PN-ACC-124

STRATEGIC PRIORITIES FOR SUSTAINABLE AGRICULTURAL GROWTH IN EGYPT: IMPACT ON GROWTH, AND EMPLOYMENT

November 1995

for:
United States Agency
for International Development

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2101 Wilson Blvd., Ste. 100
Arlington, VA 22201
Contract # 263-0225-C-00-5045-00-5045-00

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A development strategy for agriculture is necessarily a "dynamic" proposition. It can state in general terms the priorities that need to be pursued for a considerable period of time. But each of those priorities must be open to constant change and revision because real-life circumstances are never static. Occasionally some of the basic priorities may change, but continuity will remain vital in the overall development effort. The purpose of this document is to begin the dialogue on how to implement a strategy for Egyptian growth, a dialogue that must become a central component of the basic strategy. Only then will it be possible to set appropriate priorities for all aspects of agricultural development, particularly public policy. Priority setting is a task of vast proportions, but, as has been the case in the preparation of this report, widespread consultations with citizens ranging from farmers to officials at the highest levels can help to put one on the right track.

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EXECUTIVE SUMMARY

Accelerating employment growth is essential to achieving Egypt's economic and social goals. The respectable but still modest pace of growth in agricultural output, and the much slower growth of net value added in agriculture are at the heart of the current employment problem. For agriculture to properly play its vital role it must grow far more rapidly than in the past. A good rule of thumb would be 2 percentage points faster than the population growth rate. It must do so with increasing productivity of the major inputs. That is in contrast to the declining productivity of the past. This report suggests strategic priorities for achieving a vital growth role for agriculture. It does so in the context of the existing agricultural development strategy of Egypt.

The policy, institutional development, and investment actions needed for the necessary acceleration in agricultural growth require focus on a small set of commodity priorities. And, agricultural growth requires deregulation and privatization that in a scarcity economy will occur only erratically. For example, the political reality is that cotton deregulation requires sufficient supplies for the domestic textile industry and for exports; fertilizer deregulation requires supplies adequate to fully service the domestic demand growth. Thus, a privatization strategy must have elimination of scarcity as a central prerequisite of not just a result of privatization.

Thus, the strategic priorities set forth call for acceleration of the agricultural growth rate by 1–3/4's percentage points; require that input use grow no more than proportionately to output, and preferably less than proportionately; and set priority on cotton, horticulture, and smallholder livestock for output growth, while maintaining a substantial rate of growth in the food security oriented cereals commodities. A set of actions are stated for policy, research and extension, marketing, and credit for achieving those objectives. The strategy generates increased per capita incomes but they are also necessary to the strategy because of the importance of domestic effective demand to provide incentives to growth. Exports play an important complementary role. The strategy includes specific steps for implementation. This strategy is fully consistent with and supportive of the strategy developed by the Ministry of Agriculture in association with the World Bank. In concept, it represents a logical extension of that strategy into specificity of priorities, increased detail in priority areas, and an acceleration of the growth sufficient to have a major impact on employment.

Employment

An addition of 1–3/4's percentage points to the long term (1972-86) agricultural growth rate would, through direct and indirect effects, add 380 thousand jobs annually in the rural sector. That is 3/4 of the total number called for by President Hosni Mubarrak in his December 16, 1995 address to the new parliament. It would also add 1.1 percentage points to the GDP growth rate. The employment growth would more than absorb additions to the rural labor force. The initial annual employment impact of such an acceleration in agricultural growth would be twice as much as a 20 percent rate of growth in non-traditional exports.

In the 1980's, agricultural output growth hardly exceeded population growth. Hence its contribution to overall growth was negligible. Even that growth was achieved with declining resource productivity. As a consequence, per capita farm incomes grew modestly, agricultural employment growth did not exceed natural increase, and rural employment contributed less than its share to employment growth. What rural employment growth did occur was in services and a category called "inadequately described". The implication is that much of rural employment growth was in ill defined low paying activities.

The prescribed accelerated agriculture growth creates a little over 1/3 of added jobs directly in agricultural production. That translates into a 2.7 percent rate of growth of agricultural employment. The agricultural employment estimate is a conservative estimate based on average labor requirements for the sector. However, the priority sub-sectors are relatively more labor intensive than the rest of agriculture. With a 4.5 percent growth rate in output and value added, and a 2.7 percent rate of growth of agricultural employment, per capita farm incomes would rise by 1.8 percent per year. As the backlog of the underemployed is gradually absorbed, labor productivity and farm family incomes can rise more rapidly.

Agricultural Growth

How feasible is agricultural growth acceleration from its historical rate of 2–3/4 percent to 4–1/2 percent? First, it should be noted that low and middle income countries that have achieved high overall growth rates, rapidly increasing employment, and rising real wage rates have generally achieved an agricultural growth rate of 4 to 5 percent. Second, accelerating agricultural growth is more feasible in the context of highly productive agricultural resources that already produce at a high level. Those are the resources most responsive to modern technology. That is Egypt's endowment. Third, sustained high growth rates in agriculture always have an important component of change in composition, that is increased relative importance of commodities with a high value of output per unit area of land. That component of growth relaxes the land constraint and to some extent the water constraint as well.

Some sub-sectors of agriculture lend themselves better to fast growth than others. Governments can only achieve a few major goals at a time. These two principles combine to call for priorities to a small number of agricultural sub-sectors that lend themselves to accelerated growth. The strategy for Egypt focuses on cotton, horticulture, and smallholder

livestock. In addition, cereals receive emphasis in the context of food security. This set of commodities provides 84 percent of agricultural output.

Agricultural Efficiency

Particularly in the case of Egypt, there is another important principle with a strategic implication. It is value added in agriculture, not gross value of output, that is the relevant variable for agricultural sector objectives. Value added is reflected in net farm family income that in turn drives the employment multipliers. In Egypt, purchased inputs such as fertilizer and pesticides are used at high levels by the standards of even developed countries. In contrast to developed countries, the productivity of those inputs has been declining. That is a major reason why value added has grown hardly at all since 1986, while gross value of output has grown moderately quickly. Thus, the agricultural growth strategy focuses on increasing the productivity of purchased inputs, particularly fertilizer, but also water and pesticides.

Commodity Priorities

The most important principle in setting commodity priorities is to raise the value added per unit of land. Agricultural output cannot grow rapidly without increasing intensity on the limited land area. The other key principle is that the rapid growth must be in commodities with elastic demand, either because of the capacity of the domestic market to grow rapidly with rising per capita incomes or because of export potentials. In the recent past, Egypt has obtained the bulk of its agricultural growth from cereals. This has been possible because of a substantial backlog of yield increase capabilities and short term potentials for import displacement. In the longer run, the growth must come increasingly from other sub-sectors that meet the preceding criteria.

The sub-sectors that better meet these criteria are (figures in parentheses are the proportion of the value of agricultural production in that sub-sector and the growth rate called for in that sub-sector): cotton (6 percent and 5.2 percent); horticulture (25 percent and 6.0 percent); livestock (30 percent and 6.5 percent). In addition, the cereals sub-sector is planned to grow at the average historical rate for agriculture of 2–3/4s percent and the residual, rest of agriculture, at 3.0 percent.

Cotton production achieves a 6.5 percent growth rate through a 3 percent rate of growth of area; a 1–1/2 percent rate of growth of yields; and a 2 percent rate of growth of value due to shift to higher quality cotton. The growth in area is likely to be at the expense of rice, with a consequent major saving in water use. The rice area transferred to cotton would be that on the less saline, better drained soils. The yield increase is comparable to that experienced year in and year out by the developed countries with already high levels of technology development. The quality increase requires redeveloping the export market for the finest grades of cotton, for which Egypt has no peers.

To achieve this record in cotton requires major policy changes to facilitate private sector development of quality export markets and assuring supply, growth, and reliability. It also requires an orientation of research towards raising yields and shortening the growing season for extra fine staple cotton, including treating various pest problems. These are major and difficult changes to make.

Horticultural production achieves a 6.0 percent growth rate by a 25 percent growth rate in the currently still small export sector and a 4.7 percent growth rate for the domestic market, consistent with growth in domestic demand. To achieve this record, there must be attention to the foreign exchange rate so that higher inflation rates in Egypt than in competing countries do not disadvantage Egyptian producers and exporters. There must be active public policy to encourage private sector exports. And, a research partnership needs to be developed between the public and private sectors to provide better horticultural varieties and to solve disease, storage, and shipping problems.

Livestock growth is to occur primarily in the smallholder sector, particularly dairy and its by-products, in which Egypt has a comparative advantage. Smallholder livestock is vital to maintenance of soil structure and fertility in the face of extraordinarily high cropping intensities and use of chemical fertilizer. Accelerated growth of the smallholder livestock sector also improves income distribution and the participation of women in increased income. Livestock absorbs 71 percent and 40 percent, respectively, of female and male agricultural labor, and provides nearly half the agricultural income on farms of 1 feddan or less. Dairy and poultry account for 2/3 of total livestock output.

Smallholder livestock growth is domestic demand driven. Egypt does not have a comparative advantage in livestock exports. However, the favorable domestic prices arising from the natural protection of high transport costs makes small holder livestock production profitable, constrained only by the size of the domestic market. Because of the high income elasticity of demand for dairy products, rapid economic growth will allow the demand for milk and milk products to grow at a 6.5 percent and higher rate. Thus, the essential condition of rapid growth in livestock production is a high rate of growth of per capita income.

The smallholder sector currently uses resources at unusually low productivity. That is particularly so compared to developing countries, such as Pakistan and India, that have highly efficient smallholder dairy sectors in climate and other physical conditions similar to those of Egypt. To achieve comparable results requires a major applied research/extension effort, and policies to facilitate private sector marketing.

Food security in Egypt requires increased employment to put purchasing power in the hands of low income rural people. That will be the most important outcome of the strategy delineated. However, the strategy will also ensure a growth rate of cereals production that exceeds the rate of growth of demand for human consumption. That growth rate of cereals output of 2 3/4s percent is to be achieved entirely through increased yield, as the new lands brought into production are assumed to be only sufficient to meet the need for expanded area in cotton and horticulture. While cereals play an important role in the growth strategy it is clear that the high overall growth rate targeted cannot be achieved largely though cereals expansion. That is because a high growth rate requires shift to higher value crops per hectare, and yield growth in cereals is unlikely to exceed the high 2.8 percent stated. The growth rate

postulated will result in decline in imports of cereals for human consumption, even though cereals for livestock feed may well continue to grow.

While the strategy envisions decline in the rice area, there is need for large increases in wheat output—perhaps driven in part by increased area in response to shorter season cotton varieties.

Input Productivity

In recent years, several developed countries have seen the value added in agriculture grow more rapidly than the gross value of output. In developing countries, the opposite has been the case. For Egypt, rapid decline in the productivity of purchased inputs, at the margin, particularly fertilizer and pesticides, has caused the value added in agriculture, 1986-93, to grow hardly at all (0.6 percent per year), while the physical volume of agricultural output has grown far more rapidly (2.9 percent). Measuring value added is difficult and this report only draws attention to the disparity between gross value of output growth and value added, not the precise numbers.

