land will be required to provide a growing population with the current per capita supply of these products.

To get some measure of the potential realizable on the production side, some comparisons have been made with vegetable areas cultivated and yields obtained in the United States. While these comparisons are subject to several limitations because of different conditions, they are useful in pointing up problems and opportunities in Egyptian vegetable production.

As noted earlier, in 1979 vegetables (excluding potatoes) occupied about one million feddans in Egypt. In relation to population, this is equal to 2.4 feddans per 100 persons. In the United States, the commercial area in vegetables is only 1.4 feddans per person. The ratio of area to population in Egypt is thus about 70 percent greater than in the United States. If Egypt had the same ratio as in the United States, the reduction would be equal to the release of over 300,000 feddans for other crop uses.

Put in another perspective, that of relationship to the total cropped land in each country, the comparisons are of a different magnitude. In the United States, with its large land base, less than one percent of its cropped land is in vegetable production compared with Egypt's nine percent. About 0.15% of total productive land (crop, pasture, forest) is in vegetables in the U.S.

In a country where land is relatively more scarce and labor is relatively more abundant, one would expect more intensive cultural practices with resultant higher yields per unit of cultivated area. Overall, the yields per feddan in each country are about the same, just over seven metric tons. But this comparison is misleading because of the differing relative importance of various crops. In the United States, production is more concentrated in products with low yields (and higher values per ton) such as green beans, green peas, asparagus, etc. In Egypt, 45 percent of the total vegetable area is in two crops, tomatoes and onions, while in the U.S. these vegetables account for only 17 percent of total area.

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The yields in Egypt for these two crops is much lower than obtained in the United States. In recent years, tomato yields in the United States have averaged about 16 to 17 tons per feddan, and onions 14 MT per feddan while in Egypt the average yields for 1979 were 7.4 and 4.5 respectively. ^{1/}

Bringing yields up to U.S. levels would reduce the area in these two crops by about 60% and still give the same production. Another possible result of higher yields and reduced waste in marketing could be a larger availability of vegetables for export. The present marketing system is especially inadequate for expanding the present low level of exports. In addition, even if the efficiency of marketing methods (and production) were greatly improved, so that a consistent supply of quality product of certain crops in certain seasons were available, there is additionally the question of access to foreign markets and meeting competition of other country suppliers, especially those in the Mediterranean area.

These problems of access and competition in foreign markets for potential exports of fruits and vegetables were explored as part of a broad study on the prospects for development of New Lands in Egypt ^{2/}. This study reports on the current state of

^{1/} In the U.S., about two-thirds of the area is harvested for processing for which the yield is higher, equal to about 20 MT

^{2/} See Working Paper No. 6 "Perspectives for Fruit and Vegetable Exports", EGYPT: NEW LAND PRODUCTIVITY STUDY, prepared by Pacific Consultants for USAID, January, 1980.

marketing fruits and vegetables in Egypt, on potential markets in other Arab countries, Eastern and Western Europe, including a special survey of four major produce markets in the EC. At present, the EC is the major world import market for fruits and vegetables, with 55 percent of world fruit imports and 60 percent for vegetables.

The conclusions of the fruit and vegetables study are well summarized in the report as follows:

"Under present conditions in Egypt there is little prospect of substantially increasing exports of fresh fruit and vegetables, especially to Western Europe. To achieve an increase it will be necessary to stimulate production of quality produce, improve transportation, both inland and ocean-going, revitalize services at sea-ports and airports, and provide cold storage and adequate container facilities. Communications should be improved and marketing costs reduced. Greater participation in export operations by the private sector is recommended. Exports to Eastern Europe and the Arab countries are bound up with governmental decisions and controls. In spite of such limitations, these areas may offer the best opportunity for market expansion."

As noted in this summary less hope is held out for the markets of Western Europe than those in Eastern Europe and the Mideast. The markets in Western Europe are more highly organized and require higher standards and more sophisticated marketing methods. In addition, even though Egypt does receive some preferential tariff treatment along with most other Mediterranean countries, once Spain, Greece and Portugal are full members of the Common Market, greater barriers very likely could be erected for outside EC suppliers.

Nevertheless the New Lands study does conclude there are "profitable market opportunities for a considerable range of commodities" but only if great advances are made in production and marketing of these commodities. On the production side, it is noted that the light sandy soils of the New Lands may be especially adapted for crops such as peanuts, potatoes, onions and other root crops.

Information Needs:

In order to identify the optimum role of fruits and vegetables in Egyptian agriculture, including export potential, more information and analysis are needed on a wide range of topics such as:

- Improvements in production practices to increase yields and quality.
- Reduction of physical waste in harvest and in post-harvest from assembly to final distribution point.
- The potential for processed fruits and vegetables in domestic and export channels.
- Development of infrastructure needed to provide marketable-quality produce for export.
- Identification of potential for exports, the markets, countries, products and seasons.

Further, once this information is available, policies will need to be established to improve the coordination of production and marketing of fruits and vegetables.

Horticultural Specialty Crops:

Flowers, ornamental shrubs and plants, etc., represent another potential area for development of exports of high-valued crops. The soil and climatic conditions together with a large available labor supply relative to land area suggests their adaptability to Egypt. As for fruits and vegetables, realization of this potential will require an efficient production and well-developed marketing infrastructure able to meet competition in export markets.

Policy Research Priorities ^{1/}

1. Produce the needed information outlined above to develop a more efficient production-marketing system for fruits and vegetables including the identification of export potentials.
2. Determine, on basis of this research, the role of the government in providing needed investment especially in marketing facilities, grades and standards and policies to

1/ A long-term project of a general nature titled "Agricultural Marketing and Distribution of Fruit and Vegetables" has been submitted as a proposal for the Agricultural Development Systems project (ARE-U.Cal.-USAID). This project statement develops in more detail the various research areas that would be needed to meet the policy research priorities listed below for fruits and vegetables. It is complementary to work now underway on this overall development project to improve the productivity of production of tomatoes and other fruits and vegetables.

provide needed incentives for private enterprise to provide capital and know-how, both in production and marketing.

K. Costs and Benefits from Growing Short-Staple Cotton

Egypt has had a long tradition of producing high-quality, short-staple cotton which has commanded a premium in the world market. However, its once virtual monopoly position is very eroded by three factors:

1. Egyptian policy which has the effect of limiting production and increasing the long-staple differential.
2. Increasing production by other countries to take advantage of the large price differential.
3. Development of improved technology which tends to narrow the end product differential between longer and shorter staple.

Short-staple varieties are available which render Egypt's near ideal growing conditions would yield much larger amounts of seed cotton and Egypt's domestic market for cotton lint for lower cost textile is growing rapidly. If Egypt is to have an important exportable surplus in the 1990's, it must increase output substantially. Shift of part of the area to higher yielding, shorter staple cotton offers one possibility.

A more important possibility is to introduce short-staple cotton into new lands where reports indicate it does well and would be likely to have a comparative advantage relative to other crops at world prices. Availability of domestic short-staple would release more valuable long-staple, being consumed domestically, for export and displace imported short-staple cotton. Thus it should, in effect, give higher return to the economy than its FOB export value would suggest.

These prospects are sufficiently promising to justify early and intensive study and appropriate action.

L. Tobacco Production:

Tobacco consumption is now about 30,000 MT per year and growing at nearly 10% annually. Since tobacco production is prohibited, Egypt must rely on imports for all its consumption. That the reason for the prohibition on domestic production is not well understood was abundantly demonstrated by the wide variety of answers given by senior officials as well as researchers and non-government persons. These included: tobacco won't grow under Egyptian conditions; it wears out the soil, irrevocably; it is not competitive with other crops in Egypt; our farmers know nothing about raising tobacco; we don't have any suitable varieties; and finally, if we raised tobacco, we would have difficulty collecting the tobacco excise tax which is now easily collected since it is all imported.

This concern about collecting the highly lucrative tax on tobacco which we estimate to be, in average, near LE 150 million per year depending on level and mix of imports probably is the principle deterrent. However, with over 70 percent of the tobacco going into cigarettes this risk would seem manageable. The returns to tobacco production in terms of foreign exchange saved, and farm income and employment generated makes it difficult to justify continuation of the present policy. It should be possible to produce, at U.S. yield levels where returns to farmers commonly exceed \$2,000 per acre or about LE 1,600 per feddan. (This is eight times the return of soybeans at one ton/feddan even with the high LE 200/ton price for soybeans). At this relationship 30,000 feddan which should produce 30,000 tons of tobacco would give more returns than 200,000 feddans in soybeans (in terms of foreign exchange savings and domestic income). Alternatives for this tax need to be examined along with returns to tobacco production so this crop is not precluded.

Summary of Research Needs:

In order to understand many of the issues listed above, one needs to examine both their micro and the aggregate components. For example, the mechanization issue involves farm-level economics as well as the national allocation of investment capital. Research is needed at both levels.

Special emphasis, however, should be placed on the farm-level components of the issues. The basic forces behind many of the issues

are not understood. But before any additional farm surveys are conducted, the data from surveys already taken should be utilized. The most comprehensive is the Ministry of Agriculture's farm management survey. Surveys of selected areas, households and of selected types of farms exist. For example, about 400 farmers were surveyed in 1979 for the Winrock livestock study. A farm management survey of similar size was also conducted for the mechanization study. Ford Foundation has assembled substantial primary farm data. There are government and university studies of farms and households that tend not to be publicly distributed.

We were surprised at the extent to which research has already been done, but the results are kept "in house" (not known about by outsiders).

Priority should be identifying, assembling, and utilizing these data sources before or at least as additional surveys are planned. In some cases these data may need additional analytical effort.

The research topics listed below, which we feel should have priority, imply studies of all sizes. Some require several person-years of effort, while others can be done by one person in several months. E.g., making really precise estimates of alternative investment needs and their relative benefits could be a massive undertaking. Making reasonably accurate estimates at lower costs should be given

Budgets:

Construct a set of crop and livestock budgets that represent the major production practices in Egypt. Emphasize physical quantity of inputs and outputs. Prices, which are more volatile, quickly become dated. These budgets could be constructed from data obtained from the Farm Management Survey (Ministry of Agriculture) and other surveys currently available. These budgets are very important as a source of data for many of the research projects listed below.

Description of Subsectors:

Prepare a description of each of the major subsectors of the agricultural sector, e.g., cotton, wheat, rice, sugar, meat, poultry. For each, describe the process from production or import to assembly, to processing, to consumer. A flowchart is envisioned that contains the quantity flows, prices, value added, and taxes or subsidies for each step from producer to consumer.

Livestock Imports:

What are the costs, problems, and prospects for importing meat, poultry, and livestock products? How do import costs compare with cost of domestic production when delivered to urban areas. Use social opportunity costs of domestic resources.

Livestock/Mechanization/Cropping System:

Evaluate alternative systems of improved livestock, mechanization of major power needs, and the associated cropping system. Use both local administered prices and "free market" prices. Examine both at the village level and at the national level. What are the net returns to farmers; how is his risk affected? Stress the impact on the demand for both farm family and hired labor.

Food Security:

Identify alternative definitions of food security that are appropriate in the Egyptian context. Consider long-run food needs, international market variability, and short-run delivery bottlenecks. What are the sources of insecurity? What are the costs of overcoming various levels of insecurity?

Supply of Rural Labor:

Estimate the supply and use of rural farm labor. This project has both a short-run and a long-run component. In the short-run, the labor migration situation and reservation price are given. In the long-run these are subject to change.

Surplus Transfer:

What is the magnitude of the net transfer of economic surplus from the agricultural sector to the rest of the economy? Estimate the input subsidies and the implicit tax on agricultural output. Also

consider the public services (extension, regulation, etc.) provided. Attention should be given to the social value of the irrigation water.

Demand for Food:

Estimate the urban and rural demand for major food groups. This study is important for analyzing the consumer subsidy programs. Consider both price and income effects per capita, and population growth.

Loss of Cropland:

Identify the factors related to the loss of cropland to non-crop uses, e.g., housing, specific industries, other agricultural uses, roads. Estimate losses in recent years and project losses under alternative assumptions about growth and government land use regulations.

Fruit and Vegetable Export Potential:

Examine the potential markets for Egyptian fruits and vegetables. What competitive advantage does Egypt have -- or potentially have? What infrastructure is needed to be competitive?

Fruits and Vegetables Domestic Marketing:

Describe the process of marketing from producer to final consumer. What quantity goes unconsumed and what quantity and quality is

consumed at full price, at discount for poor quality or is used for livestock? What methods of transportation are used and what are the costs?

Agricultural Inputs:

- a. Costs and return to different types and levels of on-farm use of inputs (by crop, size of farm, type of land). This would require a combination of on-farm soil classification, appraisal of drainage problems, review of fertility trials and survey of farmers' actual practices and results obtained.
- b. Use of various inputs on farms and estimates of effects of alternative policy changes on use of inputs on different crops. This would be concerned with impacts of changes in crop/input price relationship and elimination of fertilizer supply constraints and allocation rationing of fertilizer.
- c. Costs and return to feeding of concentrates to different types of indigenous livestock and of high yielding cattle and buffalo.
- d. Costs and returns to summer forage crops including impact on area in berseem.
- e. Costs and returns of alternative institutions for distributing production inputs and services.

- f. Analysis of major factors affecting choices of farmers in use or non-use of alternative production increasing inputs and mixes of inputs.
- g. Costs and benefits to alternative drainage systems and methods of installation of tile drainage.

Investment-Magnitude-and-Benefits:

Investment in agriculture has been low and generally not directed to highest priorities. Because of artificial price signals, farmers have invested primarily in less important commodities, e.g., orchards. Public investment generally appears to have generated relatively low returns. It is true that Egyptian agriculture compared with that in many countries is well developed, but it still has far to go to generate the level of output it is potentially capable of generating. Further, the land base, rather than expanding, appears to be declining due to losses to other uses, deterioration in quality and delays in developing productivity of new lands.

Some of the more obvious candidates have been suggested for investments in improving output and efficiency and support of agriculture and related agribusinesses. Information on investment magnitudes required or that can be absorbed, priorities, possible benefits relative to costs, and organization and incentives on these and other candidates is generally lacking. Collection and analysis of data to provide the information necessary for programming major increases in investment in agriculture should be accorded high priority. As a minimum first step more information should be gathered

on farm enterprises and factors that constrain adoption of practices and making of investments which would increase output and efficiency of farms and agribusinesses.

CHAPTER IV

SOME RECOMMENDATIONS ON MANAGING FOREIGN ASSISTANCE

Our recommendations for managing foreign assistance are divided into two parts: recommendations for a change in direction of the assistance package for agriculture, and recommendations for a research program that focusses on agricultural economic policy. The initiative for bringing about needed changes, discussed before, necessarily must rest with the Government of Egypt.