Egypt uses purchased inputs at extraordinarily high levels by the standards of even developed countries. A key element of the strategy is maintaining the productivity of purchased inputs so that the rate of growth of value added is as great as the rate of growth of agricultural output. Of course, none of this will come easily, but the benefits of success will be immense. It is time to concentrate on increasing input efficiency. Such an effort will not only help raise farm incomes at a greatly accelerated pace, but it has favorable effects on both export competitiveness and the environment as well

Increasing the productivity and efficiency of purchased inputs requires policy attention to ensuring fertilizer supply in the quantity and forms that are most economic and establishment of a research based extension system to conserve on purchased input use. Increased productivity of pesticides can also grow out of a farmer-oriented research program.

The strategy contributes to increased water efficiency by transfer of area from rice to cotton. The research program must also focus on water efficiency issues, particularly in the context of the water demands of new lands.

Export Orientation

The strategy has a strong export orientation, with about 12 percent of the growth initially coming from exports of cotton and horticulture. That proportion would double over a 10 to 15 year period. However, even after a decade or more of the strategy the degree of concentration in these two commodity groups will leave less concentration than in comparable developed agricultures such as the irrigated areas of California in the United States.

Action

The growth objective and its component parts will be difficult to achieve. They require: improved policy, at the macro and micro levels; a sharp focus and improvement in the research/extension system; expanded and improved marketing systems; and, further reform and improvement in rural financial markets, with emphasis on PBDAC.

Policy: The most important policy decision is to ensure priority to high growth rates in the commodity sub-sectors. Priorities are difficult to set and even more difficult to implement. Then it must ensure continued progress in the shift to free markets, including the foreign exchange rate, and encouragement of the private sector. That will be much easier in the context of expanding supplies, particularly of cottons and cereals. Aggregate fertilizer supplies must be ensured to facilitate the flexibility, high productivity, and competition of the private sector. There must be constant vigilance of the foreign exchange rate to ensure that domestic inflation does not lead to a de facto overvaluation of the exchange rate with consequent prejudice towards exports. Finally, the many sub-sectoral policy changes required must be prioritized in the context of the strategic priorities and the growth rates required so that the critical policy changes are made expeditiously.

Research/Extension: The strategy places three special burdens on research/extension administration. First, the research/extension system must establish the same priorities as the strategy. Second, it must operate so as to ensure a practical impact on farmers and marketing institutions. Third, it must focus on both technical and economic efficiency in resource use, including fertilizer, water, and pesticides. The latter two will require major reorientation towards on farm research. These three emphases will bring rapid improvement in the quality of research and farmer impact in the sub-sectors that will ensure accelerated growth. Such an approach is readily monitored in terms of impact on national levels of yield, area devoted to the priority commodities, and resource productivity, and it should be so monitored.

Marketing: The strategy focuses on marketing areas that require flexibility and quick response to changing conditions. That favors the private sector, which in turn requires well operating price signals if it is to perform effectively. But that private sector requires priority attention by the government to working with it to ensure out front research/extension support; removal of regulations inhibiting to private marketing growth; assistance in understanding and entering foreign markets; and providing critical infrastructure for private marketing.

Credit: The strategy is finance intensive. Cotton, horticulture, and smallholder livestock have large and complex credit needs. The rural credit system will require further development to serve these complex needs. PBDAC now so dominates that its rural finance structure must be expanded and appropriately reformed to handle the critical tasks. At the same time, efforts should continue to make it financially viable and to develop the rural financial market.

Domestic Income Interactions

Development necessarily involves two way interactions among component parts. The strategy starts by emphasizing the favorable demand pull of agricultural growth on other sectors, and particularly the employment implications. Export demand is important to that growth. However, overall, the strategy is much more dependent on domestic demand than exports. Some of the growth in domestic demand will come from the agricultural growth itself. But growth in other sectors will also be important. Thus, agricultural growth is intertwined with non-agricultural growth.

But there is another aspect of growth that is critical to the strategy. Continued deregulation, freeing of prices to market determination, and privatization are essential to achieving a high agricultural growth rate. But those changes cannot be expected to occur rapidly in a situation of scarcity. In that circumstance, market prices are unlikely to be competitively determined and the incentive to generate economic rents by manipulating both government policy and markets is great. Public action is then certain to inhibit the operation not only of free markets but of private initiative as well. The strategy set forth should provide the output growth that will facilitate the operation of free markets and the exit of government from interference with those processes.

What is Next?

If the strategic priorities are broadly acceptable the next steps are to modify them appropriately through widespread workshop discussions. The only caveat for the process is that a small set of priorities must be preserved as a precondition of effective action.

Once the strategic priorities are seen as broadly acceptable an implementation structure is needed. That structure must have two components. First, a high level body to provide oversight and recommendations to whatever point in the government is required to act. Second, that body requires an analytical unit that can collect essential data for monitoring and diagnosing action needs.

BACKGROUND

AGRICULTURE IS THE LEADING EDGE of the growth strategy proposed in this document. The emphasis is on specific sub-sectoral changes. Those include not only policy reforms narrowly defined but also broader institutional reforms and changes in investment priorities. Since any strategy consists of addressing a host of problems, it is vital to begin with actions that will have the greatest impact on a country's economic objectives. Those priorities must in turn be coordinated in an overall strategy for development.

Priority-setting in subsector policies received considerable attention at the highly successful agricultural policy conference held in Cairo in May 1995, in which USAID played an important role. JMA, Inc. proposed to formulate such a set of strategic priorities and define the comparative advantage for USAID. After an initial meeting in Washington, D.C., with USAID staff, a reconnaissance mission took place to ensure that the data needed for the task were available and that the hypotheses for the main mission were sufficiently well formulated and documented to ensure that the most appropriate team would be chosen and would be directed in the most useful directions.

The reconnaissance was conducted by John W. Mellor in the last half of July, with substantial assistance from a large number of Egyptian colleagues in the government and in private institutions. Fruitful discussions were also held with USAID staff. Near the end of the mission, a seminar was held at Cairo University and an informal meeting was held at USAID. The report of the mission reflected those discussions as well as earlier discussions and analysis.

The main mission was led by John W. Mellor. The other team members were Gunvant Desai, Ragaa El Amir, Rashaad El Saadany, and Sohail Malik. From September 15 to October 8, 1995, the team conducted intensive interaction with a large number of private individuals, academics, and government officials in Cairo, as well as five days of intensive interaction in four governorates with farmers representative of various size classes and with government and private sector operatives in the various field support services provided for farmers.

Especially helpful to both the reconnaissance mission and the main mission were Minister of Agriculture and Deputy Prime Minister Youssef Wally, Minister of Supply Ahmed Goueli, Dr. Saad Nassar, Ministry Adviser and First Undersecretary, Ministry of Agriculture and Land Reclamation, and Dr. Hassan Khedr, Chairman, PBDAC, to whom the mission was grateful for their encouragement and wisdom. Also important was the continuing assistance of USAID staff, particularly Rollo Ehrich, Mohammed Omran, Fenton Sands, Clemence Weber, and John Westley. The mission met with a large number of other gracious and helpful persons. Their names are listed at the back of the report.

As always in such an effort, we learned a great deal in meetings with farmers and operational staff of government institutions, particularly the field staff of PBDAC, who facilitated our farmer meetings. We sincerely hope that our report adequately reflects the wisdom of these people. We are deeply grateful for the time and goodwill they so freely provided. Although we hope that they would all agree with the thrust of the report, none of those who assisted us should be seen as endorsing any particular outcome of the analysis.

THE AGRICULTURAL GROWTH RATE

THE PAST RECORD OF AGRICULTURAL GROWTH IS the base upon which the need for strategic priorities is judged. What is measured and why is it important to achieve Egypt's economic and social goals, especially accelerated growth in employment, requires careful analysis.

THE CONTEXT: POOR ECONOMIC GROWTH IN RECENT YEARS

Ever since its oil boom subsided, Egypt has been suffering immensely from the deleterious effects of slow economic growth. Between 1986 and 1993 real gross domestic product (GDP) grew at the limp rate of 2.5 percent a year, after a vigorous average of 9.1 percent in 1972-86. Since population grew at an average annual rate of 2.4 percent, per capita income in real terms was virtually stagnant.

The sharp decline in the growth rate was an outcome of reduced growth in all three of Egypt's main economic sectors: agriculture, industry, and services. The two commodity-producing sectors, in particular, turned in a dismal performance: agricultural GDP was almost flat at 0.6 percent per year, while industrial GDP actually fell 1.2 percent per year. The overall rate of 2.5 percent masks the hardships caused by the deceleration, since it was largely based on the 5 percent growth rate of the service sector. This relatively high growth rate of the service sector in a stagnant economy may simply reflect the backing up of labor in the low-productivity services.

Table 1. Growth Rates of Overall and Sectoral GDP (at constant prices), 1972–93
(percent per year)

Period	Total	Agriculture	Industry	Service
1972–86	9.1	2.7	9.7	14.0
1976–86	8.1	3.0	8.4	11.1
1980–93	4.3	1.3	1.6	7.0
1986–93	2.5	0.6	-1.2	5.0
1972–93	6.8	2.0	5.8	10.6

Source: Estimated by fitting exponential trends to data in World Bank (1995).

The strategic priorities we are proposing are designed not only to remove the deleterious effects of poor economic growth, but also to put accelerated economic growth on a sound and sustainable footing as expeditiously as possible. Agriculture must be the sheet anchor of efforts in this direction. Though difficult, these efforts will pay off because Egypt's agricultural sector is capable of playing a lead role in the country's broad-based economic development.

MEASURING AGRICULTURAL GROWTH

To arrive at an appropriate remedy, it is first necessary to understand the full extent of the problem. What is particularly puzzling in Egypt's case is that the period of faltering GDP, from 1986 to 1993, was one in which many far-reaching agricultural policy reforms had been launched and had even begun to show a positive effect on the production of various crops. The impact of these reforms has been described in several recent studies—most notably, the report of a 1994 USAID-sponsored mission to evaluate the National Agricultural Research Project in Egypt, and the 1995 paper by Saad Nassar, Ronald Krenz, Fenton Sands, and Mohammed Omran. How, one may well ask, did these unprecedented yield and production gains translate into a mere 0.6 percent annual growth rate for agricultural GDP? The explanation lies in the distinction between agricultural production and gross domestic product in the agricultural sector, and the way in which the latter is estimated. In the statistics of Egypt's national accounts, agriculture includes three subsectors: crops, livestock, and fisheries. Hence, agricultural GDP relates to value added in the production of the three subsectors. This is first estimated at current prices and then deflated by an agriculture-specific GDP deflator to remove the effects of changes in relevant prices. The resulting estimate reflects total value added by the three subsectors in real terms. Thus, reason for the dismal growth rate of agricultural GDP lies in the distinction between production and value added, the relative importance of the three subsectors of agriculture, and their differential performance in value additions.

Each of these factors is examined in the following paragraphs. The analysis provides valuable insights to identify priorities in the strategy for agricultural growth that would make a vital contribution to such national objectives as broadly based economic growth, sustainable growth in agricultural production, and a rapid expansion of productive employment.