A. Foreign Assistance

Our observations lead us to conclude that there are serious and growing problems with current foreign assistance, especially to the agricultural sector. These are:

- Slow, uncertain rates of disbursement of funds in the pipeline.
- Heavy, probably unmanageable, demands on Egyptian administrative machinery.
- Unbalanced requirements for local currency relative to foreign exchange.
- Failure to address some of the critical policy and investment issues inhibiting agricultural development in the context of the government's strategy for use of foreign assistance upon which it is heavily dependent for development financing.

The Egyptian government is saddled with managing an intricate system of public companies and controls that pervade the agricultural

sector. This system of public control which has evolved over the years, has led to serious sectoral distortions. Most, if not all of each of the elements of the complex system of intervention including public companies, price controls, subsidies allocations, rationing, etc., can be traced to particular situations which, at the time, appeared to justify the measures taken. Unfortunately, these interventions have tended to have an independent life of their own continuing after the cause d'etre no longer existed or existed under changed form. This has created increasingly serious and costly distortions. Recently the climate has changed. The role of agriculture in the economy has also changed, as discussed earlier. The Egyptian government seems interested in starting to dismantle the public control of agricultural production. This task would be greatly facilitated if adequate capital were available to the government for agricultural investment. In recent years the agricultural sector has been starved for both medium-term and longer term investment capital.

Recognizing these investment needs, the government's 1980-84 strategy calls for a significant increase in investment in agriculture. Great demands will be placed upon the government bureaucracy in planning and implementing the additional investment as well as trying to deal with the serious structural and policy issues. It is unlikely it can be done without (a) considerable improvement in supply of local currency and foreign exchange liquidity, (b) more rapid drawdown of foreign assistance funds, and (c) less demands being placed on the administrative organizations and staff to plan and implement projects.

In recent years donor assistance in agriculture (particularly AID) has been heavily oriented to the establishment of a technological and institutional basis for greater efforts aimed directly at agricultural production. It was expected that this would make it possible to pump additional resources into the agricultural sector.

Our analysis leads us to support fully this early project emphasis on development of stronger technological and institutional bases and policy and planning capability. Support of this direction should continue. However, the percentage of total resources going to Egypt, which are directed to the agricultural sector, we think is inappropriately small. Further, we think it is timely now to plan for a major increase in donor support to agriculture, with this additional support being made available with fewer restrictions as to purpose for which they are drawdown. Funds should disburse quickly to overcome the liquidity and local currency bottlenecks and disburse simply to overcome the management and administrative bottlenecks. Release of quarterly tranches should be tied only to progress on specific undertakings of government.

We think the time is ripe for Egypt to come forward with a major set of proposals which address the growing difficulties with managing donor assistance and also address policies which constrain agricultural development and increase the food supply and demand imbalance.

The assistance package it would propose might include much of this food aid plus approximately 15% of other consortium aid assistance funds. Essentially all the latter funds should be made available

for purchase of goods and services from any place in the free world in support of an aggressive expansion of Egypt's agricultural sector. Hopefully most donors would join in this type of effort. These additional resources, available quickly for very flexible use in agriculture, should enable Egypt to undertake investment and price policy changes essential to a much accelerated agricultural expansion and improved food security. As a minimum, we think these should include:

- Make needed levels and types of investment and operating allocations to agriculture. (20-25% of total investment resources.)
- Make needed intrasectoral adjustments including reductions in the government's direct role in agricultural production and provision of inputs and services and concentration of its efforts on more essential government services.
- Make price and other changes necessary to provide incentives to farmers to improve land and water use efficiency, reduce wastage and expand production of commodities which contribute most effectively to food security and other high priority goals.
- Make adjustments in consumer food price distribution policies which now are stimulating rates of growth in consumption which in the long run appear not to be sustainable.

The program would be implemented by donor loans and grants to the treasury of the Ministry of Finance (or other appropriate body) with a specific understanding as to investment allocations and specific policy adjustments the Egyptian government plans to make. The first

quarterly tranche could be released on signature of the agreement and the second tranche on the basis of initiation of the first quarterly evaluation. Release of subsequent tranches would be dependent on specific progress in allocations of resources and execution of policy adjustment measures as described in the terms of the agreement(s). The terms might follow rather closely Egypt's 1980-1984 strategy. The idea is not to force a new plan but to provide the means for insuring implementation on schedule of the current plan.

The initiative for such changes must come from the government of Egypt. We would urge that it come forward with a comprehensive multiyear plan which stimulates greater private effort and gradually disengages government from its many direct interventions and calls for greater international donor support.

B. Background

A current trend among donors is to shift increasing amounts of foreign aid from balance of payments or primarily commodity import financing to specific project funding, and within the "project" category, from heavy industry and large infrastructure which are usually fairly predictable in rate of drawdown of funds, to agriculture and other project areas which more directly address disparities in income and equity such as extension of social services (water, sanitary facilities, health and education) and employment. These newer types of projects are time consuming in identification and individual design and generally extremely slow in implementation and drawdown of funds. In Egypt this is creating serious problems

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since foreign exchange becomes available only as the project expenditures are made, usually in local currency.

The annual rates of drawdown of assistance by 1979 had dropped to a level of only 18.4% of the pipeline plus new commitments. For projects it was only 14.4% of available funds.

One of the results as noted in the November 1979 IBRD report was that Egypt had to resort to the much higher cost options such as bank loans and supplier credits to meet its current financial needs.

TABLE IV-1

DISBURSEMENT PATTERNS FOR FOREIGN ASSISTANCE

(Amount in US\$ Million)

<u>Year</u>	<u>Availability</u> ^{1/}		<u>Disbursement</u>		<u>Disbursement Ratios (%)</u>		
	Proj.	Comm.	Proj.	Comm.	Proj.	Comm.	Total
1977	3034	1605	418	491	13.8	30.6	19.6
1978	3746	2150	520	721	13.9	33.1	20.9
1979	3860	2455	555	605	14.4	24.6	18.4

^{1/} Starting pipeline plus new commitments. Source: IBRD, Nov. 1979, P. 17.

The draft of the 1980-84 strategy is based on the assumption that this low ration of drawdown of pipeline funds will be substantially increased as the table below, taken from the plan, indicates.

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TABLE IV-2: OFFICIAL FOREIGN AID FLOWS AND EXTERNAL DEPT
(US\$ Million)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>
<u>Aid Commitments</u>						
1. Starting pipeline	<u>4300</u>	<u>5155</u>	<u>5750</u>	<u>5990</u>	<u>6580</u>	<u>7380</u>
(of which, project)	(3000)	(3305)	(3370)	(3575)	(4125)	(4775)
2. New commitments	<u>2015</u>	<u>2245</u>	<u>2500</u>	<u>3575</u>	<u>4000</u>	<u>4500</u>
(of which, project)	(860)	(985)	(1285)	(2350)	(2650)	(3380)
<u>Aid Disbursements</u>						
(Project)	(555)	(920)	(1110)	(1770)	(2000)	(2300)
(Ratio of Pipeline ^{/1})		31%	34%	54%	56%	56%
(Non-Project)	(605)	(730)	(1150)	(1215)	(1200)	(1300)
Amortization ^{/2}	938	970	1150	1560	1970	2050
Interest Payments	415	430	448	480	540	600
Debt-Service Ratios	20.6%	18.4%	18.5%	21.2%	23.6%	22.6%
<u>New Inflow</u>						
Aid Disbursements						
Less Debt Service	-193	250	672	945	690	950

^{/1} Project disbursements as related to previous year's pipeline.
^{/2} Debt service including service on suppliers' credits.
Source: "Egypt's Development Strategy, Economic Management and Growth Objectives 1980-84," November 1979 Page 7.

The slow rate of drawdown of AID funds despite increases in bank loans and supplier credits has been cited as an important factor in the low level of imports of intermediate and capital goods. ^{1/} "The IBRD November 1979 report notes:

"The projected outcome for the balance-of-payments in 1979 is based on eight months data but there are clear signs of adverse developments requiring policy response to forestall a trend developing. Although the current account deficit is about 15 percent lower than in 1978, it is largely because of a major shortfall in import flows, entirely in the imports of intermediate and capital goods. Aggregate imports are estimated to increase by about 11 percent which would indicate merely the maintenance of 1978 "real" import volumes. Simultaneously, intermediate goods and capital goods imports are each estimated to have marked nominal increases of barely 3% suggesting "real" declines of about eight percent. Both these declines are largely to be traced to the rather dramatic declines in foreign aid disbursement and could impede the short- and medium-term growth prospects of the economy."

The increased rate of drawdown projected for 1980-84 is heavily relied upon to meet the debt servicing and new investment requirements. Should there be major delays in project identification, design and approval and disbursement, Egypt's economic situation could substantially deteriorate.

The increased donor project orientation noted above, already may have contributed to a substantial sectoral and intrasectoral distortion as suggested in the 1980-84 strategy statement. To wit:

"While the choice of projects to be financed in each aid agreement is the joint effort of the donor governments and the government of Egypt, the absence of an aggregate picture can lead to some discrepancy between priorities and actual allocation of aid funds. This is to be expected, particularly as the project pipeline has been fed rather rapidly since 1975 when Egypt did not possess a shelf of projects to be presented to

donors. The choice of projects was in effect dictated more by the availability of feasibility studies rather than priority listing. In a sense, it would have been surprising if the final outcome, after five years of ad hoc choice of projects, would be closely related to the Government's announced overall priorities. As a result, allocation of project funds to agriculture represents 3.3 percent of total allocations, to irrigation 6.3 percent, to health and education services 4.9 percent, and to industry some 22 percent."

Further sectoral breakdown is shown in Table IV-3.

TABLE IV-3: SECTORAL DISTRIBUTION OF FOREIGN ASSISTANCE TO EGYPT AS AT END OF JUNE 1979

<u>Sectors</u>	<u>Allocation</u>		<u>Commitments</u>	<u>Disbursement</u>	
	<u>LE</u> <u>million</u>	<u>Percent</u> <u>of total</u>	<u>LE</u> <u>million</u>	<u>LE</u> <u>million</u>	<u>Percent</u> <u>of total</u>
Transport and communication	738	25.7	485	234	15.8
Industry	633	22.0	397	225	15.2
Power	427	14.9	243	87	5.9
Housing & construction	278	9.7	144	64	4.3
Water supply & sewage	233	8.1	85	25	1.7
Irrigation	180	6.3	28	13	0.9
Services	140	4.9	100	24	1.7
Agriculture	94	3.3	13	5	0.3
Tourism	9	0.3	6	4	0.3
Others	139	4.8	100	86	5.8
Total Project Loans	<u>2871</u>	<u>100</u>	<u>1601</u>	<u>767</u>	<u>51.9</u>
Commodity and Cash Loans	1368		979	710	48.1
Grand Total	<u>4239</u>		<u>2580</u>	<u>1477</u>	<u>100</u>

Source: Ministry of Economic Cooperation and Ministry of Planning.

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"The sectoral allocation of foreign assistance does not reflect Egypt's development priorities. In any case, it need not necessarily do so; as a foreign assistance represents an addition to the country's investment resources devoted to finance any number of projects included in a plan and not necessarily those on the top of the list of priorities. The problem arises, however, from the observations that (a) project assistance to Egypt has been generous enough to represent a sizable portion of the foreign content of investments; it becomes, therefore, tempting to choose "pre-financed" projects to the exclusion of others, and (b) in allocating local currency requirements of projects, the question of priorities becomes more urgent and equally more difficult as satisfying foreign-financed projects earmarks a sizable portion of domestic resources. The outcome at the national level would, by necessity, reflect an investment program which does not sufficiently reflect declared priorities in the Plan's overall strategy."

"The rates of disbursement on commodity loans, as shown in Table 3, are much higher than those for projects. This is a universal phenomenon in aid-receiving developing countries. Commodity loans designed to redress scarcities in intermediate as well as capital goods (not necessarily related to new projects) will not only ensure higher productivity and more efficient use of the country's existing capital stock, but will also improve the efficiency of the total national product complex. In the process, local currency can be generated in a less inflationary form, the proceeds of which can then be devoted to finance new development projects."

"It should be clearly stated that the Egyptian government recognized that in the ultimate analysis, rapid development is dependent upon the efficient use of project funds. However, at a time when (a) the process of project preparation and evaluation leaves room for significant improvement, (b) ongoing projects command sizable proportion of total investments, and (c) the legacy of policies prevailing in the past affecting distribution require heavy fiscal intervention, disbursement on project loans will not truly reflect the country's development efforts. In a real sense, the outstanding pipeline -- defined as a stock of available resources for development -- does not relate, closely enough, to the optimum flow of development assistance."^{1/}

^{1/} Egypt's Development Strategy, Economic Management and Growth Objectives, 1980-84.

It should be noted that disbursement relative to allocations and commitments have been particularly slow for agriculture and irrigation despite the very low allocations they have received. (Part of this must be attributed to newness of these projects.)

Availability of local currency also may be a problem in implementation of projects and drawdown of the project pipeline as suggested in Government's Strategy Statement.

"One of the major problems hindering faster rates of disbursement on official long- and medium-term loans has been the inadequate allocation of local currency financing for projects supported by foreign assistance. At the end of June 1979 some LE 2871 million of foreign assistance had been allocated to projects. Of that amount, supply contracts have been made to the tune of LE 1600 million and LE 767 million actually disbursed -- some 27 percent. Every effort is being made to give high priority in the Plan for those projects. To this end an attempt was made to ensure the inclusion of each individual project in the sectoral allocation within the Plan."

It should be noted here that the government by its own actions in excessively subsidizing resale of imported commodities (particularly food) has seriously exacerbated the local currency shortage. It could have used the sale of imported commodities such as wheat to generate much more revenue than it has. Internal receipts from sale of wheat, or lowest quality bread, have not much more than paid for internal costs of handling and milling wheat and baking and distributing the bread.

In summary, the present rapid shift to project funding has:

1. Delayed fund commitment and drawdown leading to current fund problems.
2. Increased local currency demands while reducing ability to generate local currency in noninflationary ways such as import of intermediate and capital goods.
3. Caused sectoral and intrasectoral investment distortions. Agriculture in particular has been shorted in allocations, receiving only LE 94 million of LE 2871 million of allocations (3.3%), LE 13 million of LE 1601 million of commitments (less than 1%), and LE 5 million of LE 767 million of disbursements (0.3%). In addition, disbursements for irrigation were LE 13 million (0.9%) from allocations of LE 180 million. (See table above).

Allocations and commitments may be proportionally higher in the next few years, but are still likely to lag well behind plans and requirements of the sector and behind amounts justified by expected rates of returns. Restrictions and delays are particularly unfortunate on rapid and high return investments and expenditures such as those on intermediate goods essential to increased agricultural productivity and raising incomes of farmers. This is especially serious for inputs such as fertilizers and some types of pesticides and seeds. Precise estimates are not available on the shortage of fertilizer and resultant losses of production, but they are clearly substantial as evidenced by the large volume and high price of fertilizer in the black market relative to the subsidized government price. For example, one study indicated that about a third of the fertilizer used on maize was diverted from other crops and prices

paid to obtain additional supplies usually were 60 to 70 percent above the official price.