Agricultural Production vis-à-vis Agricultural GDP

Since disaggregate time-series data on the production of all crops, livestock products, and fisheries are difficult to obtain, we have used FAO's indices of agricultural production to represent growth in the total volume of agricultural production. These indices show the aggregate volume of agricultural production (including livestock products) for each year between 1982 and 1993 in comparison with the base-period (1979–81). The growth rate

estimated from this time-series is then compared with the 0.6 percent growth rate of agricultural GDP to examine if the latter was due to dismal growth in the aggregate volume of agricultural production. Table 2 and Figure 1 show the FAO indices of agricultural production and also the indices of agricultural GDP (at constant factor prices) developed from the World Bank estimates with the same base period. It is clear that there was no stagnation in the aggregate volume of agricultural production between 1986 and 1993. However, the growth rate of agricultural GDP (0.6 percent) was substantially lower than the growth rate of the total volume of agricultural production (2.9 percent). The gap between the two growth rates remains unchanged even if the entire period of 1982 to 1993 is considered.

Table 2: Indices of Agricultural Production and Agricultural GDP, 1982–93 (base 1979–81)

	Production	AGDP
1982	105.02	106.43
1983	107.58	109.51
1984	108.42	111.81
1985	116.14	115.38
1986	122.37	117.82
1987	126.47	120.28
1988	127.21	112.98
1989	129.29	115.23
1990	136.82	117.19
1991	141.92	119.30
1992	148.35	120.98
1993	145.64	122.94
Growth rates:		
1982–93	3.32	1.01
1986–93	2.90	0.60

Source: FAO Production Yearbook, 1993; World Bank World Tables, 1995.

Table 3 shows the growth rates of agricultural production and agricultural GDP between 1986 and 1993 in Egypt and 15 other countries. These growth rates are estimated from the same two data sets, namely FAO indices of agricultural production and the World Bank's estimates of agricultural GDP. In growth of agricultural production, Egypt ranks after Pakistan, Indonesia, China, and India. However, when ranked by the growth rate of agricultural GDP, Egypt is the tenth because of larger gap between the two growth rates.

Figure 1: Indices of Agricultural Production and Agricultural GDP, 1982-93.

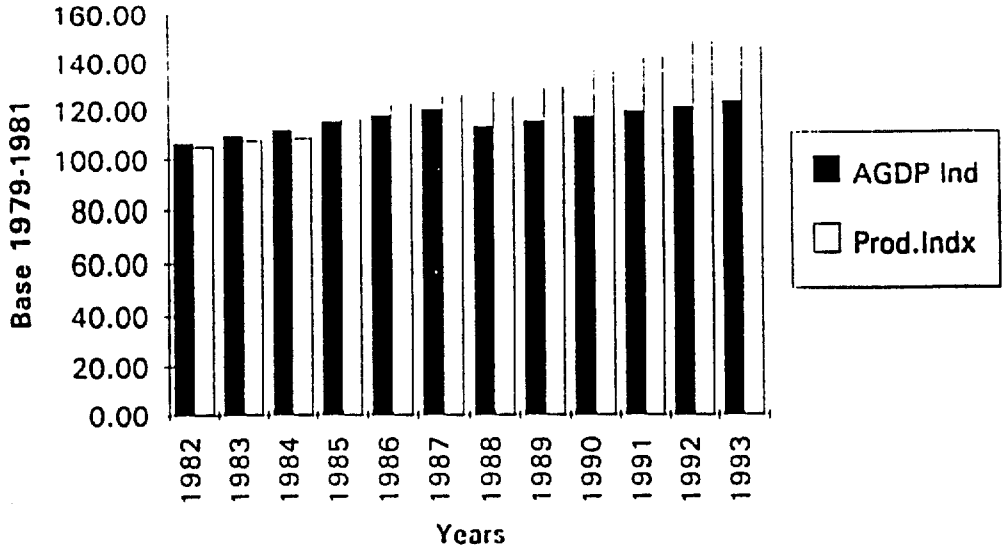


Table 3: Growth Rates of Agricultural Production and Agricultural GDP, Selected Countries, 1986-1993 (percent per year)

	Growth Rates, 1986–93	
	Agricultural Production	Agricultural GDP
Egypt	2.90	0.60
Syria*	0.51	-0.18
Turkey	0.98	1.46
China	4.16	4.11
India	4.09	3.70
Pakistan	4.50	4.36
Indonesia	4.48	3.19
Philippines	1.84	1.82
Netherlands	1.18	5.24
Greece	1.03	-0.13
Spain	1.03	0.40
France**	0.28	1.36
Italy**	0.82	0.91
Hungary	-3.72	-4.96
Poland	-0.80	-1.52
Romania	-5.04	-0.38

* Data up to 1991.

** Data up to 1992.

Source: Estimated from data in FAO Production Yearbook, 1993; World Bank World Tables, 1995.

Typically, agricultural production grows faster than agricultural GDP. This is also true for the 13 countries with positive growth rates of production in Table 3. Three out of four

exceptions are the Netherlands, France, and Italy. In the wake of the environmental concerns, agricultural GDP is growing at a faster rate than production in these developed countries because of the emphasis on raising efficiency of chemical inputs and reducing their level of application. The latter is reflected in the unusually low growth rates of production in these countries. The option of reducing the use of inputs like fertilizers is obviously not available to the developing countries because of their need for high growth rates of agricultural production. But the importance of raising the efficiency of inputs' use cannot be denied. Its urgency in the case of Egypt is pointed out by Egypt having the widest gap between the two growth rates among 13 countries with positive growth of production. To address this task, one must first identify sub-sectors (and commodities) with low ratios of value added to gross value of output.

Relative Importance of Sub-sectors in Agricultural GDP

In 1991 and 1992, crops accounted for 68 to 70 percent of the gross value of agricultural output, livestock for 25 to 27 percent, and fisheries for 4 to 5 percent (Table 4). Thus, in gross value, livestock production was nearly 40 percent as important as crops. But in net value, crop production dominated with 81 to 83 percent share while livestock production accounted for just 11 to 14 percent. This is because the ratio of net value to gross value of output was 88 percent in crops but only 33 to 37 percent in livestock.

Table 4: Relative Importance of Crop, Livestock and Fisheries in Overall Agricultural sector, 1991 and 1992 (millions of LE)

Subsectors	Gross Value (GV)	Net Value (NV)	NV as % of GV
1991:			
Crop	19,370 (70.1)	17,031 (83.2)	87.9
Livestock	6,992 (25.2)	2,271 (11.1)	32.5
Fisheries	1,288 (4.7)	1,171 (5.7)	91.0
Total	27,560 (100.0)	20,473 (100.0)	74.2
1992:			
Crop	21,285 (68.7)	18,728 (81.4)	88.0
Livestock	8,377 (27.1)	3,098 (13.5)	37.0
Fisheries	1,301 (4.2)	1,183 (5.1)	90.0
Total	30,963 (100.0)	23,009 (100.0)	74.3

Note: Figures in parentheses are the percentage of the total.
Source: MALR.

The low ratio of net value to gross value of output in the livestock sub-sector substantially lowers the overall agricultural GDP. Furthermore, it would also depress the overall growth rate of agricultural GDP if the relative importance of livestock production in the agricultural sector is rising. Given the weight of the livestock sub-sector, raising the ratio

of net value to gross value of livestock production is considered a high priority in the strategy proposed in this report.

Changes in the Composition of Crop Production

Another reason for the very low growth rate of agricultural GDP is the differential rates of growth in the production of different crops. These differences affect agricultural GDP as a whole not only because crops differ in their unit value but also because they vary in their ratios of value added to gross value of output.

The importance of this phenomenon is bought out in Table 5, which is based on estimated growth rates of area, yield, and production for major crops in Old Lands between 1987 to 1993 (see Nassar et al., 1995) and value added as a percentage of gross value of output (at market prices) for these crops (see World Bank, 1993). The table also shows the estimates of domestic resource cost at economic prices to show how these changes affect Egypt's comparative advantage. The crops listed accounted for 80 percent of cropped area in Old Lands (or 72 percent of total cropped area of Egypt) in 1992.

It is clear from Table 5 that cropping pattern changes and differential growth rates of production of different crops had an adverse effect on the growth rate of value added in agriculture. Three out of four top crops with a production growth rate of 6–12 percent per year ranked among the bottom four when the ratio of value added to gross value of output was taken into account. Three of them were also in the bottom half when the gross value of output per feddan was considered. Conversely, some of the high-value crops that also had relatively high ratios of value added to gross value of output (e.g., cotton and tomatoes) had very low growth rates of production because of negative growth rates of area. Thus, this pattern of growth in the production of different crops tended to lower the growth rate of agricultural GDP despite impressive growth in the production of major cereals and oranges.

Another important point to note is that although the impressive growth in the production of major cereals has greatly improved food security, by itself, that growth is insufficient to ensure food security at the household level. For this, accelerated growth in per capita agricultural GDP is obviously needed. Whatever agricultural strategy Egypt adopts, it must address this issue. Note, too, that from the perspective of domestic resource cost at economic prices, the direction of changes in production pattern after 1986 were generally consistent with Egypt's comparative advantage (see also Nassar et al., 1995). The strategic priorities we are proposing aims at speeding up this process.

Table 5: Growth Rates of Area, Yield, and Production of Major Crops between 1987 and 1993, and Their Ratios of Value Added to Gross Value of Output in 1992

Crop*	Annual Growth Rates, 1987–93 (%)			Value Added as % Gross Value (Mkt Prices)		Domestic Resource Cost (Econ Prices)	
	Area	Yld	Prod	Ratio	Rank	Ratio	Rank
Rice-6**	6.0	5.4	11.7	68.8	8	0.97	10
Oranges-4	7.1	3.6	11.0	61.3	11	0.58	2
Wheat-7	5.8	3.6	9.6	75.1	6	0.59	3
Maize-9	0.7	5.7	6.4	68.5	9	0.79	7
Sugar beet-11	-0.2	3.8	3.6	62.5	10	0.86	9
Cotton-5	-3.0	5.3	2.1	77.2	4	0.64	4
Sugarcane-2	0.2	1.8	2.0	81.9	1	1.42	12
S-berseem-12	-2.1	2.9	0.8	69.2	7	1.16	11
Tomatoes-1	-3.5	4.1	0.4	78.0	3	0.44	1
L-Berseem-10	0.1	-0.4	-0.3	79.6	2	0.77	6
Potatoes-3	-6.7	3.9	-3.1	46.4	12	0.69	5
B-beans-6	-2.8	-5.2	-7.9	76.7	5	0.85	8

*Arranged in descending order of the rate of growth in production.

**Ranked according to gross value of output per feddan.

Source: Growth rates of area, yield, and production from Nassar et al. (1995). Value added as percent of gross value of output and DRC ratios from World Bank (1993).

Livestock Sub-sector in Agricultural Growth Strategy

Livestock may appear to have only a small role to play in agricultural growth because its very low ratio of net value to gross value of output. However, this is not the case, especially when a distinction is made between meat and smallholder dairy production. At the present stage, livestock is important, for three main reasons.

First, in addition to Nile water, the draft power and manure supplied by animals have long been essential in achieving a high intensity of land use and world-class yields (see "The History of Agricultural Development" by T. Ruf in The Agriculture of Egypt, ed. G. M. Craig). These inputs of the livestock sector are still vital. Despite the growth in farm mechanization, animal power continues to be important, especially because a vast majority of Egypt's farms are very small. Similarly, even though chemical fertilizers are used extensively, farmyard manure continues to be of great value in combating soil exhaustion—both because it is a source of plant nutrients and also because it has beneficial effects on soil properties. According to the Ministry of Agriculture data, total manure production in 1992 was 194 million tons—which amounts to about 16 tons (about 200 to 250

kgs of nutrients) per cropped feddan. Such high level of manure application plays a key role in sustaining high productivity of land. In this respect Egypt resembles countries like the Netherlands, Denmark and Germany where high application of both organic manure and chemical fertilizers have been the mainstay of very high crop yields.

Second, livestock production is an important source of income for farm families. Total gross value of livestock production in 1992 was LE 8.377 billion. This amounts to an average of LE 2,094 per farm family, which is not inconsequential. Furthermore, this is likely to be an underestimate because it does not include the value of draft power and implies just about 230 kgs of milk production per animal per year. This seems on the low side because 55 percent of the relevant animal population comprised cows and buffaloes. The importance of livestock as a source of income was also confirmed by feedback from farmers during our field trips. In judging livestock's importance to farmers' economy (as opposed to the overall economy), the ratio of net value to gross value of output may not be the most appropriate indicator. This is because two main elements of cost (namely, labor and berseem) are internal to the farm family, and berseem is also an important element in maintaining soil fertility.

Third, as the experience of countries like India and Pakistan suggests, the livestock sector offers opportunities for equity and employment-oriented agricultural growth in a dynamic setting. This is especially true in the case of smallholder dairy, which not only has the potential to raise farmers' cash income but also generate employment for women.

Summing Up the Growth Rate of Agricultural GDP

As the preceding discussion shows, growth in agricultural production needs to be distinguished from growth in agricultural GDP to identify the high-priority tasks in policy reform as well as to evaluate the impact of reforms that are undertaken. Because of the vast gap between the two growth rates, this distinction is especially helpful in identifying opportunities to (1) improve the real income of farm families, (2) boost employment-oriented economic growth in the nonagricultural sector, (3) reduce the inflationary pressures inherent in the rapid expansion of employment, and (4) achieve sustained rapid growth in agricultural exports.

The analysis also points out three vital factors for Egypt to consider in developing policies for agricultural growth.

First, it is essential to increase the growth rate of aggregate agricultural production. The present rate of 2.9 percent is only 0.5 percentage point higher than the population growth rate. Thus, in terms of per capita income of farm families, it is too low to raise their welfare, or to set in motion the dynamic interplay of income and employment multipliers in the rural nonagricultural sector. As explained later in the report, these effects can only be achieved with a growth rate of about 4.5 percent in total agricultural production.

Second, high-value commodities need to increase in relative importance if the growth rate of agricultural production is to improve significantly. This is because of Egypt's land constraints and already high yields per feddan. As shown in Table 3, growth rates in the

production of such high-value crops as cotton, tomatoes, and potatoes were quite low in relative terms.

Third, and most important, the ratio of value added to gross value of output must be raised through an all-out effort to increase total factor productivity. In view of the cavernous gap between the growth rate of production and agricultural GDP, this task is more urgent than any other. A market-determined price environment is a necessary but insufficient condition for a continuous improvement in the ratio of value added to gross value of output, especially when all farmers use inputs like fertilizers, pesticides, and farm machinery at very high levels. Raising the efficiency of these inputs is not just a matter of conveying market-determined price signals. As the discussion on fertilizers makes clear, research-based extension is crucially needed for continuous improvements in efficiency of inputs.

AGRICULTURAL STRATEGY AND GROWTH IN LABOR FORCE

EGYPT'S MOST PRESSING NATIONAL CONCERN TODAY IS how to absorb the growing labor force and the backlog of unemployed. This must be one of the first issues addressed by Egypt's agricultural strategy. The magnitude of this problem is enormous.

GROWTH OF THE POPULATION

In the past century, Egypt's population (excluding those living abroad) increased from about 7 million to 48 million (Table 6). The midyear estimate for 1993, which was based on the 1986 census, was 56 million. And the projected figures for the years 2000 and 2025 are 65 million and 94 million, respectively.

Table 6: Estimated Population of Egypt, 1982 to 1993 and Projections for 2000 and 2025

Year	Population (thousands)	Growth Rate (% per year)
1882	6,712	
1897	9,669	2.46
1907	11,190	1.47
1917	12,718	1.29
1927	14,178	1.10
1937	15,921	1.17
1947	18,967	1.77
1960	26,085	2.48
1966	30,076	2.40
1976	36,627	1.99
1986	48,254	2.80
1993	56,060	2.17
2000	64,810	2.09
2025	93,536	1.48

Source: CAPMAS. 1994.

SIZE AND GROWTH OF THE LABOR FORCE

According to United Nations statistics, which use the terms "labor force" and "economically active population" interchangeably, the estimates of labor force include "all persons engaged or seeking employment in an economic activity, whether as employers, own-account workers, salaried employees, or unpaid workers assisting in the operation of a family farm or business" (FAO, 1993). In other words, the labor force can be said to include not only those who are employed in paid work but also those who are seeking employment, as well as unpaid workers assisting in family farms and business.

Table 7 shows the estimates of Egypt's total population (excluding those living abroad) and labor force from the *Statistical Year Book* issued by CAPMAS (June 1994) for the three census years 1960, 1976, and 1986. It also shows these estimates for some years between 1970 and 1993 from *Production Yearbook* (FAO 1990 and 1993), which also provides estimates of the labor force in agriculture. The estimates of the labor force in the nonagricultural sector were obtained by subtracting the agricultural labor force from the total labor force.

Table 7: Population and Labor Force in Selected Years, 1960 to 1993

Year	Popula-tion mil.	Labor Force mil.	LF as % of Pop	Agriculture		Non-agriculture	
				mil.	%	mil.	%
1960	26.09	7.73	29.6				
1976	36.43	10.26	28.0				
1986	48.25	13.40	27.8				
Annual Growth Rates							
1960–76	2.14%	1.77%					
1976–86	2.79%	2.71%					
1970	32.54	9.17	28.2	4.76	52	4.41	48
1975	35.91	10.04	28.0	4.90	49	5.12	51
1980	40.86	11.24	27.5	5.13	46	6.11	54
1985	46.51	12.79	27.5	5.51	43	7.28	57
1990	52.43	14.51	27.7	5.88	41	8.63	59
1991	53.63	14.89	27.8	5.96	40	8.93	60
1992	54.84	15.28	27.9	6.04	40	9.24	60
1993	56.06	15.67	28.0	6.12	39	9.55	61
Annual Growth Rates							
1970–80	2.30%	2.06%		0.75%		3.31%	
1980–93	2.46%	2.56%		1.37%		3.50%	
1970–93	2.39%	2.36%		1.10%		3.42%	

Source: Developed from data in FAO Production Yearbooks, 1990 and 1993.

The estimate of 15.674 million (only 28 percent of total population) for the "economically active population" appears to be an underestimate for 1993. Very few countries have less than 30 percent of the population in "economically active" category. Even for Africa (the least developed region), the estimate is 37 percent. For many developing countries (including Muslim countries like Turkey and Indonesia), it is about 40 percent. Wahba's discussion (1993) also suggests the figure of 28 percent is an underestimate. According to Wahba, the labor force estimate does not include many persons participating in economic activities. He specifically cites women who take part in cotton harvesting. To this must be added women who participate in milk production and dairy-related activities in the smallholder sector. Incidentally, the small holder sector accounts for 85 percent of total milk production. In all likelihood, labor force statistics also ignore the women involved in dairying. Thus Wahba's estimate—that 60 percent of total population is economically active—may not be as absurd as it appears at first glance.

Another indication of underestimation is that only 9 percent of females as opposed to 48 percent of males in the age group of 6 years and older are in the estimated labor force. Consider, too, the age distribution of population. Conventionally, those 15 to 64 years of age are considered to be of working age. In 1986, 57 percent of Egypt's population was in this category (Table 8). Since about half of them would be female, it is quite likely that the labor force is underestimated as a result of their large-scale exclusion. Also note that the percentage of the population in this age group increased by three percentage points between 1960 and 1986. Yet the labor force ratio remained unchanged at 28 percent. This also suggests that it may be incorrect to treat the estimates of labor force in Egypt as estimates of the economically active population. Labor estimates in Egypt likely include only those who are self-employed (e.g., farmers, traders) plus those who are in paid employment. In other words, they leave out unpaid participants in economic activities of the family farm and business, as well as those in active search of employment. Obviously, these people need to be taken into account in developing a strategy to expand employment and raise the income of rural families.

Table 8: Distribution of Total Population by Age Groups in 1960, 1976, and 1986 (percent)

Age Group	1960	1976	1986
0-14 years	42.6	39.9	39.4
15-64 years	53.9	56.5	56.8
65 years & above	3.5	3.6	3.8

Source: Wahba. 1993.

If 40 percent of the total population is considered "economically active," then the size of the labor force in 1993 becomes 22.4 million, as opposed to the estimate of 15.7 million. The growth rate of the Egyptian labor force estimated by ILO is 2.6 percent per year for

1981–90 and 2.7 percent per year for 1990–2000 (World Resources, 1994–95, p. 268). At a 2.7 percent rate, the average annual addition to the labor force between 1993 and 2000 works out to 447,000 if the 1993 base is taken to be 15.7 million, and it works out to 656,000 if the base is taken to be 22.4 million. This gives some idea of the magnitude of the challenge in creating additional employment every year in the years ahead. When apportioned between rural and urban area, assuming 56 percent to be rural and 44 percent to be urban, the estimates presented in Table 9 are obtained.

Table 9: Calculated Annual Increment in Labor Force and Its Distribution between Rural and Urban Areas, 1993 to 2000

Assumption of 1993 Labor Force	Average Annual Increment		
	Rural	Urban	Total
15.7 million	250,000	197,000	447,000
22.4 million	367,000	289,000	656,000

Source: Estimated by projecting the alternative estimates of 1993 labor force to the year 2000 at 2.7 percent per year growth rate. The distribution between rural and urban areas is estimated by taking 56 percent as rural and 44 percent as urban.

PAST ABSORPTION OF GROWTH IN THE LABOR FORCE

Table 7 also provides information on the distribution of labor between agriculture and the nonagricultural sector since 1970. The share of agriculture declined from 52 percent in 1970 to 39 percent in 1993. This was an outcome of about a 1.1 percent growth rate for the labor force in agriculture as compared with 3.4 percent in the nonagricultural sector. This means that over the 23-year period, when total labor force increased by 6.5 million, only 1.36 million (21 percent) of the 6.5 million new members of labor were absorbed in agriculture. It is not clear whether the remaining 5.14 million were absorbed in the nonagricultural sector because of the vast expansion of productive employment in this sector or because they were pushed out of agriculture. The latter seems more likely.