Black market trade in fertilizer for other crops also is frequently reported to be large especially for crops such as fruits and vegetables where prices commonly are free or only loosely controlled. The disparity between recommendations and actual use in recent years would suggest a shortage of at least 100,000 MT of nitrogen per year or more. Translated into grain equivalent this could mean 1-1.5 million tons of additional exports (or imports avoided) with a value in the neighborhood of \$200-\$400 million. That is a potential increment in production worth \$200-400 million which was foregone to save possibly \$50 million per year in expenditures for fertilizer imports and their internal subsidy.

The shift in donor loans and grants to projects and, in the case of agriculture, to relatively small and slow disbursing projects may have reduced government and donor attention to the overriding price and sectoral investment policy issues. For fertilizer one constraint was reported to be the availability of funds to pay the rapidly growing subsidy on domestically produced and imported fertilizer distributed by the government.

It is understandable that both government and donors desire to have their resources related to project and programs which are visible and hopefully have a measurable impact on production and well-being of low income rural families. However, to the extent these new directions result in neglect of the underlying negative policies,

particularly with respect to production incentives, use of resources, and consumption behaviour, they undercut the very program objectives they seek to advance. It seems desirable that donors, in consultation with the government, not recommend heavy future concentration on large numbers of relatively small projects particularly in light of impacts it has on administrative requirements, rates of drawdown of funds, demand for local currency, cumulative future budgetary commitments of the government, and intersectoral and intrasectoral distortions (because of project availability and natural project size). The past emphasis on development of technology and institutions was necessary and appropriately assigned early high priority. These need to be seen through, but future emphasis should be sharply shifted to activities permitting rapid drawdown with emphasis in improving investments and prices, and related policy environment.

C. Some Investment Priorities

Based on our analysis of agricultural production problems and probable returns, we recommend highest priority for investment be given to full development of the production capacity of old lands. This should include:

- A total program of drainage and efficient water management.
- Adequate production and/or imports and improved distribution to insure a situation of plenty for principal inputs (fertilizer, pesticides, improved seed including forage planting materials, improved livestock and poultry breeding stock and feeds. Hopefully with both feed and livestock products will be sold without government administered or fixed prices).

- Improved research and extension emphasizing cropping systems, soil fertility (including minor elements), pest resistance in major crops and summer/winter forage combinations.

Second and third priority should be given to improvement in productivity of old new lands and development of new lands. At the moment the economics may not appear favorable to such investment, but countries probably cannot afford to look at all investments or resource conservation and development measures in this short-range way. The energy crisis is teaching many new lessons on economics of resource use and conservation. With Egypt's vast solar potential for development of energy and the worldwide programs likely to be undertaken to increase the efficiency of capturing solar energy, it is quite possible that within not many years solar energy may provide the lift necessary to move water to areas where now it appears economically unfeasible. We conclude that under the conditions that Egypt faces, a small but still substantial investment in development of new lands is justified in the interest of security, particularly food security, even if a favorable benefit/cost ration cannot be demonstrated at this time. The major efforts in new lands at this time should be devoted to finding development methods and cropping systems which ultimately will make new land development more economical and which develops some of the institutional experience needed to efficiently manage an economic development process.

1. Drainage, New Land Development and Water Management

- a. Drainage and improved water management in old areas where adverse effects of waterlogging and salinity are moderate

(e.g., 10% reduction in yield potential) to severe (50-100% reduction in yield). Salinity was the severe problem in the Delta 1500 years ago when, according to some sources, as much as 1.5 million feddans was reported untillable. ^{1/} In 1952 it was estimated that about 900,000 feddans had deteriorated due to this problem and by 1961 about 1.5 million feddans. In 1979 the USDA/AID team estimated that 80% of the land soon would be seriously affected. Waterlogging and salinity build up is a result of poor management of water delivery all the way from the Nile to the farm and of poor water use on the farm. Too much enters the system; too much is wasted in delivery and generally too much is applied with application poorly timed. Some of it is the farmer's fault, but most is beyond his control. Improved water management must receive high priority. However, it is not possible now to predict costs or rates of implementation.

The IBRD has launched a major assistance effort aimed at providing drainage on over four million feddans with some inputs from other donors. Progress has been very slow. Projecting forward from 1980 it is likely that the equivalent to essentially all of the current cropped area will need to be installed with tile drains or improved open drains during the remainder of this century. It is likely that an amount equivalent to that already drained as of

^{1/} Waterbury 1,77, P. 18.

1979 will need replacement due to natural deterioration or improper installation. Cost of drainage is estimated to average at about LE 500 per feddan including sand and gravel fill around tile where needed. This would imply a total cost of LE 3 billion for roughly six million feddans. In addition to this investment, a system for adequate monitoring and evaluation of results is essential to insure that efforts and investments are not wasted.

- b. Improvement of productivity on old/new lands totaling over 900,000 acres. This was estimated sometime ago by the government to cost LE 350 millions, but in the 1980's this cost will probably rise to LE 600-700 million.

- c. Development of new lands to expand the total crop base and increase food security for 1990 and beyond. Government has proposed developing two million additional feddans. This seems overly optimistic though some water use studies indicate the potential to serve more than eight million feddans from the Nile, even with cropping intensity of two or higher. In 1978, the World Bank estimated costs of developing new lands at LE 600-1,100 per feddan. Pacific Consultants, in its recent draft report, estimated cost in late 1979 for land development irrigation and drainage on new lands (not including other costs such as social infrastructure) at LE 500-1,500 per feddan depending on systems used. Assuming a conservative 1.5 million feddans total area developed, this would require about LE 2 billion.

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Total for Drainage and Land Development

Old land drainage	LE 3.0 billion
Old new land productivity	0.7 billion
New land development (1.5 million feddans)	<u>2.0 billion</u>
T O T A L:	LE 5.7 billion

If the government stated plan is followed, namely of concentrating on irrigation and drainage and leaving old new and new land development to private initiative, much of the LE 2.7 billion might need to be made available as long-term credit.

In programming resources, it would seem desirable to make a major and concentrated effort in a smaller area where drainage, water management and other programs might be joined. Fayyoun is suggested as a candidate because of its acute problem and the isolated nature of the ecosystem.

2. Inputs

Expansion of supply of production increasing inputs such as fertilizer, improved seed, pesticides, improved poultry breeds and feed, provide such quick and usually high economic returns compared with alternatives of import of the finished product that their restriction cannot be justified, even under conditions of severe foreign exchange constraints. Their import restriction . and rationing are, almost without exception, evidence of a breakdown in prioritising, planning and agricul-

tural development execution on the part of responsible government agencies. Production of major items such as fertilizer is being dealt with in the industry sector. Within the agricultural sector the pay offs on imported inputs such as fertilizer, pesticides, improved seed, and modern poultry types along with their feed is so rapid, less than a year, that investment allowance need be made for no more than about a year's funding of input requirements. Much of this would be handled by private investment if opportunities were provided. At current world prices these requirements (including domestic production for a year) would be approximately as follows:

Fertilizer and improved seed	LE 300-400 million
Pesticides	LE 80 million
Feed, mainly for poultry	LE 200 million

These levels would be expected to about double by the year 2000. If present trends continue, much of the fertilizer needs would come from domestic plants. However, until subsidy policies are changed, adequate provision must be made on the budget to finance the cost of this subsidy which is especially large for fertilizer, insect control on cotton and some types of feed.

3. Others

Other investment candidates are listed on Chapter III.

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D. Policy Research Strategy

We recommend that GOE and USAID support a series of research studies directed to priority issues, some of which are suggested in this report. The most urgent research needs are for studies that provide a better understanding of the basic economic relationships. Input/output data are needed for crops and livestock, particularly micro data. What is the complex relationship among food and power demands for livestock, livestock feed, and the cropping pattern? An understanding of the "big picture" is also needed. For example, how does a ton of wheat or other commodity get from the ship or the Egyptian farmer to the consumer and what are the real costs and value added along the way? What subsidies or taxes are imposed along the way? What is the real incidence of costs and benefits of different subsidies and price controls? How do they affect output and investment? An illustrative list of studies of this type are attached in Chapter III.

We recommend that at this time formal systems analyses or sector modeling not be encouraged. The scarce human and financial resources available for policy research need to be concentrated on more fundamental issues. Also, these more sophisticated techniques require a long-term commitment of research resources. To utilize these techniques, a continuity of personnel, research objectives, and financial support would be needed, i.e., a stable institutional structure dedicated to agricultural policy research and in touch with policymakers. That does not now exist and we do not think it expedient at this time to attempt to mobilize the personnel and financial resources and deploy them for such use.

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To further assist the growth of agricultural economic research capability, support should be provided to the teaching-research program in the agricultural economics (and/or economics) departments at the universities. Their libraries are very poor. Textbooks, reference books, journals and data books (data on Egypt, world trade, agriculture around the world) are needed. Visiting professorships might be sponsored as well as Egyptians going abroad and U.S. professors going to Egyptian universities. Emphasis should be on teaching and research related to the more "applied" issues.

We further recommend that the GOE and AID support the improvement in the collection of agricultural statistics, as discussed in the Koffsky-Henderson Report.

APPENDIX

AGRICULTURAL INPUTS

1. SUMMARY

The status of agricultural production inputs was reviewed from the points of view of supply, price relationships, and distribution systems.

Most inputs received some subsidy and for some the subsidy is very substantial. The two largest and most obvious subsidies are on fertilizer, in general, and insect control on cotton. However, there are less evident subsidies in varying amounts on other inputs. Irrigation water is made available free of charge at or near the farm. Public drainage systems are being installed without charging farmers. Much of the seed is produced directly or contracted for by the government and sold at below cost. Fuel is sold at well below its market value. Feed is distributed by the government in rationed amounts (when available) at very low price. A substantial part of the underpricing of feed is made possible by underpricing of the raw materials, especially seed cotton. Cottonseed for planting which is sold at only LE 25 per ton also is supported by low prices for seed cotton. Some inputs receive no subsidies. This, in general, is the case for inputs not supplied by the government such as vegetable and grain seeds commonly supplied by private entities, pesticides other than insecticides for cotton, and most machinery.

In general, price relationships are favorable to increased use of inputs. Most subsidized inputs (e.g., fertilizer, cottonseed, live-

stock feed, irrigation water) are priced so low as to require some form of rationing. Most of the rationing mechanisms are inefficient in their operation, countereconomic in their production impacts, and appear to be inequitable in their social impacts.

Inadequacies in the distribution system for most inputs further aggravate the situation. To some extent, the low prices compensate farmers for the low quality, limited and uncertain supply, and poor distribution services they receive on subsidized inputs.

Farmers and the economy as a whole would be much better off if prices of most subsidized inputs were increased moderately and adequate quantities of quality inputs and services were provided through improved, more responsible distribution systems, and if farmers were given more latitude to make their own production decisions. A major increase in the rate of growth in agriculture seems unlikely until the supply, quality, and distribution of most production inputs and services is substantially improved. Such improvement should be accorded priority along with improvement in price policy discussed in earlier chapters.

2. BACKGROUND

Inputs used in agricultural production broadly defined include all the various elements used in the production process -- land, labor, capital, management, water (especially for irrigation), physical facilities, seed, fertilizer, feed, pesticides, machinery, etc. This section will be restricted to some of the physical inputs purchased off the farm, particularly fertilizer, improved seed, pesticides, animal breeding stock, and feed concentrates.

Prior to 1961 most of the trade and processing in agricultural products and provision of production inputs and services was in private hands. Prices though subject to some government influence especially for cotton, nevertheless tended to be responsive to temporary expedients, as, for example, limits on cotton area during World War II to encourage food production and again after the post Korean War cotton boom to avoid excessive production. Other adjustments have been made in allocations to adjust for particular situations. ^{1/}

However, beginning in 1961 there was a large scale nationalization of private trade covering most economic activities including all large scale industry, commerce and banking. Tenure reforms were strengthened. ^{2/}

Ultimately, most of the industry and trade excluding minor activity was monopolized by government and it began to play a larger role in farm production particularly in running reclaimed and expropriated lands. To control inflation and to keep down demands for real wages an ever increasing range of food commodities, as well as cotton, were subjected to price controls and land input allocations. In the 1970's an increasing array of input subsidies were provided to partially compensate for low output prices or to keep output prices down. As was to be expected, different output and input prices were almost never in step. One well-known writer on Egyptian economics recently offered his judgment that the program of administered prices (controlled

^{1/} Development and Economic Policy, Hansen and Marzouk, Pages 91-142.

^{2/} Op.cit. Chapters 5-6.

prices) was the major factor in the present disastrous supply/ demand situation for agricultural products. Administered prices have had serious adverse demand and production impacts in total and among different products as prices were allowed to get out of equilibrium with respect to other sectors and within the sector. Efforts to moderate increases in prices of inputs such as fertilizer, seed, pesticides by government subsidies frequently have introduced new constraints and distortions. Input supply frequently has become the servant of the subsidy budget or the budget of producing public entity, and critically needed inputs have been rationed directly or indirectly.

Farmers have become increasingly dependent on the government, generally through the Principal Bank Agency or coop for input needs (not produced in the village) -- seeds, pesticides, feed concentrates (mixed feed, imported feed grain, bran, cotton seed meal), improved breeding stock (dairy cattle, buffalo and poultry), pharmaceutical supplies. They are dependent on the same organization for credit (banks too being nationalized) and must deliver the quotas of their major crops to the government usually through the same entity.

Prices relationships between fertilizer and outputs, even prices on quota amounts, have improved over the last two decades with slow increase in crop prices and very little increase permitted in fertilizer prices. (See Table A-1). In recent years, slow growth in use is due mainly to inadequate supplies, not high prices.

Feed prices are subsidized at various amounts depending upon the feed and type and disposition of the product and availability of the feed.

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Wheat bran is sold at LE 40/MT, yellow maize at LE 55-60/MT (LE 55 if animals are insured). Mixed rations for fattening cattle and buffalo are LE 34.00/MT and for milk production LE 42/MT ^{1/} Berseem cash costs vary depending on arrangements. Typically a buyer may pay LE 96 to 144/feddan/cutting or LE 384 to LE 576 for four cuttings which would work out to about LE 16 to LE 24 per ton. Wheat straw is reported to sell for LE 30-40/ton.

Poultry feed is reported sold between LE 93 and 180/ton depending on whether birds are sold to the government at the lower price. Supplies of feed provided by the government are frequently short. First priority is given to state livestock operations, then to growers with contracts, growers without contracts but enough livestock to be insured (e.g., 4-5 head of cattle or more), and last to small operators with too few animals to get insurance.

In 1979 pesticides prices were increased by about 70% as the pound was devalued from \$2.56 to \$1.43 and the new exchange rate was applied. Currently, pesticides imported other than through government auspices must pay the \$1.25/LE exchange rate. Hence, the real price is up more than 100% in a year and is now effectively at world market prices. The government shares part of the cost of insect control for cotton, but not other pesticides or uses.

Vegetable seeds imported by private entities such as the Egyptian Agricultural Organization or Horticultural Union are basically at

^{1/} Contents of these mixed rations are about 42% cottonseed meal, 25% wheat bran, 22% maize and 11% other, including minerals.