Table 10 provides some information on the annual increase in total labor force since 1970, labor distribution between rural and urban areas, and the extent to which agriculture and the nonagricultural sector in rural areas helped absorb the annual increment of labor force. The estimates are based on a 28 percent labor participation rate.

Table 10: Annual Increase and Distribution of Labor Force, 1970–1993
(in '000s)

	Economically Active Population							
		Rural(56%)			Urban(44%)			
	Grand Total	Total	Agri	Non-Agr	UrNon Agri	TotNon Agri	Agr % of GT	Rural NAg % 0f TNAg
1970–75	174	99	28	71	75	146	16	46
1975–80	240	134	46	88	106	194	19	45
1980–85	309	173	75	98	136	234	24	42
1985–90	346	194	75	119	152	271	22	44
1991	375	210	78	132	165	297	21	44
1992	386	216	80	136	170	306	21	44
1993	399	223	81	142	176	318	20	45

Notes: Columns (1) and (3) are based on estimates of the economically active population (total and in agriculture) given in the FAO Production Year Book, 1990 and 1993. Columns (2) and (4) were estimated by using 57 percent of total population as rural for 1970–75 and 56 percent for all other points in time. These estimates are based on information available in the Statistical Year Book, Arab Republic of Egypt, June 1994. Column (4) = Column (2) - Col (3). Column (6) = Column (4) + Column (5). Column (7) = Column (3) ÷ Column (1) x 100. Column (8) = Col (4) ÷ Column (6) x 100.

As Table 10 shows, in early 1990s, the total labor force increased by about 400,000 every year. A little over half (210,000 to 223,000) of this increment was in rural areas, where agriculture was absorbing 43 percent of the annual increment in labor in the early 1980s. By the early 1990s, this figure fell to 36–37 percent. In other words, a growing proportion of the annual growth in rural labor is absorbed by the rural nonagricultural sector. Because of these trends, since 1970 agriculture has been absorbing less than one-fourth of the overall annual increment in the labor force (Column 7). Finally, more than 40 percent of the annual increment in the labor force in the nonagricultural sector has been in rural areas.

These observations point to three conclusions. First, by the early 1990s, agriculture was absorbing just one out of five workers added to the total labor force. Second, the rural nonagricultural sector is as important as the urban nonagricultural sector in absorbing the additions to labor. And third, in rural Egypt, the nonagricultural sector is about 1.5 times as important as agriculture in absorbing the growth in rural labor. Furthermore its relative importance has grown over time.

As pointed out earlier, caution must be exercised in interpreting the growth in nonagricultural labor as an indication of growth in productive employment outside agriculture. The former could just as well be due to labor being pushed out of agriculture because of its inability to absorb more. Thus, the twofold challenge in developing an employment-oriented strategy for rural areas is how to increase productive work for farm households to improve their income and simultaneously convert the rural nonagricultural sector into a domain of economic activities with dynamic expansion in productive employment.

The strategy proposed here addresses precisely this issue. First, it increases on-farm labor requirements because of the higher labor intensity in the production of cotton and horticultural crops. Similarly, the smallholder dairy would also have a positive impact on income generated through productive use of family labor—especially the income of women. Second, the strategy would have a positive impact on nonfarm employment in the marketing and processing activities of cotton, horticultural crops, and dairy products. Third, the growth in income resulting from accelerated agricultural growth of this type would set in motion employment multipliers through the growth in consumption expenditure on locally produced commodities and services, as discussed in the next section.

IMPACT OF RAPID AGRICULTURAL GROWTH

INTERNATIONAL COMPARISONS

FAST OVERALL ECONOMIC GROWTH IS USUALLY ASSOCIATED WITH FAST agricultural growth. The areas included in Table 11 (three of which have per capita incomes lower than those of Egypt) have averaged 7.4 percent in overall growth and 4.5 percent in agricultural growth in recent years.

In the Asian countries for which such data are available, a one percentage point increment in the per capita agricultural growth rate is associated with a 1.5 percentage point addition to the per capita nonagricultural growth rate. When farmers in developing countries have rising incomes, they typically spend 40 percent of the incremental income on locally produced nonagricultural goods and services, and another 20 percent on high-value agricultural commodities, primarily fruits, vegetables, and livestock products (Mellor, 1976; Bell, Hazell, and Slade, 1982). When one carries those marginal propensities to spend locally through several rounds of expenditure, each incremental unit of farmer income can be said to provide another unit of income to rural non-farmers and to farmers producing high-value crops. In addition, there are smaller multipliers on the rest of the economy.

EGYPTIAN DATA

The nature of these rural nonfarm expenditures can be inferred from surveys of how rural people spend overseas remittances. According to a detailed village survey carried out in 1987 by Richard Adams, 19 percent of the incremental income goes for current expenditures (food, clothing, and various services), 49 percent for durable goods, and 32 percent for investment (Table 12). As in other countries, the bulk of the expenditure in each category is on locally produced goods and services. Although such income may be regarded as transitory, the patterns are similar to those for permanent income in Thailand and Punjab, India (Mellor, 1995) and in Malaysia (Bell et al. 1982).

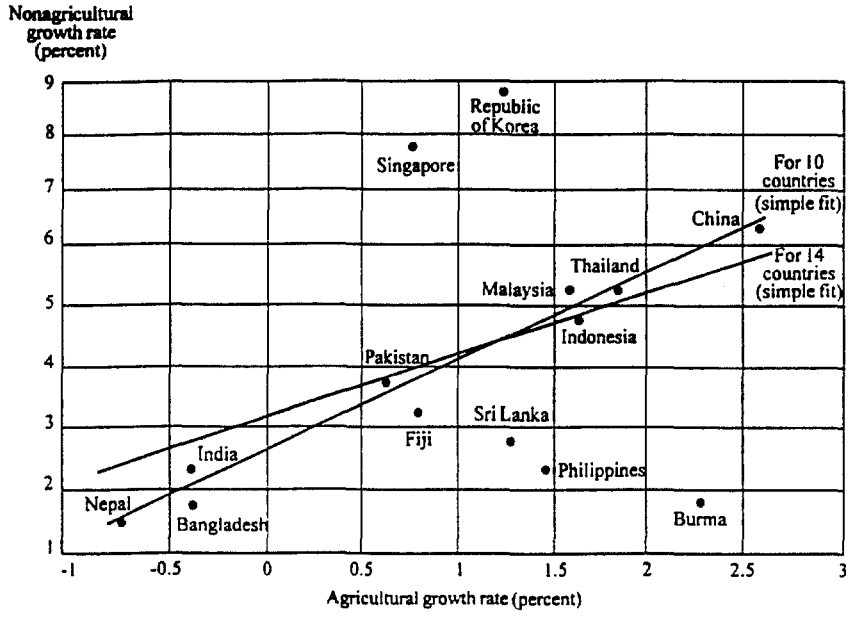
Table 11: Per Capita Income, Growth Rates of GDP, of Agriculture and Share of Agriculture, Various Countries and Periods

	Egypt 1972–86	Colombia 1964–79	Costa Rica 1960–73	Kenya 1963–78	Philippines 1965–80	Taiwan 1960–75	Thailand 1970–87	Punjab 1968–88
Macroeconomic Env.								
GNP per capita US$ in '87	690	2,360	1,550	330	590	5,050	840	422
Growth rates (%)								
Real GDP	9.10	4.26	6.34	7.33	5.79	9.25	6.43	5.34
Real GDP per capita	6.71	2.66	3.12	3.70	2.71	6.31	4.00	3.03
Agricultural Growth								
Output*	2.70	4.26	5.54	5.10	4.69	3.31	3.74	4.52
Output per capita	0.31	1.80	2.40	1.60	1.70	0.30	1.40	2.21
Beginning Share of GDP	30.87	31.24	29.30	41.54	28.29	28.54	29.10	59.69
Ending Share of GDP	20.64	24.01	21.41	36.92	23.35	15.74	18.20	51.59
Beginning Share of Agr.Empl.	52.00	45.28	51.20	87.62	58.00	50.20	72.28	62.16
Ending Share of Agr. Empl.	42.00	37.00	38.00	81.76	51.80	30.40	58.03	50.40
Nonagricultural Growth								
Manufacturing Output(%)	9.70	3.49	9.00	10.21	7.23	14.80	8.30	9.04
Services(%)	14.00	6.34	5.79	7.02	5.22	9.72	7.11	5.98

*** Value added in percent.**

Source: Mellor (1995); World Bank World Tables, 1995.

Figure 2: Growth Rates of Per Capita Agricultural and Nonagricultural GDP, Various Asian Countries, 1960–86



Note: Descriptive variables for simple fit, 10 countries (excluding Burma, Philippines, Republic of Korea, and Singapore): R-square, 0.91: value of coefficient of agricultural growth rate, 1.41; t-statistic of agricultural growth rate, 9.33; and standard error of agricultural growth rate, 0.15. Descriptive variables for simple fit of 14 countries. R-square, 0.23:value of coefficient of agricultural growth rate, 1.07; t-statistic of agricultural growth rate, 1.92; and standard error of agricultural growth rate, 0.56. Constant 1980 GDP at market prices in local currency.

Source: World Bank (1989).

Table 12: Increases in Income and Expenditure from Remittance Income, Rural Households, 1987

Item	*Egyptian Pounds*
Income excluding remittance	391
Remittance	381
Total income	772
Increase in income from remittance	97
Increase in consumption	32
Increase in durables	211
Increase in investment	137
	Percent
Incremental share consumption	19
Incremental share in durables	49
Incremental share in investment	32
Total share investment	**100**

Source: Adapted from Adams (1991).

The breakdown of the expenditure on durables is shown in Table 13: housing takes up over half of the expenditure, while less than 10 percent is spent on goods and services from outside the local economy. These expenditure patterns are very labor-intensive. That is, the employment impact of these expenditures is large and tends not to decline. These data increase confidence in the use of the expenditure data cited earlier, and hence suggest a multiplier on local expenditure of 2.

Table 13: Expenditure on Nonrecurring Items as a Percentage of Total Actual Remittance Earnings of Once-Abroad Migrants, 1986/87

Item	*Percentage of Total Actual Remittance Earnings*
Built new house	42.5
Repaired house	11.4
Purchased agricultural land	11.2
Marriage expenses	10.8
Purchased land for building	9.3
Purchased car or taxi	4.7
Opened or expanded store	3.0
Purchased television	2.3
Purchased radio	1.0
Purchased refrigerator	0.9
Other	2.9

Source: Adams (1991).

The key to economic transformation lies in the increase in the per capita rate of growth in agricultural production; that is what has great implications for other sectors of the economy (Mellor, 1976, 1995). As pointed out earlier, Egypt's agricultural GDP has been growing only slightly faster than its population, even if the period from 1986 to 1993 is ignored. With employment elasticities of anything less than 1, such a low per capita growth rate does not absorb even the increase in labor resulting from population growth in rural areas.

An addition of 1.75 percentage points to the agricultural growth rate would add about 2.1 percentage points to the overall GDP growth rate (Table 14). Similarly, it would provide a 2.7 percent growth rate in agricultural employment, and a 3.3 percent growth rate of rural nonagricultural employment (Table 15). The total increase in rural employment would add 381,841 jobs per year, starting from the current base. In a recent study of the impact of greatly accelerated (20 percent rate) growth of nontraditional exports, the employment growth generated is 142,000 jobs per year, assuming the same multiplier of 2 as in the agricultural impact (SRI, USAID, 1995, Nontraditional Export Study). Part of that employment growth is from nontraditional agricultural exports (particularly horticultural exports). A 20 percent growth rate in tourism employment would add 30,000 jobs per year. These calculations are based on an unrealistically high elasticity of employment with respect

to output of 1. A lower, more realistic elasticity is used for the agricultural employment impact. These three sources of employment total to 553,841.

Application of the same assumptions to a 2.75 percent agricultural growth rate gives only 60 percent as much employment growth. In fact, these assumptions overstate the nonagricultural employment import of slow growth, because the multiplier will tend to be smaller with such a drastically lower per capita agricultural growth rate.

Given the high priority assigned to employment growth, attention must be given to promoting not only agricultural growth, but also the growth of nontraditional exports and tourism. Indeed, the first two are closely intertwined, and thus policies to encourage nontraditional agricultural exports and the role of the private sector in those exports is central to the proposed agricultural strategy. But, it is agriculture, because of its large initial size and the potential for high growth rates in key portions of the sector, that will drive employment growth.

Table 14: Effect on Overall Growth Rate of Accelerating the Agricultural Growth Rate from 2.75 percent to 4.5 percent.

Assumptions Set #1:

1. The multiplier of per capita agricultural growth on per capita nonagricultural growth is 1.5 (Mellor 1976, Bell et. al. 1982).

2. The population growth rate is 2.4 percent; thus an agricultural growth rate of 2.75 provides a negligible per capita increase (0.35).

3. Agriculture represents 20 percent of the economy and nonagriculture 80 percent—providing the weights in (a) and (b) below.

4. The base nonagricultural growth rate is 4.5 percent with only 0.5 of that attributable to agriculture.

Then: The base case.

(a): Agricultural growth at 2.75% x 20% weight = 0.55% points (b): Nonagricultural growth at 4.5% x 80% weight = 3.6% points
(c): Overall growth rate = 4.2 percent

And: With acceleration of agricultural growth by 1.75 percentage points and derived acceleration of non-agricultural growth of 2.62 percent (1 .75 x 1.5).

(a): Agricultural growth at 4.5% x 20% weight = 0.9% points
(b): Nonagricultural growth 6.62% (4.0% + 2.62% x 80% weight = 5.3% points
(c): Overall growth rate = 6.2 percent

Thus the growth rate accelerates from 4.1 percent to 6.2 percent (plus 2.1 percent) as a result of a 1.75 percent acceleration in the agricultural growth rate.

Table 15: Employment Impact of Accelerating the Agricultural Growth Rate from 2.75 percent to 4.5 percent, 1993 Base

I Labor force data, 1993 (Source, Tables 9 and 10, and associated text)

1. Agricultural labor force	=	5,017,600
2. Rural nonagricultural labor force	=	7,526,400
3. Total rural labor force	=	12,544,000
4. Urban Labor Force	=	9,856,000
5. Total labor force	=	22,400,000
6. Annual rural labor force increment at 2.7%	=	338,688

II Assumptions

1. Elasticity of agricultural employment with respect to agricultural output = 0.6
(empirical record is between 0.3 and 0.6, the former when
labor scarcity induces labor saving investment) (source: H. Rao, 1975)
2. Elasticity of nonagricultural employment with respect to nonagricultural output = 0.9
(output induced by small price increase, elastic supply of
labor, when labor scarce labor saving induced and elasticity
declines)
3. Marginal propensity to spend incremental income from agr.
is 0.6 in the rural economy (0.2 in high value agr. and 0.4 in rural nonagriculture)
(Source: Bell et. al, 1982)
4.Multiplier of agricultural income is 2, the result of two rounds.
of expenditure (1.0 + 0.6) + (0.6 x 0.6)= 1.96. Further rounds would increase beyond 2, as would the urban multiplier.
5. The multiplier on consumption expenditure and hence on employment falls partly in agriculture and partly in nonagriculture, but assuming same level of labor productivity in agriculture and non-agriculture the number to which the employment multiplier is to be applied is the same as the agricultural labor force. This follows from the consumption multiplier of 2.0 (see 2, below).
6. Base employment in agribusiness at 20 percent of agricultural labor force, and the employment elasticity is 0.9.

III Therefore employment growth as follows

1. Agriculture growth 4.5 x 0.6 = 0.027 times agr. labor force	=	135,475
2. Nonagriculture consumption 4.5 x 0.9 = 0.041 x no. = to agriculture labor force	=	205,722
3. Nonagriculture production 4.5 x 0.9 x agr. labor x 0.2	=	41,144
4. Total increment in employment (1+2+3)	=	382,342
5. Rural labor force growth at 2.7 percent	=	338,688
6. Excess rural employment (5-4)	=	43,654
7. Percent excess rural employment to total rural employment	=	0.14

Excess rural employment results either in return of urban labor force to rural areas, or rural employment spilling into urban areas and affecting that labor market, or rising real rural wage and consequent decline in employment elasticity.

A quite different way of looking at the agricultural multiplier can be found in Richard Adams's survey of the impact of foreign wage income remittances in Egyptian villages. He estimates that 12.5 percent of total village income came from that source (Adams, 1990). The data are for 1987. Current data suggest that remittances had reached $5.9 billion by 1994, nearly twice the level of $3 billion reported in 1987. However, the more recent data may be biased upward by short-term capital flows, and the implied rate of growth may be further exaggerated by fuller reporting in the later years. Rural real wages peaked in 1985, dropped by 20 percent by 1987, and dropped a total of 43 percent by 1990. This pattern confirms that the growth in foreign worker remittances peaked in the mid-1980s (Table 16).

Table 16: Real Wages, Money Wage, and Wage Index, 1981–90

Year	*Money Wage Index*	*Rural CPI Index*	*Real Wage Index*
1981	5799	1653	351
1982	7561	1889	400
1983	9900	2339	423
1984	11919	2552	467
1985	13969	2851	490
1986	15507	3502	443
1987	15379	3969	387
1988	16437	4787	343
1989	17686	5507*	321
1990	17526	6330*	277

* Assumption rate of change of CPI = 1980–88.

Source: Richards (1994); 1914–38: Hansen (1966); 1938–70: Radwan (1977); 1970–90: Wages: Ministry of Agriculture, Rural CPI: CAPMAS.

It would take only seven years of the 1.75 percent incremental agricultural growth rate posited here to equal the total effect of remittances as shown in Richard Adams's study. And, of course, the agricultural effect would continue to grow. For example, in another seven years it would become twice as important as the remittances effect shown. Since agricultural growth per capita is almost negligible, the vibrancy of market towns in Egypt must largely be due to the impact of remittances, which as Adams shows have a large employment content in their expenditure. The income from incremental agriculture growth would have similar expenditure patterns and impact.

ACCOUNTING FOR GROWTH

THE STRATEGY RECOMMENDED HERE STARTS WITH AN accelerated growth rate for agricultural output based on commodity priorities and commodity-specific actions, and then enables that growth rate to have a direct and indirect impact on GDP and on employment. With the aid of a Growth Accounting Framework (GAF), the targeted growth rate can be expressed as a function of the growth rates of the various agricultural subsectors, and the growth rates of each of these subsectors can be developed as a function of the appropriate variables for achieving those growth rates. We present such a framework in this section and in Tables 17 and 18. The tables show (1) the sources of growth for five agricultural subsectors; (2) the percentage contribution to growth of 13 variables; and (3) the growth rates for the base year and for 5- and 10-year periods. Also calculated is the effect of accelerated agricultural growth on the overall growth rate of GDP.

Table 17: Growth Accounting Framework and Sources of Growth, Subsectors and Weights

Cotton		Horticulture		Livestock		Cereals		Other	
Weight	0.06	Weight	0.25	Weight	0.30	Weight	0.23	Weight	0.16
Area	3.00	Population	2.10	Population	2.10	Yield	1.50	Yield	1.50
Yield	1.50	p.c.incm.gr.	3.30	p.c.incm.gr	3.30	Catchup	1.20	Catchup	1.20
Quality	2.00	incm. elast.	0.80	incm. elast.	1.30			Quality	0.30
		% exports	0.05						
		% exprt.gr	25.00						
Rate	6.50	Rate	5.99	Rate	5.16	Rate	2.70	Rate	3.00
% incr.gr.	8.30		33.20		34.20		13.70		10.60

Table 18: Growth Accounting Framework, Percentage Contributions to Growth of 5 Subsectors, 1, 5, and 10 Years

	Year 1			Year 5		Year 10	
Subsector	Weight	Rate	Share	Weight	Share	Weight	Share
Cotton	0.06	6.50	8.30	0.06	8.90	0.07	9.50
Horticulture	0.25	5.99	33.20	0.26	34.80	0.28	36.30
Livestock	0.30	6.39	34.20	0.32	34.40	0.34	34.60
Cereals	0.23	2.70	13.70	0.21	12.30	0.18	10.90
Others	0.16	3.00	10.60	0.15	9.60	1.03	8.70
	1.00		100.00	1.00	100.00	1.00	100.00
Growth rate		4.51		4.63		4.72	

This framework indicates the relative importance to growth, with specified assumptions, of the various priority subsectors and of the specified sources of growth of each subsector. Thus, the framework provides a sensitivity analysis of the importance of various assumptions and the relative weights in the growth rate of each of 10 variables deemed important to achieving the given accelerated growth rates. The number of variables has purposefully been kept small to simplify the analysis. This makes it possible to focus on those interventions that are most important to the aggregate growth rate, and to discuss the feasibility of each of the component parts.

The most important function of the Growth Accounting Framework is to show a plausible set of sub-sectoral growth rates for achieving the overall 4.5 percent growth rate in agriculture. That then provides a basis for reducing contributions considered implausible and the magnitude that must then be made up by increased growth in other subsectors.

The overall growth rate of GDP is shown as a function of the agricultural growth rate times the proportion of GDP in agriculture and the nonagricultural growth rate times its weight. In the base case, the agricultural growth rate is taken as 2.75 percent for 1972–86 (the pre-reform period) (Table 1). The nonagricultural growth rate is taken to be 4.5 percent. That is calculated, per the stated assumptions, as 0.5 percent derived from the agricultural growth and 4.0 percent from outside agriculture. This assumption relates to base growth rates in other countries (see for example Mellor, 1995). The non-agricultural growth rate in Egypt has generally been higher, but it is meaningful to abstract from the effects of the oil boom, major distortions, and the likely over counting of growth in the services sector. The resultant overall growth rate is 4.1 percent. Note that with the slow growth rate of agriculture, which is barely more than the population growth rate, its contribution to the growth of other sectors is negligible. Given the labor-intensive nature of such a contribution, the root of the employment problem in Egypt becomes clear.