TABLE A-1: COMPARATIVE PRICES OF NITROGEN AND PHOSPHATE FERTILIZERS ON PRINCIPAL CROPS

(Number of Kg of Crop to Buy 1 Kg of N and P₂O₅ Respectively)

	Fertilizer Prices ^{1/}		Wheat		Rice		Cotton		Sugarcane	Maize
	N ^{2/}	P ₂ O ₅	N	P ₂ O ₅	N	P ₂ O ₅	N	P ₂ O ₅	N	N
1960	13 - 15		4.5 - 5.5		7.0 - 8.0		1.4 - 1.6			4.5 - 5.5
1961	13 - 15		4.5 - 5.5		7.0 - 8.0		1.5 - 1.7			4.7 - 5.8
1962	12 - 15		4.5 - 5.5		7.0 - 8.0		1.4 - 1.6			4.8 - 6.0
1963	12 - 15		4.5 - 5.5		7.0 - 8.0		1.4 - 1.6			5.0 - 6.2
1964	12 - 15		4.5 - 5.5		6.5 - 7.5		1.2 - 1.4			4.7 - 5.9
1965	13 - 16		4.3 - 5.3		6.2 - 7.2		1.3 - 1.6			4.7 - 5.9
1966	13 - 16		4.0 - 5.0		5.0 - 6.0		1.3 - 1.6			4.8 - 6.0
1967	13 - 16	8.4	3.5 - 4.5	2.3	4.3 - 5.3	2.8	1.2 - 1.5	.8		4.2 - 5.2
1968	13 - 16	8.4	4.0 - 5.0	2.6	4.2 - 5.2	2.7	1.2 - 1.5	.8		3.1 - 4.5
1969	13 - 16	8.4	4.0 - 5.0	2.6	4.2 - 5.2	2.6	1.1 - 1.4	.75		4.3 - 5.2
1970	13 - 16	8.4	3.2 - 4.0	2.1	4.8 - 6.0	3.1	1.2 - 1.4	.75	50 - 60	4.0 - 5.0
1971	13 - 16	8.4	3.2 - 4.0	2.1	4.8 - 6.0	3.1	1.2 - 1.4	.75	50 - 60	4.0 - 5.0
1972	13 - 16	8.4	3.2 - 4.0	2.1	4.8 - 6.0	3.1	1.1 - 1.3	.7	45 - 55	3.5 - 4.3
1973	13 - 16	9.3	3.2 - 4.0	2.3	4.8 - 6.0	3.4	1.1 - 1.3	.75	30 - 40	3.0 - 4.0
1974	13 - 16	9.3	2.8 - 3.4	2.0	4.0 - 5.0	2.9	0.9 - 1.1	.62	22 - 27	2.5 - 3.2
1975	13 - 16	9.3	2.5 - 3.0	1.8	3.2 - 4.0	2.3	0.8 - 1.0	.58	14 - 23	2.5 - 3.2
1976	13 - 16	9.3	2.5 - 3.0	1.8	2.6 - 3.2	1.9	0.6 - 0.8	.45	16 - 20	2.5 - 3.0
1977	13 - 16	12.3	2.5 - 3.0	2.4	2.6 - 3.2	2.5	0.6 - 0.8	.56	16 - 20	1.9 - 2.1
1978	13 - 16	12.3	2.5 - 3.0	2.4	2.0 - 2.4	2.0	0.6 - 0.8	.55	15 - 18	NA
1979	14 - 17	14.6	2.0 - 2.35	2.1	2.0 - 2.4	2.2	0.5 - 0.6	.5	14 - 17	1.7 - 2.05
1980	18 - 20	16.2	2.6 - 2.9	2.4	2.6 - 2.9	2.4	0.6 - 0.7	.58	18 - 21	2.0 - 2.2

^{1/} In PT per Kg of nutrients

^{2/} Calcium nitrate (15.5% N) has consistently been most expensive form of N, usually by PT 2/Kg over AS (20.6% N) and CAN (20.6% N) and 3 PT/Kg over CAN (26% and 33.5%), NAS (26.5%) and Urea (46%). In early 1979 prices were raised by 7% (for the lowest analysis) to 10% over 1978 prices. The end of 1979 prices were raised by about PT 4/Kg of N and PT 1.6/Kg of P₂O₅.

^{3/} Paddy Basis

world prices. In contrast quality inspected cottonseed supplied by the government is sold for Pt 2.5/Kg. (LE 25/ton) at the sowing rate of 70 kg per feddan which is about one-fifth of its value for processing (oil and cottonseed meal) value.

Farm machinery and equipment is imported without preference on exchange rates, that is with the importers paying full costs of the import. Subsidized credit may be obtained, and fuel is subsidized heavily. Facilities for repair often are a severe problem.

Some farm operations might be greatly improved by small animal-drawn or manually handled equipment, e.g., for precision placement of fertilizer and seed and ground applications of pesticides. With the skyrocketing cost of fertilizer, hit or miss broadcast of fertilizer with little or no mixing into the soil no longer is an economically tolerable practice even for a rich country, much less for a country with Egyptian's level of resources. Such practices adversely affect yield and it no longer is feasible to compensate for poor fertilizer placement by adding more fertilizer. The same negative production impacts results from poor seed placement. Seed "quotas" in general are much higher than recommended with proper technology (Table A-2).

Improper pesticides use reduces yields and also creates human and environmental risks which become accentuated when numbers of applications or rates are increased to compensate for initial spotty coverage. Pesticide coverage faces another growing problem, in that cotton field sizes are small and becoming increasingly scattered, so the government aerial operations are likely to encounter increasing

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inefficiency and health and environmental risks. Efficient, small scale, low cost manual spray units clearly are badly needed for cotton and for other crops, especially fruits and vegetables. Virtually everyone seems to agree that, except for cotton, farmers have almost no technical help available at the village either from the inputs suppliers or the extension service. This presents a particularly serious problem in use of pesticides especially more toxic insecticides needed for crops other than cotton.

In general, the more serious problem on inputs (with some exception) is not cost, but availability - both absolute shortages and uncertainty about obtaining supplies when needed. Reports were frequently encountered that even when supplies were available, the workers in the village agency or cooperative, which monopolized supplies, were at best indifferent and unhelpful and often unpleasant or demanding. Thus would-be clients bought only essential items for which they had no alternative sources. They saved their own seed (even when it was recognized to be poor).

Shortages have been most frequent for fertilizer. The total shortage of fertilizer is not easily determined, but available evidence from black market prices and disparities between MOA estimated requirements and actual use, would put the total at 100,000 MT of nutrients (mostly nitrogen) per year continuing over the past several years. In most years a ton of nitrogen, generally would have added between two and six times its international cost in the international value of added product. Hence, the net loss to the economy of this strategy of limiting fertilizer supply has been a major one. Further, the allocation process used to ration the short supply has tended to compound

this loss. It is directed to achieving fairly uniform rates of application while variations in marginal returns among fields and among crops suggests the desirability of quite wide variations in use among farms and fields. Waterlogging is one important factor affecting yield capability of land and fertilizer response. The black market fertilizer trade among farmers has mitigated some of the more serious diseconomies of the allocation process. However, difficulty of movement tends to inhibit interarea adjustments.

Pest control on cotton is the largest farm subsidy item after fertilizer. ^{1/} Pest control has been subsidized between 40 and 60% of cost. However, the farmer's share for 1979 was increased from LE 13 to LE 41 per feddan. This is likely to adversely affect farmer's interest in pest control on cotton despite the 1979 increase in cotton prices (as of costs of inputs and prices of competing crops rise).

Seeds were to receive a total subsidy of LE 1,200,000 in 1979. The General Directorate of the Ministry of Agriculture supervises production of seed on farms of contracting private seed growers. Seeds commonly are sold at below cost of production with the difference paid by the State.

Beginning in 1966, the price of gypsum used to treat alkaline and saline soils was fixed at PT 81 per ton with transportation cost subsidized by the State at PT 60/ton. In 1970, the price at the farm

^{1/} Cost of impoundment and delivery of irrigation water probably is the largest, but is not considered in this section since it is not a "purchased" input. Drainage is another big subsidy item.

TABLE A-2

Seed quota per feddan1. Winter season seeds:

Crops	minimum	maximum	Crops	minimum	maximum
Wheat	75 kgm.	78 kgm.	fenugrek	40 kgm.	40 kgm.
Barley	50 kgm.	60 kgm.	flax	80 kgm.	80 kgm.
Lentils	63 kgm.	80 kgm.	onion (seeds)	6 kgm.	8 kgm.
Beans	75 kgm.	78 kgm.	onions (bulbs)	40 kgm.	50 kgm.

2. Nile and summer seasons seeds:

Crops	minimum	maximum	Crops	minimum	maximum
Maize	24 kgm.	30 kgm.	sesame	3 kgm.	5 kgm.
Maize	18 kgm.	18 kgm.	ground nut.	16 kgm.	30 - 35 kgm.
Sorghum	12 kgm.	12 kgm.	sweet maize	10 kgm.	12 kgm.
Rice	50 kgm.	60 kgm.	sun flower	6 kgm.	8 kgm.
-	-	-	soya beans	30 kgm.	30 kgm.

Cotton seeds: 60 kilos per feddan of Dandara and 70 kilos of all other varieties.

Source: Principal Bank for Development and Agricultural Credit.

TABLE A-3: COSTS OF COTTON PESTS CONTROL AND THEIR DISTRIBUTION

<u>Year</u>	<u>Costs per Feddan</u>				<u>Total Costs of the Cotton Acreage</u>		
	<u>Cotton Acreage</u>	<u>Total</u>	<u>Born by Farmers</u>	<u>Born by the State</u>	<u>Total</u>	<u>Born by Farmers*</u>	<u>Born by the State**</u>
	1,000 Fed.	L.E.	L.E.	L.E.	m. L.E.	m. L.E.	m. L.E.
1974	1,453	26	13	13	38.4	19.2	19.2
1975	1,346	32	13	19	46.2	17.5	28.7
1976	1,248	32	13	19	53.1	16.2	36.9
1977	1,423	35.6	13	22.6	55.3	18.5	36.8
1978	1,192	43.7	13	30.7	46.9	15.5	31.4
1979	1,200	66.5	41	25.5	80.-	49.4	30.6***

* Costs for farmers were calculated by multiplying the cultivated area x average subsidy per feddan.

** Agricultural Stabilization Funds

*** Appropriations in 1979 budget.

SOURCE: Ministry of Agriculture, 3/14/79

was fixed at PT 81 and the stabilization fund paid LE 3.10 per ton subsidy. With exhaustion of the El Ballal quarry, costs were expected to go to LE 7,20 of which the State was to pay LE 6,39. The subsidy was estimated at LE 1,690,000 for 1979. However, the budget limitation was expected to restrict the amount of the subsidy per ton to LE 2,90 requiring a markup of the price to farmers from LE 0.81 to LE 4.30 per ton.

For onions and tomatoes, the two more important vegetables occupying together about 450,000 cropped feddans, yields are about a third of what should be possible. Much of this yield problem on tomatoes at least can be attributed to poor seeds and poor pest management.

Shortages of livestock feed is endemic especially for ruminant livestock during the non berseem season -- May to November. Feed concentrates are distributed through the village level agency of the Principal Bank, at highly subsidized prices, but supplies are very limited and apparently too uncertain for most farmers to depend upon.

The economics, for society as a whole, of feeding expensive concentrates to low producing livestock is doubtful. However, evidence indicates that, on balance, they pay more than their keep at internal prices of feed, milk, meat and power. To small farmers having their own milk cow or buffalo makes a major contribution to nutrition and well being of the family. Typically, almost all the milk produced on small farms is consumed by the family. Subsidized rations to milking cattle, when available, appears to be one of the few transfers to low income farm households. However, small livestock units are last in priority for receipt of feed. Occasional and uncertain distribution

of feed is not an adequate substitute for regular supply of low cost forage which might be obtained by encouraging farmers to plant small plots of hot season forage. This could reliably and economically fill the May-November feed gap for ruminant livestock. It would also permit a straw to grain shift in wheat production emphasis.

Supply of broiler chicks, until recently monopolized by the General poultry Company, has been a serious problem.

3. NEW SHIFT IN DIRECTION

There have been some small relaxations recently in the government monopoly of inputs. These directions, if adequately pursued, would seem to offer new opportunities for Egyptian agriculture. In principle, private enterprises, including the quasi private Egyptian Agriculture Organization and the Horticultural Union, will be able to import a wide range of inputs albeit at only free exchange rates, that is, without subsidy. This includes pesticides (if in the approval listing), fertilizer, seeds or at least parent seed lines for field crops and vegetable seeds. Private production of quality seed in-country also is to be encouraged.

Private chick producers are being encouraged to bring in breeding lines and produce and sell chicks. However, up to this point, there does not seem to be a significant break in the government monopoly or virtual monopoly of production and supply of oilseed meal (cottonseed, soybean), and bran (wheat and rice) or of the commercial mixed feed industry. This may become an increasingly serious obstacle to development of a livestock industry based on modern high producing

livestock especially dairy cattle and poultry. Use of modern high producing species is the only direction Egypt can go economically in expanding domestic production and reducing the rate of growth in dependence on imports of livestock products.

Increased effectiveness in the artificial insemination program for cattle and buffalo will be essential for farmers to upgrade the productive capability of their milk animals.

4. ORGANIZATION FOR PLANNING AND SUPPLY OF INPUTS

There are major similarities in organization and in steps in approving specific types of inputs, establishing national quantities and making allocations (by acres in the case of crops and by head for livestock). The principal responsibility for specifying physical requirements for crops and livestock, estimating total needs, proposing allocations, and coordinating procurements and distribution lies with the Ministry of Agriculture. It also has principal responsibility for production, inspection and processing of seed (except for cotton where it only inspects). For livestock it has responsibility for supply of improved breeding stock, e.g., breeding animals or semen for dairy and poultry chicks for broiler and egg production.

It operates pest control programs directly in the case of cotton using contract aerial sprayers or cooperates with the Bank at the village for ground operations. The MOA is also heavily involved in direct production of meat, milk, broiler and eggs in competition with farmers it services. Figure A-1 shows the organization of the Ministry of Agriculture.

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The Principal Bank for Development and Cooperatives which is closely affiliated with the MOA is the principal agency (with over 4,000 village units or agencies) for delivery of inputs and credit at the village level and procuring quotas on specified crops. It distributes fertilizer, seed, pesticides, and mixed and by-product feeds as a virtual monopolist at the village level.

The Ministry of Industry plays a key role in producing inputs (directly or as processing by-products). This includes cotton ginning (cottonseed for planting), oilseed processing (protein concentrates for feed), wheat and rice milling (bran for feed). It also produces fertilizer and other soil additives, formulates pesticides, and produces farm machinery.

The Ministry of Supply is principally responsible for import of different food including wheat which provides the bran used for feed. Other ministries are involved on various issues (Finance, Trade, Planning, Economics).