An acceleration of the agricultural growth rate to 4.5 percent has two important impacts on GDP: the agricultural growth itself and the multiplier on other sectors. That multiplier, consistent with previous exposition, including figure 1, is taken as 1.5. That is, each percentage point by which the agricultural growth rate increases adds 1.5 percentage

each percentage point by which the agricultural growth rate increases adds 1.5 percentage points to the nonagricultural growth rate. Thus the nonagricultural growth rate can be seen as having two components: the base 4.0 percent that is generated exogenously to agriculture and the incremental 2.6 percent added by the acceleration of the agricultural growth rate. With these assumptions, the overall GDP growth rate accelerates from 4.1 percent to 6.2 percent. That is a 51 percent increase in the growth rate. With a population growth rate of 2.4 percent, the per capita growth rate more than doubles from 1.7 percent to 3.8 percent—all ascribable to the acceleration of the agricultural growth rate by 1¾ percentage points. That increment is achieved through labor-intensive production, and so the impact on employment is large.

Note that a reduction of the population growth rate has a major impact on per capita income growth. In this case, dropping the population growth rate from 2.4 percent of the past to the 2.1 percent through the rest of this decade raises the per capita GDP growth rate by a further 0.3, or nearly 8 percent, to 4.1 percent.

AGRICULTURE

Here, the objective is to accelerate agricultural growth rate to the point where it will significantly increase overall economic growth and to do so through processes that expand rural employment decisively. To achieve this objective, priorities are set for a small number of subsectors—specifically, cotton, horticulture, smallholder livestock, and cereals. Cereals are included because of a specific concern for food security, the potential for yield increase and their place in the rotation.

In the growth accounting framework, we use gross value of output as a proxy for value added largely because of lack of disaggregate data on value added by different subsectors. Obviously, agricultural growth rate measured from gross value of output could differ from one measured from value added in agriculture depending on growth rates of the gross value of output and inputs. As shown in Table 19, hypothetically three situations are distinguished: (i) The growth rates of the gross value of output and inputs are the same (5 percent per year). Here, the growth rates of agriculture measured from gross value of output and value added in agriculture are identical (namely, 5 percent). This is because the value of inputs as a percentage of the gross value of output remains constant over time (at 25 percent in the example). (ii) The gross value of output grows at a faster rate than the value of inputs (say, at 5 percent and 3 percent respectively). Here, agricultural growth rate measured from gross value of output would be lower than the one measured from value added in agriculture. This is because the value of inputs as a percentage of the gross value of output has declined as a result of improvements in the productivity of inputs over time. (iii) The gross value of output grows at a slower rate than the value of inputs (say, at 5 percent and 7 percent respectively). Here, agricultural growth rate measured from gross value of output would be higher than the one measured from value added in agriculture. This is because the value of

inputs as a percentage of the gross value of output has increased over time as a result of decline in the productivity of inputs over time.

Typically, developing countries represent the third situation especially when growth in the volume of agricultural production is dependent on increasing number of farmers taking up the use of such inputs as fertilizers, pesticides and farm machinery at higher and higher rates. At the root of the problem are various inefficiencies in the use of these inputs due to both faulty price policies which encourage the use of inputs and underdeveloped research and extension systems which are incapable of providing technical support to farmers as in the developed countries.

Table 19: Three Hypothetical Situations of Agricultural Growth

		Situation 1		*Situation 2*		*Situation 3*	
Year	*Gross Value Output*	*Cost of Inputs-1*	*Value Added-1*	*Cost of Inputs-2*	*Value Added-2*	*Cost of Inputs-3*	*Value Added-3*
1	100.00	25.00	75.00	25.00	75.00	25.00	75.00
2	105.00	26.25	78.75	25.75	79.25	26.75	78.25
3	110.25	27.56	82.69	26.52	83.73	28.62	81.63
4	115.76	28.94	86.82	27.32	88.44	30.63	85.14
5	121.55	30.39	91.16	28.14	93.41	32.77	88.78
6	127.63	31.91	95.72	28.98	98.65	35.06	92.56
7	134.01	33.50	100.51	29.85	104.16	37.52	96.49
8	140.71	35.18	105.53	30.75	109.96	40.14	100.57
9	147.75	36.94	110.81	31.67	116.08	42.95	104.79
10	155.13	38.78	116.35	32.62	122.51	45.96	109.17
11	162.89	40.72	122.17	33.60	129.29	49.18	113.71
Growth Rate	5.00%	5.00%	5.00%	3.00%	5.60%	7.00%	4.25%

Note:
Situation 1: Growth rate of cost of inputs = Growth rate of gross value of output
Situation 2: Growth rate of cost of inputs < Growth rate of gross value of output
Situation 3: Growth rate of cost of inputs > Growth rate of gross value of output

As pointed out in Table 3, Egypt represents the extreme case of the above situation. This is because inputs like fertilizers and pesticides are universally used by all farmers, their rates have gone up very rapidly during last decade and a half, and the institutional support systems are inadequate to the needs of a high intensity agriculture. The policy reforms have not arrested this process because in general farmgate prices of output have risen faster than those of inputs like fertilizers.

The agricultural strategy that we propose rules out the continuation of the above trends. There is maximum emphasis on increased efficiency of input use—strategic actions needed to ensure this are discussed later in the fertilizer section. In the present context of the

value of output as a measure of agricultural growth is not over-estimating the economic impact of agricultural growth. And the extent to which the proposed 4.5 percent growth rate in the use of inputs is reduced, the positive impact of 4.5 percent growth rate in agricultural output on overall economic growth and employment would only be larger.

The agricultural growth priorities occur in three subsectors: cotton, horticulture, and the smallholder dairy industry. Because of food security concerns as well as production potentials, emphasis is also placed on cereals. Thus, the agricultural sector is depicted as being made up of those four subsectors, plus a residual subsector.

The four specified subsectors represent 6 percent (cotton), 25 percent (horticulture), 30 percent (livestock), and 23 percent (cereals) of agricultural GDP. The residual makes up 16 percent of the total (Table 17).

Table 17 also shows the growth rate for each subsector that arises from the plausible set of assumptions in succeeding sections of the report. Those rates are 6.5 percent for cotton, 5.2 percent for livestock, and a combination for the horticultural sector of 4.7 percent growth of the 95 percent weight in the domestic market and a 25 percent rate of growth in the international market, with cereals growth continuing at the historical rate of 2.7 percent for the agricultural sector, and a somewhat higher rate of 3.0 percent for the residual sector. With the assumptions for horticulture, its growth rate picks up from 6.0 percent in the base period to 6.5 percent at the end of the fifth year of the new priorities. Taking those assumptions together, the agricultural GDP growth rate is 4.5 percent in the base period.

Before proceeding to a discussion of the subsectoral growth rates, two important points should be made concerning the overall growth that those subsectoral rates achieve. First, the contribution to growth of a particular subsector is a function of its weight and the growth rate. Second, as growth occurs, the weight of the faster-growing subsectors increases; if the growth rate can be maintained, then the weight of that sector in growth increases, and the overall growth rate accelerates.

Thus, the cotton subsector, although important to overall growth and to employment growth, provides only 8 percent of the incremental growth in the beginning. Horticulture, with a larger initial weight and a slower initial growth rate than cotton, still contributes 33 percent of incremental growth. The cereals sector contributes 14 percent of incremental growth, and the residual sector another 11 percent. When these two subsectors are compared with cotton, it should be remembered that each of them is composed of several commodities, whereas cotton comprises just one commodity. Because of the rapid growth assumed to meet domestic demand, the livestock sector initially provides 34 percent of incremental growth. Given the initial weight of the livestock sector and the rapid growth in domestic demand, it will obviously be difficult to achieve a high growth rate in agriculture without a major contribution from that sector.

Similarly, the overall growth rate gradually picks up from an initial 4.5 percent to 4.7 percent in the tenth year. That acceleration is achieved with the subsectoral growth rates constant and is entirely due to a change in composition toward the faster-growing subsectors. These growth rates faster than the 4.5 rate targeted means that if the growth rate of cereals yield, for example, declines significantly from their high initial rates, the overall growth rate of 4.5 percent can still be maintained.

What proportion of the incremental growth is attributable to exports? Cotton growth, which is export driven, accounts for 8.3 percent, while horticulture accounts for about 25 percent, and hence 8.3 percentage points of the horticultural growth is due to exports. Thus, about 17 percent of the incremental growth is export driven. That proportion rises slowly over time. By the tenth year the export-driven component has increased to nearly one-quarter. Successive iterations of the Growth Accounting Framework will provide substantial acceleration of the agricultural growth rate over time with no changes in assumptions, but only growth in the export base. That also allows the export sectors to compensate for a gradual decline in the yield growth rates in traditional subsectors such as cereals, while maintaining the overall growth rate.

A question that might be raised at this juncture is whether the export sectors can grow more rapidly. The answer is yes. But there is a practical problem to resolve here: how to provide incentives to private exporters and how to organize small farmers in large numbers to meet the rigid quality, timing, and other standards of the export market. Since the rate of growth of the export sectors is already shown to be high, it is only the initially small base that constrains the overall contribution of exports to growth. That is a problem for all export-led growth in Egypt.

COTTON

Cotton growth is taken to be a function of three supply-side variables: area, yield, and quality.

The area growth rate is assumed to be 3 percent. That means about 24,000 feddan must be added to the cotton area each year. At that rate, the area of cotton would reach 1 million feddan in about eight years. In the growth calculation, a value of output on land diverted from other crops (perhaps principally rice) is not subtracted to give a net addition for cotton. It is assumed that while the growth of the cotton area may be at the expanse of other crops, the net additions of land from reclamation net of losses to urbanization will be sufficient to cover the expanded area of cotton as well as horticultural crops. This is a conservative assumption about additional land area. (see Annex I, on the new lands).

In practice, the cotton area will increase at the substantial expense of rice. Rice is grown in part on soils that are highly saline and of heavy clay texture. According to government estimates, one million feddans of the current rice area is made up of such soils. Thus, if the rice area were reduced, 300,000 feddans of soils with good drainage and ph could reasonably be added to the cotton area. Rice uses large quantities of water. When the cost of that water is taken into account, as the World Bank (1993) has done, the value added per feddan of cotton is substantially greater than that of rice. It is likely that favorable price and market policies would bring about a much more rapid shift in area than is assumed. That would allow the overall target to be met with some delay in the other subsectors.

A conservative yield-increase variable is assumed in light of Egypt's high yields of cotton. It is assumed to be 1.5 percent, which is also the rate that may be taken as the normal pace of technological advance in agriculture in advanced countries such as the United States (Tweeten, 1990). It would not be unreasonable to add a further yield increase to reflect the high variability in cotton yields among farms. That seems to be a product of the unfavorable policies toward cotton in the past and the resulting lack of attention it has received from many farmers. For example, if it is assumed that 50 percent of the farmers average 20 percent less yield per feddan than the average and that this yield differential was eliminated over a period of eight years, yield would grow by an additional 1 percent per year. Thus, a 1.5 percent rate of growth for cotton yield is a conservative estimate.