The Egyptian Agricultural Organization and Horticultural Union which are affiliated with MOA distribute some imported inputs mainly vegetable and flower seed, pesticides and fertilizer.

Figures A-2 to A-6 illustrate the nature of relationship in provision of some of the principal imports. For more details see discussion on pesticides and Appendix III (fertilizer subsidies and rationing) of the December, 1979 AID report on fertilizer.

5. UPDATE ON SUPPLY AND DEMAND FOR NITROGEN

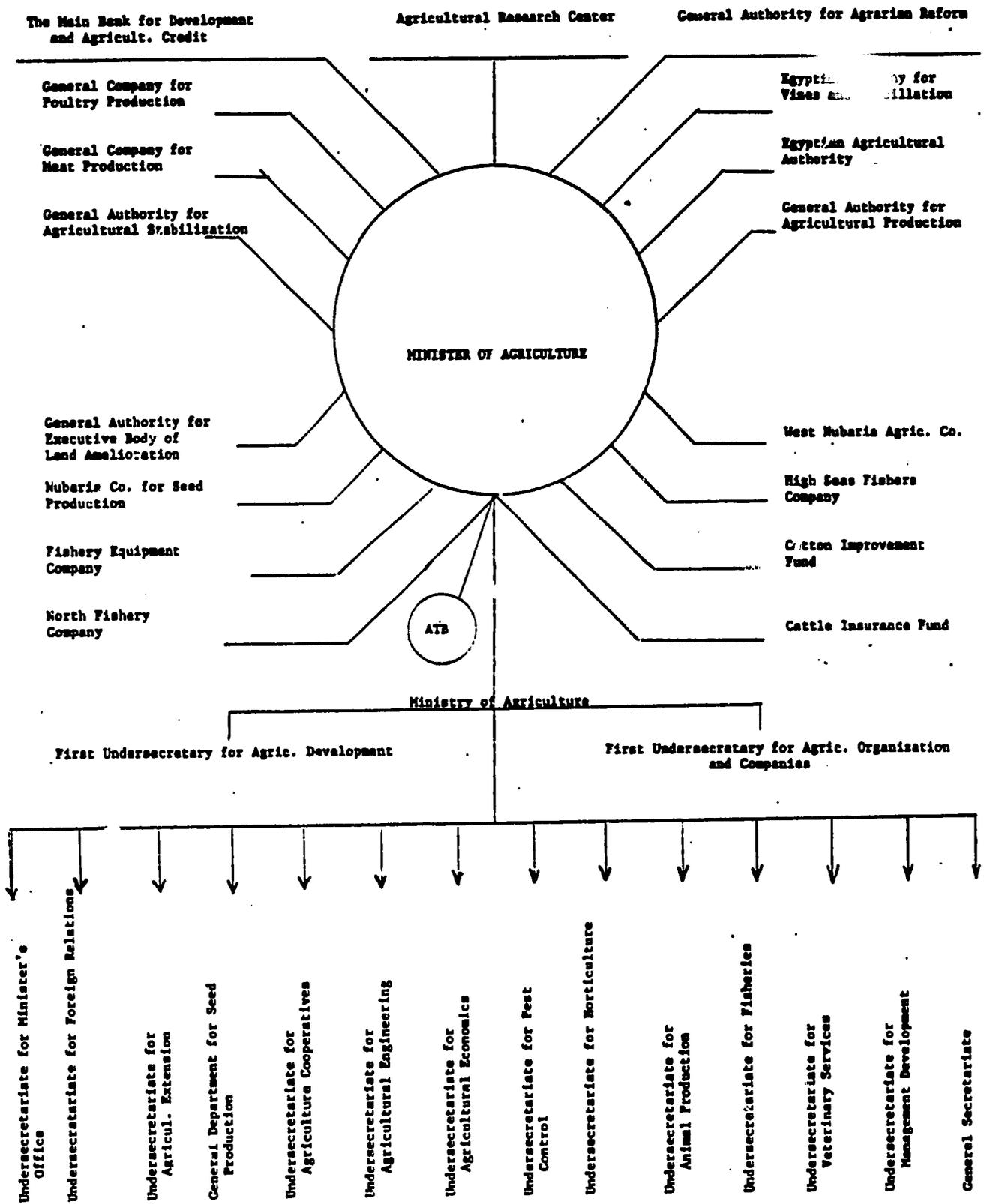
Based on discussions with the MOA, PBDAC and Chairman Abu Qir Fertilizer plant, the projections made on November 1979 -- Fertilizer Report (Newberg) have been updated for Nitrogen (Tables A-4 and A-5). These now indicate a larger shortfall between domestic production and demand than previously was projected (approximately 120,000 nutrient tons). The government continues to pursue a policy of rationing of fertilizer (allocation by feddans in various crops in different areas) and general scarcity psychology to maintain total demand within constricted supplies). Prices of fertilizer and some crops were raised substantially in 1979. The ratio of prices of fertilizer to prices of major crops is almost the same in 1980 as it was in 1978 (Table A-1).

Government estimates for growth on fertilizer use and, consequently, plans for future supplies appear very conservative, much too low to achieve even the modest five-year growth plans. MOA expects growth on use of N of only 1% per year after reaching its "crop recommendation levels" (see Table A-4). Abu Qir plant provided slightly higher, but still modest estimates with only 2-3% growth rates; the principal concern is that action on supply will make these low estimates self-fulfilling prophecies.

A 10% rate of growth on nitrogen fertilizer would be more reasonable in relation to the five-year agriculture targets. It is still very modest considering the long period of stagnation in Nitrogen fertilizer growth and the relatively low rates of Nitrogen use on this almost 100% irrigated crop area. In 1978, the application rate was

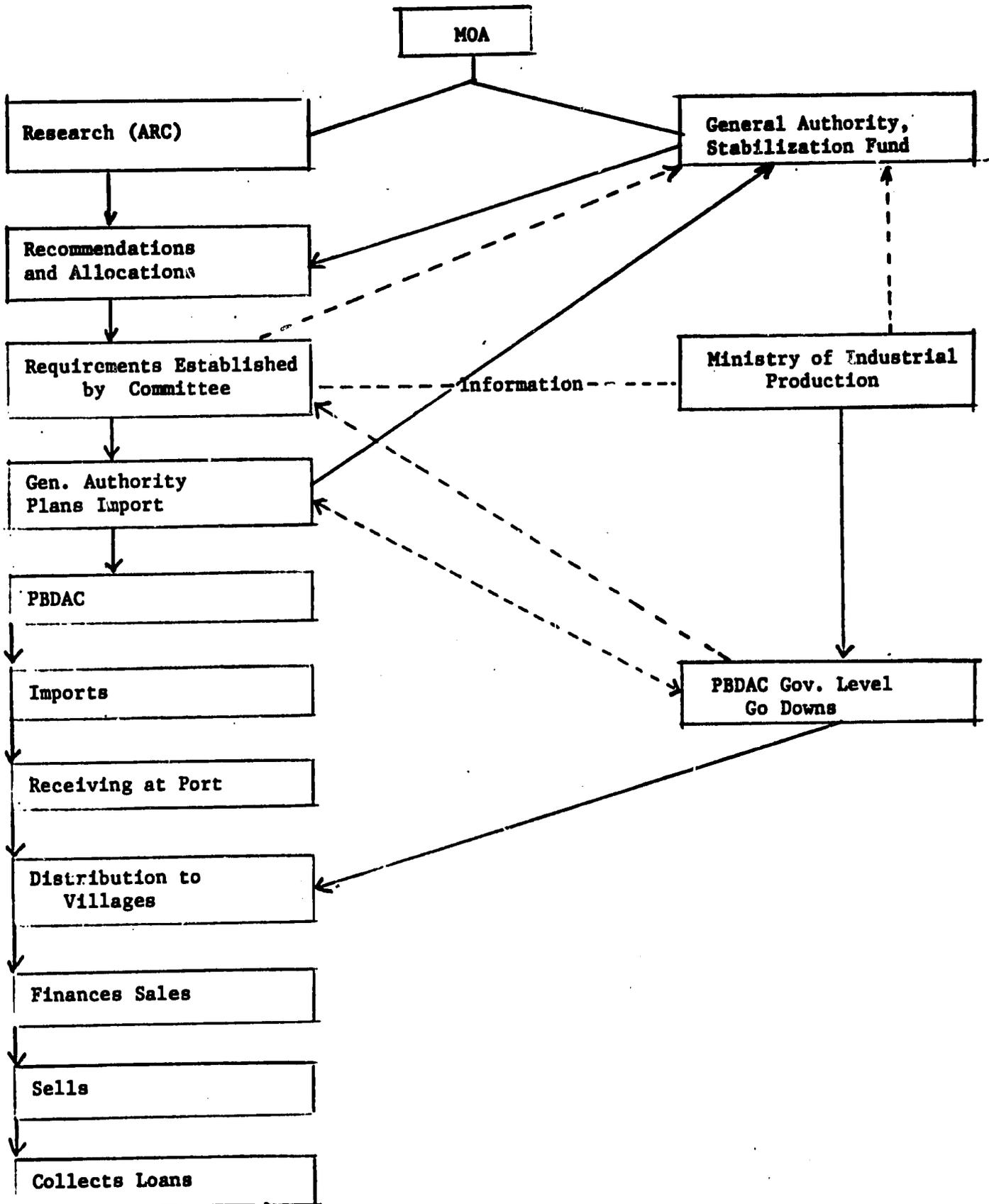
FIGURE A-1

**MINISTRY OF AGRICULTURE
AND ITS ORGANIZATIONS & COMPANIES**



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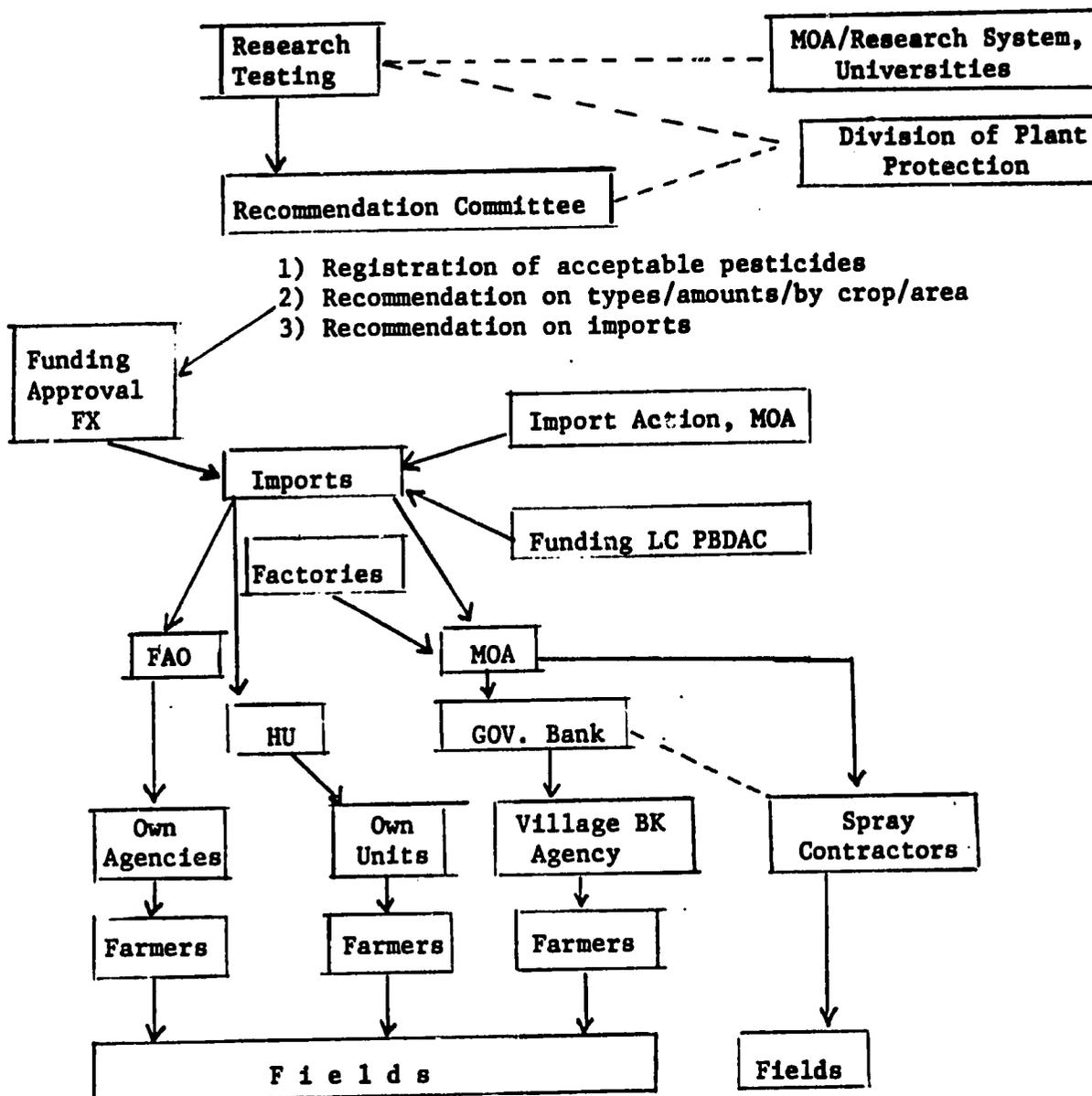
Fig. A-2: Fertilizer



Egyptian Agricultural Organization and Horticultural Union and other private groups more may import and distribute fertilizer

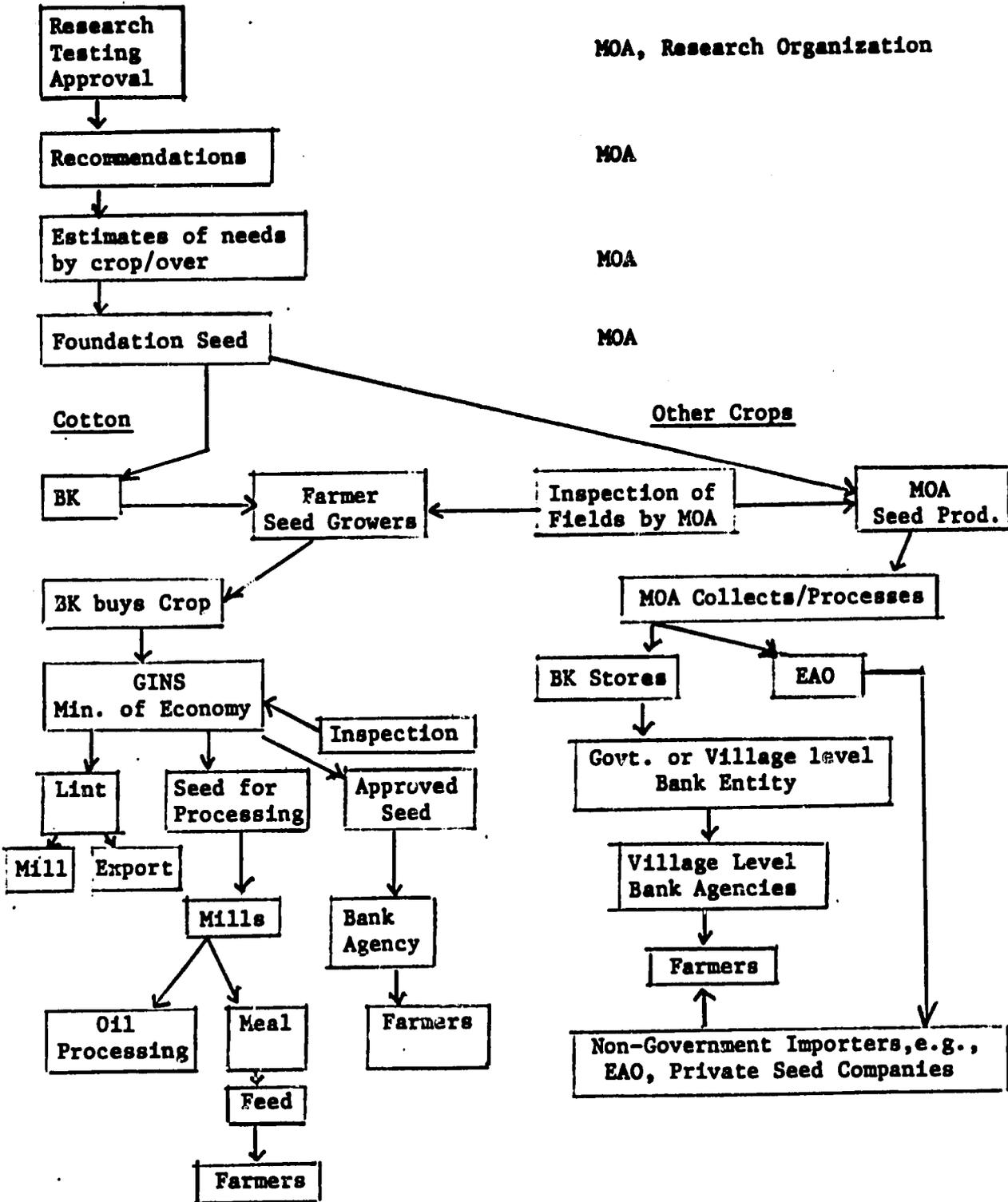
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Fig. A-3: Inputs Decision/Distribution Matrex Pesticides for field crops and cotton



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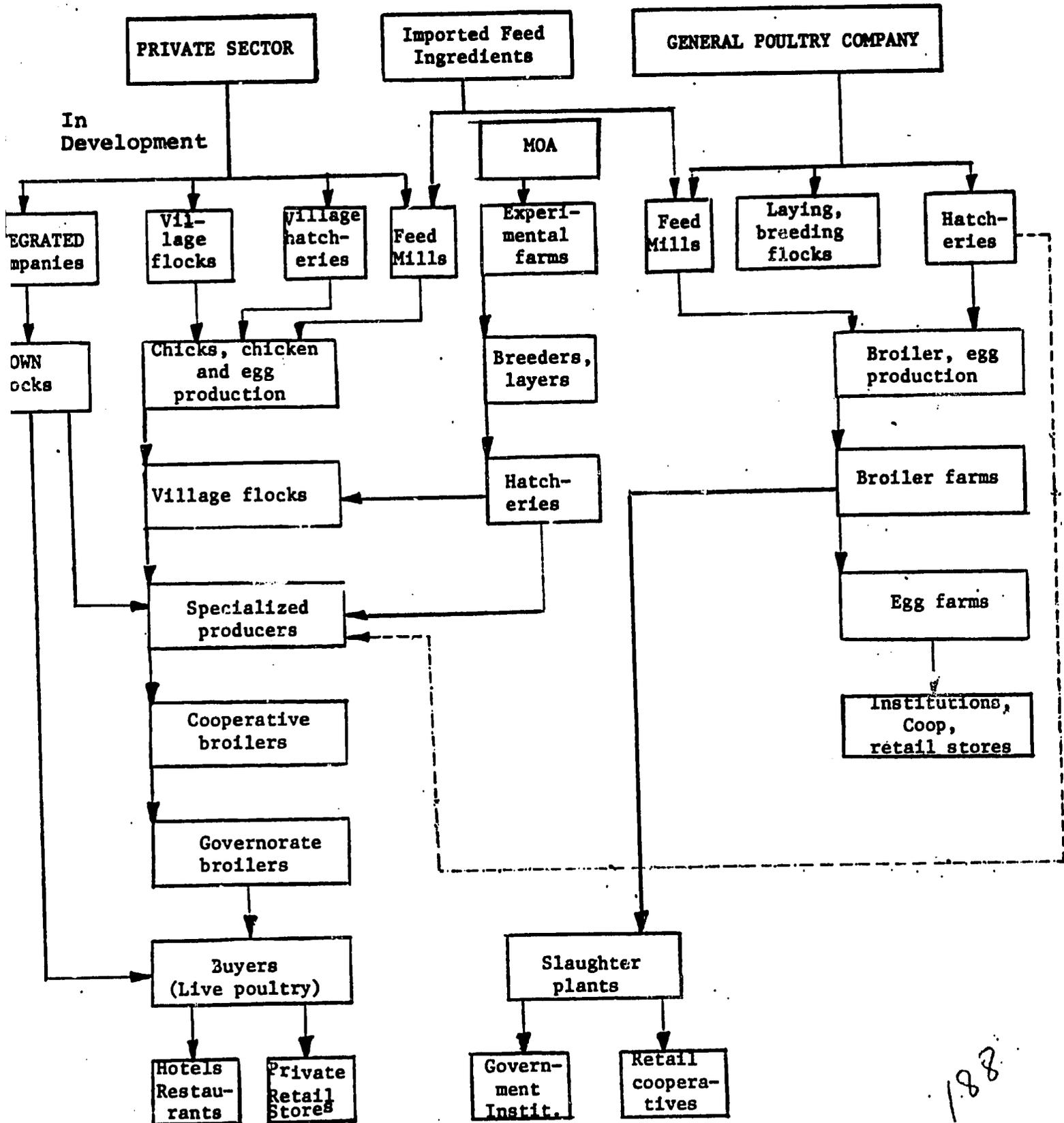
Fig. A-4: Seeds



Price of PT 2.5/Kg., or LE 25/ton
 Limit 60-70 Kg./fedcm

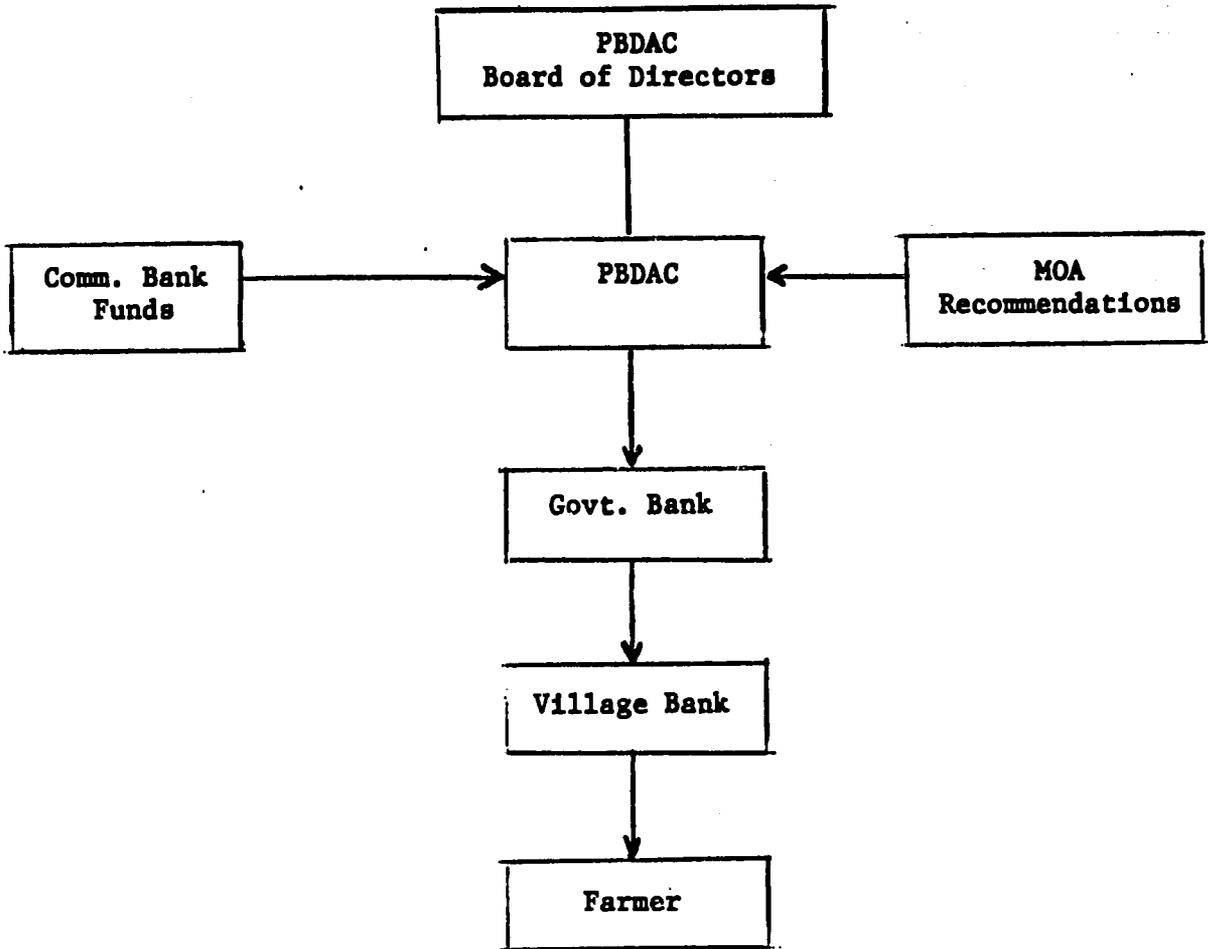
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Figure A-5: Production and Marketing System for Poultry and Eggs



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Fig. A-6: Credit



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only 40 kg over feddan. Column A Table A-6 shows results of a 10% per year growth rate; Column B assumes a jump the first year, reflecting pent up demand of 10% growth after that. An expansive policy which achieved a growth rate of assumption B with 6.5 million feddans and a 2.0 cropping rate would still be only 74 kg per feddan in 1985 (assumption A of 10% growth would be about 67 kg/feddan).

It should be highly economic at expected world crop prices, and essential to achievement of significant progress on reducing import dependence to make the shift from a policy of rationing and scarcity psychology to one of abundance and freedom of farmers to buy unlimited quantities. This might well be accompanied by some reduction in levels of fertilizer subsidies and a gradual improvement in crop prices to bring input and output prices near world market prices thereby achieving a better balance in internal prices.

The existence of a major unsatisfied demand is indicated by the black market in fertilizer. Data recently collected in a MOA survey of maize farmers suggests that this black market volume may be very substantial. Results of this survey indicate that farmers went into the black market for approximately 1/3 of their nitrogen fertilizer. The percentage was higher in Upper than in Lower Egypt. Prices paid in the black market averaged about 65% more than the regular (subsidized) price of fertilizer (at the Cooperative Store or Bank Agency). Ratio of black market to allocated fertilizer was slightly higher for urea than other fertilizers.

TABLE A-4: Projected Production and Consumption of Nitrogen:

	<u>Production</u>	<u>Projected Consumption</u>		<u>Balance (P-C₁)</u>
		<u>(Thousand M.T. of N)</u>		
		<u>C₁</u>	<u>C₂</u>	
1977	203	418		
8	206	445		
9	321	480-545 ^{1/2/}	(562) ^{3/}	
1980	481	605 ^{4/}	(576) ^{3/}	-124
1	624	620 ^{4/}	(581) ^{3/}	+ 4
2	744	635 ^{4/}	(586) ^{3/}	+104
3	768	650 ^{4/}	(590) ^{3/}	+118
4	780	670 ^{4/}	(594) ^{3/}	+110
5	792	690 ^{4/}	(599) ^{3/}	+102

1/ This is the amount reported distributed. Carry over is reported to have increased substantially. Consumption probably was below 500,000 M.T.

2/ The economics section of the MOA informed us in early March that 1979 production was actually only 1,700,000 M.T. of 15.5% or 264,000 nutrient tons and imports 1,400,000 M.T. of 15.5%. Hence, total supply was 480,000 M.T. of N.

3/ MOA from INP study based on crop recommendations.

4/ Fertilizer industry projections from Abu Qir plant information.

Table A-5: Expected Production of Nitrogenous Fertilizers, 1977-1985.
(in thousand M.T. of Nitrogen)

COMPANIES	YEARS								
	1977	1978	1979	1980	1981	1982	1983	1984	1985
	M.T. N	M.T. N	M.T. N	M.T. N	M.T. N	M.T. N	M.T. N	M.T. N	M.T. N
<u>1. El-Nasr Co. for fertilizers & Chemical industries</u>									
a) Suez plant:									
Calcium nitrate (15.5%)	17	28	39	39	39	39	39	39	39
Amm. nitrate (20.6%)	-	-	-	-	-	-	-	-	-
b) Talkha plant:									
Calcium Amm. nitrate (31%)	62	65	86	86	86	86	86	86	86
urea (46%)	-	-	-	87	160	253	253	253	253
<u>2. Egyptian Co. for Chemical Industries (KIMA):</u>									
Calcium Ammonium nitrate (31%)	95	82	93	93	105	105	105	105	105
<u>3. El-Nasr Co. for Coke & Basic Industries</u>									
Amm. Sulfate (20.6%)	2	4	4	4	4	4	4	4	4
Amm. Nitrate (33.5%)	27	27	27	27	27	27	27	27	27
<u>4. Abu-Qir Co. for fertilizers:</u>									
Urea (46%)	-	-	72	180	203	230	230	230	230
A.N.							24	36	48
Total M.T. of N	203	206	321^{1/}	488^{2/}	524	744	768	780	792

Source: Collected and compiled from information issued by nitrogenous fertilizers producing companies.

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^{1/} Information from the MOA on March 6, 1980 suggest only 264,000 M.T. of N (1,700,000 M.T. of 15.5% equivalent). This would imply a lower output for 1980 than the above figures suggest.

^{2/} The MOA said the 1980 target has been reduced to 3,537,000 M.T. or 438,000 M.T. of N.

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TABLE A-6: Consumption and Balance Based on an Expansive Growth Policy for Fertilizer. (1000 MT of Nitrogen)

Year	Production	Consumption		Balance	
		+ 10%/year A	+ 20% in 1980 then 10%/year B	A	B
1977	203	418 <u>1/</u>			
78	206	445 <u>1/</u>			
79	321 <u>4/</u>	500 <u>2/</u>	500 <u>2/</u>	-179	-179 <u>3/</u>
1980	481	550	600	- 69 <u>5/</u>	-119 <u>5/</u>
81	624	605	660	+ 19	- 36
82	744	665	726	+ 79	+ 18
83	768	721	799	+ 47	- 31
84	780	793	879	- 13	- 99
85	792	872	967	- 80	-175

1/ Actual

2/ We were told on March 6 that combined 1974 production and imports total 481,000 MT of N.

3/ B assumes 20% unsatisfied demand is satisfied in 1980 and then 10% growth per year thereafter.

4/ Based on

March 6, 1980 information, production was only 264,000 MT and imports 217,000 for a total of 481,000 MT of N. The deficit then would have been 217,000 MT in 1979.

5/ Based on early 1980 information, this may be optimistic, i.e., production may be lower and the deficit higher. Example: the MOA informed us that the 1980 target is 3,537,000 MT of 15.5% average nutrient (438,000 MT of N); import targets are 600,000 tons of 15.5% average nutrients (93,000 MT of N for a total supply of 531,000 MT of N).

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6. FERTILIZER PRODUCTION

Abu Qir Fertilizer Plant

We were informed that Abu Qir capacity is 1,000 tons per day of NH^3 using gas from a nearby well, with a capacity of 4 million M^3 /day. The well output could be doubled in three years (to 8 million M^3). Abu Qir currently uses only 1.2 million M^3 per day to produce at capacity of 1,000 MT of NH^3 and 1600 MT of urea. Construction of the plant was started in 1978 ^{1/}. In March 1979 they got their first gas, in May produced the first NH^3 and in August the first urea. For Sept.-Dec. 1979, they produced 120,000 MT of urea and in January 1980, 32,000 MT (152,000 total for Sept-Jan). In February they had to shut down to replace bricks in the primary "reformer". They started up in March with the new brick installed. They will accept operation of entire plant about May and expect to run the rest of 1980 producing about 40,000 MT of urea monthly for a total of 10 months. Hence, for 1980 they expect to produce about 400,000 MT (70-75% of capacity).

Storage capacity at the plant is only 50,000 tons (one month). Thus, the only way they can operate is by assuming full responsibility for insuring that all fertilizer is moved out on schedule.

^{1/} It took 39 months from start of construction to full operation which is good.

Production of Talkha

We were told Talkha which was to start in April at the latest now will start only in June, 1980. (If it operates at about 70% of capacity for six months which would be good, it would produce about 87,000 MT of Nitrogen in the farm in 1980).

Product Mix and Biuret Issue

Two of the major issues of concern, namely single nitrogen product in the north (urea) and biuret appear to be on the way to being resolved (a) by starting an amonium nitrate feasibility at Abu Qir to produce about 50,000 MT of N per year, (b) by holding biuret below 0.8% though at production cost. The controversy over critical level still is not resolved (Abu Qir says 1.5%, MOA says 0.8%).

Results of Consultation in U.S.

The question of biuret limits in urea has been checked again with authorities in the U.S., including both chemical engineering and agronomy staff at the International Fertilizer Development Center (TVA). First, AID in financing fertilizer as it frequently does has examined the biuret issue and established a limit of 1.5% biuret in urea it finances. There are no uniform limits applied in the U.S. It depends on individual plants, some of which have very low levels in their output. The problem leading to biuret formation is excessively high temperature during the urea cooling and drying process.

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There are two possible problems with biuret. These are foliar application and banding at seeding. In Florida they consider biuret content exceeding 0.25% undesirable for foliar application. Very little foliar application is foreseen in Egypt in the near future. In banding and other uses the possibility of burning by the urea itself limits the placement of bands and concentration of urea to levels where biuret should not be a problem at 1.5% . Further, since urea is about as effective when broadcast as when banded, there should be little reason to band the urea. There are no known biuret problems in top dressing of urea.

The conclusion of the consultations is that a limit of 1.5% should be acceptable unless the urea is to be used for foliar application.

7. PLANT PROTECTION POLICIES

Pesticides, Acts and Committees

A. Regulations

During 1951 an act was established to regulate the sale of insecticides, herbicides and fungicides and to specify field application dosages of pesticides. This regulation has been amended several times with the latest in 1967.

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B. Committees

The government committees associated with the act are as follows:

a. Agricultural Pesticides Committee

The Agricultural Pesticide Committee consists of officials from the Ministry of Agriculture and the Ministry of Public Health; the Undersecretary of State for the Ministry of Agriculture acts as the Chairman. The Committee is to advise the Minister of Agriculture on all subjects concerning the importation, formulation, marketing and sale of pesticides. It recommends the registration of new pesticides and suggests enforcement of the provisions of legislative acts and new amendments to be added concerning specifications, registration, re-registration, sampling, and restriction of intergovernorate transportation of pesticides.

b. The Permanent Committee for Recommendations

This Committee is led by the Undersecretary of State for the Ministry of Agriculture and consists of research leaders in the Ministry of Agriculture and in the Egyptian universities. The committee looks annually to results of field experiments carried out in different experimental stations, surveillance of pest tolerance to pesticides and recommends the pesticides to be applied in the coming pest control season. In addition, the committee, upon request, gives technical views on particular problems. In that sense, this committee furnishes sound opportunities for public hearing on technical pesticide problems associated with the pesticide act.

c. The Supreme Committee for Pest Control

This committee, which includes research leaders and pest control research officers in addition to members of the permanent committee for recommendations, is headed by the Minister of Agriculture. The committee looks to recommendations of the other two committees and, upon approval, recommendations and registrations are then granted. The meetings of this committee are the most useful ones to hear ideas and information on pest control problems coming from different disciplines. (Ali, 1977; from Proceedings of the UC/AID - Univ. of Alexandria, ARE, Seminar/Workshop in Pesticide Management (March 5-10, 1977).

8. CURRENT SYSTEM FOR PESTICIDE USE

A. Insecticides

The current emphasis on pesticide use by governmental agencies involves mostly insecticides, and primarily insect pest or cotton insects. It is estimated that about 2/3 of the insecticides used are for cotton insect control.

The system for testing new insecticides provides considerable safety against the premature recommendations of an insecticide. Candidate materials must undergo a three-year testing process, graduating from the initial first year laboratory and small plot screening to large-scale field experiments during the third year. Insecticide companies are charged a very nominal fee of LE 1000 for the inclusion of one of their insecticides in a test. An additional fee of LE 500 is charged

for testing each additional dosage of the same insecticide. At the same time that the field trials are being conducted, the Central Agricultural Pesticide Laboratory is conducting toxicology studies.

The Permanent Committee for Recommendations, after reviewing the results of all experimental data, recommends all insecticides that performed well in the tests to the Undersecretary for Plant Protection. Among the factors that then enter into the decision of the Undersecretary on which to purchase insecticides are: relative efficiency, price, and safety considerations.

Formerly, pesticides could only be imported by the Minister of Agriculture. However, a recent change provides some relaxation of this rule. The Minister is still responsible for importing the insecticides for cotton; however, anyone may import other pesticides, as long as they are in the book of recommended materials and approval has been granted by the Ministry.

Once the insecticides for cotton are purchased and allocated to the different governorates, the decision on what to use and when to use it is made by the Minister of Agriculture. At present, an individual insecticide may be applied only one time during the season. Subsequent applications must be with different insecticides.

Until recently, the timing of insecticide applications on cotton was based on field records showing the need for insect control. Economic thresholds of the various major pests were established and served as the guidelines for dictating this need. Sound pest management practices were utilized in conjunction with chemical control to alleviate

the need for complete reliance upon insecticides, e.g., small children were employed to collect egg masses of Spodoptera littoralis, the most important cotton pest. This reduced or eliminated the need in many instances for insecticidal control. Now, however, cotton pest control is started the first week of July regardless of pest infestation levels. Usually three to four applications are made on cotton at intervals of 15 days to three weeks. This does not include additional applications made during early season for thrips or aphids and in late season for mite control.

This new procedure has met with mixed acceptance. One authority in the Ministry stated that during the last two seasons, 2/3 of the insecticides used could have been saved had they been applied on the basis of need. Others expressed the fear of grave consequences within three to four years if this procedure persists. At the same time, industry personnel indicated that too little insecticidal control is applied to cotton and the impression was given that with less rigid governmental controls, company personnel would be exerting greater influence at the farmer level.

a. Problems Identified

- (1) Inflexibility of insecticide use.
- (2) Insecticide use based on calendar date rather than on need.
- (3) Extension service ineffective.

- (4) Organizational structure of extension service.
- (5) Lack of coordinated responsibilities between plant protection scientists of the Ministry of Agriculture and the universities.
- (6) Lack of incentive for growers to produce cotton.
- (7) Inability of department heads (or other administrative heads) to structure their departments to meet their research and/or teaching needs.
- (8) Ever-increasing labor costs.

b. Recommendations

- (1) In a sense, the relatively few insecticides selected and purchased by the Ministry of Agriculture is good, in view of the grower's lack of knowledge concerning insecticides and the lack of extension service advice at the grower level.

However, the governmental policy of limiting the application of any insecticide to one time only during the season further restricts the choice of insecticides for a particular pest species. Often a major pest will require more than one application and at the same time there may be only one good insecticide for that pest.

It seems appropriate that flexibility should be retained whereby the most effective insecticide for a particular pest and location could be used. This procedure should not jeopardize the intended benefit, i.e., prevention of resistant populations, as the reason for its institution in the first place. The most knowledgeable scientists in the area of plant protection are available to advise the Minister of Agriculture. Since the Minister issues the final ruling on cotton pest control, change could be effected quickly as new problems arise.

One of the recommendations (No. 5) stemming from the 1977 Seminar/Workshop in pesticide Management at the University of Alexandria is relevant to the present recommendation. The workshop recommendation was, "that the total pesticide management system should have complete and effective linkage among research, educational, and administrative units so that new procedures and safety mechanisms can be initiated effectively and rapidly."

- (2) Plant protection scientists in the Ministry of Agriculture have established economic thresholds for major pests of cotton. These studies are not being utilized under the present practice of spraying on a calendar-date basis. It is recommended that the practice of spraying on the basis of need be re-instated and that the necessary steps be taken to provide the grower with up-to-date assessments of the pest situation in his fields.

Implementation of proposal No. 4 in "Egypt, Major Constraints to Increasing Agricultural Productivity (Foreign Agric. Econ. Rept. No. 120)" would effectively accomplish this practice. This proposal states "Placement of one or more highly-trained extension workers in each village, with adequate resources for effective extension work. Staff at regional and national offices would service their needs."

- (3) It is recommended that special efforts be made to extend to the farmer up-to-date scientific information available from university and Ministry of Agriculture researchers. Relevant recommendations from the 1977 Pesticide Workshop (cited earlier) are:

Number 3: "Specialized training programs in Pesticide Management for agricultural engineers at the village level should be sponsored by the Ministry of Agriculture and its extension service in cooperation with the Ministry of Health. These training programs should provide up-to-date information and should include among other items annual workshops, specialized instructional materials and a training manual.

Number 7: "Agricultural Colleges and universities and other appropriate institutions should continue and expand the current programs of training for agricultural engineers in the form of short courses in pesticide management during winter, and

Number 9: "The extension service should increase its linkage with the sources of pest and pesticide management information that are available in other institutions and the universities of the country. One of the best mechanisms to achieve these strong linkages could be through the appointment of pest and pesticide management officers in the Colleges of Agriculture."

(4) Extension Organization

According to Foreign Agric. Rept. No. 120, "A complete revamping and strengthening of the extension program will be required if Egypt is to achieve the production goals discussed in this report."

Reports extending from grower level to the Ministry of Agriculture relative to the ineffectiveness of the extension service, should be dealt with.

It is recommended that a comprehensive study be conducted by appropriate persons within the Ministry of Agriculture and colleges of agriculture to provide directions for reorganizing the extension service to provide Egyptian farmers with well-trained and highly-motivated extension agents.

Although the exact picture of the reorganization would depend upon the special study committee on extension, there was considerable thought that the functional units of localized extension efforts should be with the colleges of

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agriculture at the regional universities. The colleges probably could better train the extension agents in the crop protection disciplines as well as other farm-related areas such as irrigation, marketing, etc.

- (5) Recommendation for better coordination between plant protection scientists of the Ministry of Agriculture and the universities.

Agricultural research appears to be fragmented with no real coordinated effort between the Ministry of Agriculture and the colleges of agriculture. A comprehensive study is needed to unify research efforts and provide a larger role, of local significance, for the various universities. There needs to be financial support and incentives for applied research by university scientists at the local level. This would enhance students' training and productivity of the researcher. Ministry of Agriculture scientists could concentrate on solving problems of regional or national importance and the complementary efforts of both groups would provide the grower with the best technology possible for producing his crops.

- (6) Practices employed by cotton growers indicate the lack of incentives imposed upon the grower by the government. Such practices include diverting fertilizer allocation for cotton to other crops having potential for greater cash returns to the farmer. Reducing costs of cotton insect control offers

one means of achieving a benefit to both grower and government. It reportedly cost an average of LE 56 per acre in 1979 and the equivalent of LE 62 per acre in 1978 for cotton pest control. If only three to four applications were made, as reported, then tremendous savings should be possible, even assuming the same number of applications, by better operations. Further information on timing of these applications suggests the possibility of reducing the numbers.

- (7) The law guaranteeing college graduates government employment as a last resort is directly related to the problem of the inability of administrators to direct their departments to meet the needs of the people. An illustration is the placement of six scientists, having similar discipline orientation, into a relatively small plant protection department, even though the department head indicated other areas were in greater need.

The Foreign Agricultural Report No. 120 addresses this issue as follows: "It is strongly recommended that the law guaranteeing college graduates employment within the public sector be re-appraised and modified to eliminate the proviso of guaranteed employment in the public sector. Furthermore, it is recommended that the system of compensation and promotion be restructured to provide incentive to all employees for high productivity and creativity and to administrators for abilities relating to organization and decision-making.

(8) Increasing labor costs is a problem everywhere. If the grower gets the technical assistance needed and that which would ensure following the recommendations listed above, his production should be improved to the point where higher labor costs could be met. This would improve the standard of living for both farmer and laborer and benefit the country as a whole.

B. Herbicides

The cropping system and labor-intensive agriculture in Egypt has precluded the need for extensive use of herbicides. Farmers have generally utilized all available forage on his farm to support the high animal unit (AU)/feddan ratio.

A number of circumstances points to increased use of herbicides in the future. Among these are: (a) loss of farm labor to urban areas; (b) increased cost of farm labor; and (c) increased influence of the chemical industry by virtue of relaxation of government restrictions governing importation of pesticides. Table 1 indicates the relatively minor role that herbicides have played to date in Egyptian agriculture.

a. Problems Identified

The following have been identified as problems or potential problem areas in the event the expanded use of herbicides occurs.

- (2) Increased cost burden to the grower. Herbicides are usually very expensive chemicals relative to the others that growers use in protecting their crops from various pests.

- (2) Residue problem associated with crop rotation. The high cropping intensely practiced in Egypt makes the extensive use of herbicides extremely hazardous unless highly skilled technicians constantly supervise their use. Most farming areas of Egypt have a cropping intensity approaching 2.0. The diversity of crops, small fields and the 2.0 crops per year on the same piece of land all add to the complexity of using herbicides. Their use probably will seriously restrict the flexibility the grower has in rotating his crops.

- (3) Drift to adjacent susceptible crops at time of application. The small fields involved in most of Egypt's agriculture would accentuate this problem.

- (4) Ground water contamination. High water tables and salinity problems have become increasingly important in many areas of Egypt. With the extensive use of herbicides this water could become contaminated and continue to cause root injury in other crops.

- (5) Misuse of herbicides. With the low level of technological assistance available at the farmer level and the low educational level of many farmers, it is very likely that catastrophies could occur due to the direct application of the wrong herbicide or incorrect dosage to the crop.

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b. Recommendations

As with other plant protection disciplines, a cadre of technicians, knowledgeable in all aspects of herbicide use, should be located in the villages to assist the grower with weed problems and their control. Those technicians might be team members of highly trained individuals responsible for a particular crop in a village or for weed control in general. In any event, they would need to know the effects of the herbicide on all crops in the area because of multiple cropping and crop rotations.

It is recommended that the Ministry of Agriculture maintain close surveillance over herbicide use until it is satisfied that adequate technical help is available at the village level.

9. COMMENTS ON POTENTIAL SOYBEAN ACREAGE INCREASE

A. Potential Pest Problems

Soybeans serve as an excellent host plant for a number of potential insect pests. These include pod-feeding pests such as stink bugs and Heliothis app. as well as foliage-feeding insects, primarily lepidoptera.

B. Recommendations

- a. If soybean culture becomes widespread, plant protection scientists from both the Ministry of Agriculture and the universities should immediately begin to assess the problems and evaluate damage.

- b. Consult with members of the southern regional soybean project in the U.S. and avail themselves of research findings already available.
- c. Be extremely cautious and conservative in initiating spray programs against soybean pests.

10. PESTICIDE APPLICATION

Until recent years most of Egypt's insecticide applications were made by farm workers using back-pack sprayers of "motor sprayers", whereby the applicator and his assistants manipulated a long hose through the field. This hose delivered the spray from the motorized tank which remained stationary at the field border. Those methods resulted in considerable worker exposure as the workers moved through the field following the spray.

With consolidation of small cotton acreages into large blocks, the need arose for more rapid and efficient means of treating for insect control. A considerable portion of the total cotton acreage has been treated in recent years by aircraft, primarily under contract to Polish and Bulgarian aerial application companies.

In 1979, an Egyptian aerial application company, The Afro-Asian Company, was started by General Medhat Fahim. This company could be very good for Egypt as it is utilizing all Egyptian personnel -- former airforce pilots, mechanics, etc. -- and is performing the same function that formerly caused a heavy drain on FX. This company presently has 13 aircrafts with six more due within the next three

months. Eleven more airplanes have been ordered and will arrive in August, 1980.

Insecticides are by far the most important group of pesticides applied to Egyptian crops (Table A-7). Almost 90% of all pesticides applied during the past three years were insecticides and, of those, more than 2/3 were applied to cotton. Airplanes have become the most common way to dispense insecticides to cotton. There may be both advantages and disadvantages to this method. In Egypt it has perhaps lessened direct human exposure to the insecticides, but on the other hand, it has probably resulted in greater drift contamination to adjacent areas.

There are other safe, economical, and effective ways of applying insecticides to most agricultural crops. Egypt should investigate such methods and utilize them where possible. The many small farmers would still benefit from ground applications if safety can be achieved.

11. EXTENSION

The Undersecretary for Extension in the Ministry of Agriculture expressed a thorough understanding of and belief in an extension service very similar to that in the United States. He expressed the need to strengthen extension applied research. He numerated several basic problems posing constraints to agricultural production. Among these are:

- a. Continuous and rapid land partition (fragmentation).
- b. Inadequate drainage.
- c. Inadequate supplies of production inputs, such as fertilizers.
- d. Poor administration of both extension and research.
- e. Lack of practical, applied research on key production problems.
- f. Lack of incentives for outstanding performance in Government service.
- g. Lack of competition and foreign investments, especially in businesses serving agriculture.
- h. Inefficiency in the marketing system.

He stressed the need for subject matter specialties in order to have a good extension service. He referred to a University of California study on extension conducted in Egypt in June, 1979.

TABLE A-7

(1) Market breakdown for different agricultural chemicals imported to Egypt in 1976, 1977, and 1978, per group of pesticide, in 1000 L.E:

GROUP	1976	%	1977	%	1978	%
Insecticides	19308	82.7	27564	89.3	35659	87.4
Fungicides	1726	7.4	617	2.0	1033	2.5
Herbicides	1698	7.3	1760	5.7	2287	5.6
Nematocides	98	0.4	98	0.3	135	0.3
Acaricides	49	0.2	510	1.7	543	1.3
Solvents	99	0.5	249	0.8	561	1.4
Storage Products	351	1.5	52	0.2	605	1.5
Rodenticides	-----	-----	2.5	-----	-----	-----
Growth Regulators	-----	-----	6.5	-----	-----	-----
T O T A L	23330	100	30859	100	40877	100

(2) Value of imported insecticides in Egypt by major type in 1976, 1977, and 1978, in L.E:

GROUP	1976	%	1977	%	1978	%
Cotton pests	17822682	93.3	26196932	95.1	32935046	92.4
Fruit & Veg. pests	1066870	5.5	365438	1.3	2179384	6.2
Mineral oils	35951	0.2	509214	1.8	544281	1.5
Scale insects *	382204	2.0	492737	1.8	-----	-----
T O T A L	19307712	100	27564321	100	35658711	100

* Specific products.

TABLE A-8.

Insecticides distributed during 1977 and stocks
as of 31.12.1977

Distributed during 1977 and stock	Quantity			Value	
	<u>tons</u>	<u>kgms</u>	<u>gms</u>	<u>L.E</u>	<u>msms</u>
Distributed during 1977	28343	718	426	37,714,115	085
Stock as of 31.12.1977	23711	889	560	22,467,939	851

Insecticides distributed during 1978 and stocks
as of 31.12.1978

	Quantity			Value	
	<u>tons</u>	<u>kgms</u>	<u>gms</u>	<u>L.E</u>	<u>msms</u>
Distributed	26074	115	520	37,563,219	079
Stock	29432	283	049	25,709,297	421

Data for 1979 were not yet finally available.

Source: PBDAC

12. OTHER INPUTS

Seed supplies and quality are widely criticized in all crops except cotton. Cotton breeding and related research and seed quality are reported to be the best for any of the plant species. Seed purity is well maintained and supply of seed adequate.

For other major field crops -- maize, rice and wheat -- the situation is considerably less favorable. High yielding varieties (HYV) of rice were widely adapted before international centers proliferated. Higher yield varieties of maize and wheat also were available early. For maize, most of which goes for food directly, a white flint or semi-flint type is desired which in general has less yield capability than yellow dent hybrids. Available high yielding varieties of wheat are less preferred because of shattering, nonuniform ripening, lower straw to grain ratio and relatively low grain to straw price ratio. For all three of these grains and minor grains such as sorghum, inefficiencies in government dominated commercial seed system has been a factor in recent yield stagnation. Progress in breeding for higher yield capability and resistance to disease, insects and other production hazards has been slow and often narrowly oriented. Compartmentalization of research into a single commodity group or related commodity group with little attention to cropping or crop/livestock systems or use of interdisciplinary teams is a factor in slow progress. Commercial seed production after release of accepted varieties has been weak with frequent complaints of impurities, mixing and other poor quality characteristics and inadequate supplies. This is a more serious problem for crops such as maize and sorghum where farmers likely would buy hybrid seed each year if it were consistently available.

Very recently the government has adopted a new, more liberal policy with respect to involvement of private enterprise and is encouraging private companies to bring in their varieties for testing, production and sale. However, early takers have encountered excessive bureaucratic requirements, unwillingness to make sufficiently long-range commitments on import of parent lines and lack of freedom of internal operations to permit proper planning and to capitalize on investments. This is to be expected where the competing public agency also commonly defines roles, approves specific proposals and authorizes implementing actions such as approval of imports of different lines, and pricing of products and additionally is the inspector and regulator of the final product (both its and its competitors). In most countries these conflicting roles are carefully separated.

Vegetable seed and fruits follow systems somewhat similar to grains in breeding, introduction, testing and release. However, private importation by cooperatives and others, and private initiative in production are more common. Seed potatoes for example which make up the largest bulk of vegetable seeds are heavily replenished annually by imports, mostly from Europe. Farm organizations such as the Egyptian Agricultural Organization and the Horticultural Union now have a fairly free hand in handling seed along with import of pesticides especially for fruits and vegetables. Still quality of seeds is a serious problem for some vegetable crops most notably tomatoes which cover about 330,000 fd/yr (1/3 of the vegetable area). Yields average only about seven tons per feddan despite the large input of hand labor. White fly borne leaf curl virus, to which varieties in use are not resistant, is reported to be a major factor in low yield. Control of the fly itself by using insecticides is generally found unfeasible

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for one reason or another by tomato growers. Onions, another vegetable for which yields are very low (5 tons per feddan in 1979), cover about 120,000 fd. If yield levels obtained in some countries were achieved for tomatoes and onions the same production could be obtained on about 250,000 feddans less of cropped area (less than half the current area in these two crops).

Feed and Livestock Breeding Stock

Both feed and livestock breeding stock have been serious problems for the livestock industry. Until recently the broiler chicks were available almost exclusively through government controlled General Poultry Company which produced and supplied chicks and also raised poultry products itself. Because of difficulty and uncertainty in obtaining chicks and feed many private growers have gone out of production. In 1978-79, imports of chicks were permitted, and now at least three private producers are being established to bring in their own breeding lines, produce hatching eggs and hatch and sell baby chicks.

Feed, another key element monopolized by the government, has been a constraint on development of the poultry industry. The poultry industry should benefit greatly from complete opening of the feed, breeding, hatchery and marketing of broilers to private enterprise which has demonstrated such impressive efficiency, competitiveness, high feed conversion rates and low margins around the world. Such an opening up should also relieve the government of a major load permitting it to concentrate its time and budget on more critically needed actions such as improving research and extension.

For both cattle and buffalo fertility rates and productivity are very low. Two solutions are being attempted. One is to provide improved genetic materials through introduction of artificial insemination through government stations and the other is to provide feed concentrates on a subsidized basis for milk cattle and buffalo and for animals being fattened for slaughter. Information available indicates that the artificial insemination program as presently carried out has relatively low productivity in terms of head of livestock being served by each government station. This may not be serious yet, since widespread introduction of high milk producing breeds such as Friesian cattle and Murrah buffalo might sharply accentuate the already serious May-November forage shortages.

As improved breeds are introduced and spread widely, highly efficient systems for supplying feed and other essential inputs must be established. And, of course, necessary linkage to local and foreign sources of basic feed ingredients must be maintained intact. For ruminant livestock a considerable amount of land should be utilized during the summer for production of high yielding varieties of warm weather forage such as napier grass. It should be more profitable to supplement available crop residues with small areas planted to high yielding summer forage than by importing feed grains.

Table A-9: quantities and Value of seeds distributed during 1977 to 1979

Crops	Season 1977	Season 1978	Season 1979
Sun flower	0000048 Sack 50 kgm 0000326 457	0000057 Sack 50 kgm 0000415 570	0000008 Sack 0000109 384
Sweet maize	153 Ardeb 4485 647	270 Ardeb 10816 447	263 Ardeb 11843 250
Berley	2213 Ardeb 19913 898	2132 Ardeb 20254 499	1413 Ardeb 12502 352
Maize hybridized	14426 Ardeb 153862 899	10824 Ardeb 182874 461	7952 Ardeb 181334 709
Onion bullis	27133 Sack 50 kgm 83638 740	8306 Sack 50 kgm 26994 500	8120 Sack 27634 000
Beans	46497 Ardeb 792911 610	35461 Ardeb 844302 616	40497 Ardeb 890989 424
Sesame	478 Ardeb 13713 320	161 Ardeb 5482 174	272 Ardeb 16263 503
Onion seeds	1043 Ardeb 181257 432	629 Ardeb 111419 318	863 Ardeb 160730 000
Fenugreek	11 Ardeb 220 000	40 Ardeb 1520 000	0000000 - 000000 000
Soya Beans	11201 Sack 100kgm 235282 510	22066 Sack 100kgm 462386 105	22136 Sack 100kgm 541663 157
Maize American	1714 Ardeb 14626 751	526 Ardeb 7371 800	434 Ardeb 5213 790
lentils	10122 Ardeb 264321 760	8219 Ardeb 250700 238	5699 Ardeb 210331 500
Ground nut	6099 Sack 50 kgm 75106 488	7809 Sack 50 kgm 101515 960	5662 Ardeb 90014 706
Sorghom	354 Ardeb 3040 713	290 Ardeb 3487 716	220 Ardeb 2643 656
Cotton	779315 Ardeb 1917705 954	645331 Ardeb 1755311 613	656971 Ardeb 1819810 607
Rice	309697 Ardeb 2477383 359	305126 Ardeb 2564022 911	300571 Ardeb 3203173 746
Wheat	343876 Ardeb 3059464 545	222437 Ardeb 2224329 951	269055 Ardeb 2933787 411
Imported yellow maize	-	341 Sack 100kgm 40938 480	
Imported soya	1554440 9297262 073	7212 Sack 100kgm 149355 633	12649 Sack 366024 138
		1277137	8764499 992 1332785 10474619 433

Source: Principal Bank for Development and Agricultural Credit.

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13. NOTES TO TABLE A-9

- a. All seeds used for crop production are produced locally. No seeds were imported except soyabean seeds which were imported during 1978 and 1979 by the permanent council of soyabeans.
- b. All seeds are bought and distributed during the year. No stocks are held at the beginning or at the end of the year.
- c. Seeds distributed during 1977, 1978 and 1979 are shown in the attached statement.
- d. Seeds required during 1980 and their value

Seeds of various types required for each season are dispatched according to the plan prepared by the ministry of agriculture. The quantities of seeds to be distributed in 1980 are expected to reach the level of 1979. The value of 1980 seeds will vary according to the sale prices which are fixed for each type and each season regardless of the prices of the previous seasons.

The Seeds Left-Over:

At the end of the distribution season, the seeds left-over lose their suitability for crop production.

The left-over seeds represent about 20% of the quantities prepared for distribution. Such seeds are disposed of as follows:

- a. Supply crop seeds such as wheat, beans, lentils and sesame are delivered to the general authority of supply commodities.
- b. Rice seeds are delivered to rice mills.
- c. Cotton seeds are delivered to oil mills.
- d. Soyabean seeds are delivered to the general poultry company.
- e. Barley seeds are delivered to Pyramids Beer Co.
- f. Other crop seeds such as maize, ground nut and onion are sold by public auction.