The third variable is an increase in quality. Here, it is assumed that Egypt can gradually build a market for extra-fine-staple cotton, that the price of this cotton will be 40 percent higher than the price of average production, that half the crop area will be added to the production of extra-long-staple cotton, and that this 20 percent increase in real price will occur in nine years, for an average rate of increase of 2 percent per year. These are very strong assumptions, particularly the price differential and the area to be devoted to extra-long-staple cotton. If they are to be borne out, the private sector must put vigorous effort into finding markets for such cotton, and Egypt must return to being a reliable supplier. That, in turn, requires major policy adjustments by the government. Such policies would be intended to result in eventual widening of the price spread in favor of extra-long staple cotton.

The assumptions made for each of these variables provides a 6.5 percent rate of growth of the value of output. This is a percentage point higher than what Pakistan achieved over the 15 years from 1970 to 1985. In the Pakistan case, the area increase was somewhat lower than assumed here, the quality did not improve over time, and the yields grew much more rapidly because of a much greater scope for catch-up growth owing to the much lower yields at the outset (JMA, Inc., 1994).

Under these assumptions, area growth accounts for nearly half of the cotton growth rate, yield for nearly a quarter, and quality nearly a third (computed from table 17). The overall growth rate is not highly sensitive to the cotton assumptions because the base weight is so small.

HORTICULTURE

The growth rate for horticultural products is assumed to be driven partly by domestic demand and partly by foreign demand. That is, the profitability of horticultural production for both markets is considered attractive to farmers and they are believed to be restrained from increasing production by demand and marketing constraints. A more accurate representation would be that supply is highly elastic with respect to price and hence to demand. As explained later, this is a strong simplifying assumption. However, the strategy team's meeting with farmer focus groups corroborated the profitability of horticultural

production to farmers and their perception that markets and marketing were the constraining factor, particularly export markets.

At present, total demand is largely driven by domestic demand, with only 5 percent of output exported. A 3.3 percent rate of growth of per capita GDP, 2.1 percent population growth, and 0.8 percent income elasticity of demand provide a 4.7 percent rate of growth of domestic demand. If exports grow at the very high rate of 25 percent, which is about two-thirds higher than the present growth rate, overall growth is only 6.0 percent. After four years of such growth, the weight of exports increases to 12.5 percent and with that higher weight to the fast growth export sector the overall growth rate picks up to 6.3 percent. The same growth rate is achieved if per capita income grows at 3.3 percent and exports grow at 15 percent, with the 12.5 percent weight.

If horticulture is to achieve a 6.0 percent growth rate, the land area devoted to horticulture must be increased. We assume that the area will grow at the rate of 4 percent per year, and that it will increase from the present 15 percent of the area devoted to agriculture to 30 percent in 18 years. This is still less than the proportion of the area devoted to such crops in comparable counties of California (Table 32). At that rate of area expansion, real value of output per feddan would have to increase by 2 percent per year. That could be achieved by a combination of a 1.5 percent yield increase, 0.3 percent decrease in crop losses, and 0.2 percent shift to higher-value horticultural commodities.

Clearly the limiting factor to horticultural growth is achieving very high (25 percent) rates of export growth on a rapidly increasing base, and secondarily achieving higher rates of per capita income growth to drive the domestic market more effectively. However, the domestic market is less important to growth than it is for livestock products because of the significantly lower income elasticity of demand for vegetables than for livestock products. Since markets appear to be the big constraint, improved markets must immediately be backed by production research to resolve market-related production problems concerning appropriate varieties, disease resistance, storage quality, and so on.

LIVESTOCK

Livestock are an integral part of the farming system in Egypt. They provide vital manure for organic matter in the intensively cropped land; they provide a profitable return to berseem, which restores nutrients to the soil and also helps improve soil structure; they are a major source of employment, particularly for women (Table 20); and they are a major source of income, particularly on small farms (Table 21). Although the productivity of animals is very low, at present the income from smallholder animal production is profitable. That is confirmed by studies of smallholder livestock production that show the going wage rate is paid for family labor, and by the focus group discussions that consistently express an interest in expanding livestock production.

As in the case of horticulture, we assume that the supply of livestock products is demand driven, but here 100 percent of the demand is from domestic sources. That is to say,

smallholder livestock production has a comparative advantage in Egypt only because of the large differential between export and import parity prices (see Annex IV).

Table 20: Total Demand for Agriculture Labor During 1991

	Men		Women		Children	
	mill. days	%	mill.days	%	mill.days	%
Crop requirements	420.8	60.1	94.4	29.0	133.6	82.2
Livestock Requirements	279.9	39.9	231.8	71.0	28.9	17.8
Total	700.7	100.0	326.7	100.0	162.9	100.0

Source: USAID, Agronomic and Economic Factors Effecting Cotton Production in Egypt, APCP, CAIRO, DEZ 1994.

Table 21: Structure of Farmers House Income By Farm Size, 1989

	Farm Size (Feddans)				
	0 – 1	1 – 3	3 – 5	5 – 10	> 10
Crop income	23.2	40.0	39.3	49.6	59.8
Dairy income	15.6	7.6	7.5	7.7	17.9
Sales of livestock	4.3	3.0	1.4	1.9	5.0
Wages from Agric.	14.5	13.9	3.4	---	---
Wages from Non. Agric.	31.9	27.4	29.3	12.2	12.0
Rent	4.8	3.8	12.5	22.5	5.3
Trade	2.3	0.8	1.5	5.1	---
Remittances	2.2	1.6	---	---	---
Other income	1.2	1.9	5.1	1.0	---
Total %	100.0	100.0	100.0	100.0	100.0

Source: Calculated from A. Sarris, Structural Adjustment and Agricultural Development in Egypt, Agricultural Policy Analysis in Egypt, Conference, MALR, FAO, CAIRO 1992.

At the present rate of per capita income growth, domestic demand for dairy and poultry is growing at 4.5 percent (with a population growth rate of 2.4 percent, per capita income growth of 1.6 percent, and income elasticity of demand of 1.3 percent). In this environment, the livestock subsector will grow at a substantially higher rate than the crop subsector. If GDP growth is increased to 5.4 percent and population growth to 2.1 percent or 3.3 percent per capita income growth, demand will then grow at the rate of 6.4 percent. As shown above, simply increasing the agricultural growth rate to 4.5 percent will lift the overall growth rate to 6.5 percent. Thus, the 5.3 percent GDP growth rate is very conservative, allowing for a large incremental savings rate, or lower level of income elasticity of demand. We divide the livestock sector into the two-thirds with a comparative advantage in domestic markets (Table 22, dairy by-product share of meat, poultry, and their share of manure), and the remaining one-third of livestock production. We calculate a demand-driven growth rate of 6.4 percent for the former component and assign a rate of 2.9 percent for the latter for an overall growth rate of the livestock sector of 6.17 percent. The underlying assumptions are discussed more fully in the commodity priorities section of this report.

We assume that the increased production will be achieved entirely through increased production per animal and hence that animal numbers will not increase. That requires roughly a doubling of production per animal over a period of 11 years. Cotton seed meal availability is presumed to grow at 4.5 percent per year. Corn availability, would grow at 2.75 percent per year and its use for food would decline. Thus it would also nearly keep up with the growth in animal output. Berseem production would lag as more short berseem was grown in place of long berseem and possibly further displaced by horticultural commodities, particularly potato, or even wheat. Thus, it would not be surprising if imports of feed increased. That, of course, is the standard story in virtually all developing countries experiencing rapid economic growth.

The argument for importing feed to support livestock growth is that farmers find smallholder livestock production profitable at present with roughly international prices for feed-corn.

CEREALS

Cereals production is shown as a function solely of yield growth. The growth in new lands is assumed to go to horticulture and cotton. (In practice, these may come in varying degrees from cereals area, but then, the new lands would effectively balance that.) The assumed yield increase is a standard 1.5 percent that derives from general scientific advances, both in developed and developing countries. In addition, it is assumed that there will be significant catch-up growth, particularly in wheat and corn. This is expected to be 1.20 percent per year, as Egypt approaches yield levels comparable to those in the best agricultural areas of the world. That gives an overall rate of yield growth of 2.70 percent, which will be difficult to achieve given the uniformly high yields of rice and wheat. However, it becomes more plausible with an improvement in the on-farm orientation of agricultural research and

the presence of international centers with a strong application of bio-technology. These calculations also clearly show that cereals are unlikely to provide a much higher growth rate. It is not reasonable to expect a growth in area at the expense of other crops, given the need to push area toward higher-value crops, as already mentioned.

Table 22: Value of Livestock Production in 1991 and 1992 Compared to 1985 and 1986 (million LE)

Year	Value of Livestock (mLE)	Value of Red Meat (MLE)	%	Value of Milk (MLE)	%	Value of Broilers (MLE)	%	Value of T.Eggs (MLE)	%	Value of Manure (MLE)	%	Value of Others (MLE)	%
1985	3614	1160	32.1	1003	28.8	752	20.8	540	14.9	130	3.6	29	0.8
1986	4188	1300	31.0	1171	28.0	812	19.4	713	17.0	156	3.7	36	0.9
1991	6993	3084	44.1	1921	27.5	1035	14.8	482	6.9	388	5.5	83	1.2
1992	8377	3544	42.3	2586	30.9	1159	13.8	455	5.4	507	6.0	126	1.5
Annual growth rate	12.0%	18.0%		12.9%		5.7%		-5%		20.9%		21.5%	

Source: MALR.

OTHER AGRICULTURE

Similar assumptions are made for other agricultural products. The growth rate will be maintained more or less at the historical average, derived from a quite high assumption on yields. It is also assumed that within this residual category there will be a gradual increase in the proportion of higher-value crops, with the effect of a 0.3 percentage point addition to the growth rate, and it will include many crops. It should be noted that the total of this residual is 16 percent of agricultural output. Hence, any one crop in this complex will have a very small weight and is therefore unlikely to play a significant role in accelerating overall growth, even with a very high growth rate. Thus, it is unlikely that giving priority to any of these crops would represent an effective use of scarce resources. Of course, nothing should be done to inhibit their growth.

COMMODITY PRIORITIES

FARMERS CHOOSE TO PRODUCE SPECIFIC COMMODITIES AT specific levels of output. An agricultural strategy must focus on those commodities. Similarly, the policy, investment, and institutional requirements of growth are commodity-specific. Thus, the strategy recommended here starts with commodity priorities. They are chosen on the basis of the initial weight of the commodity, the perceived potential for achieving the very high growth rates needed to pull the overall growth rate to a high level and their employment intensity. That is, the priority commodities are the ones expected to contribute the most to the acceleration in aggregate growth. In addition, attention is given to balancing export and domestic demand driven commodities, and to contributing to broad participation in growth, particularly through employment. Once the commodity focus is determined, priorities must be set with respect to the multifaceted and complex off-farm delivery systems required to achieve high growth rates. There priority is given to increasing the productivity of the major purchased inputs, particularly fertilizer, which are used in large quantity. Special attention is also given to the immense credit needs of the priorities and to preserving and expanding the rural financial system. Finally, we note the importance of food security to the large number of low- income people of Egypt and address the food security issue in the context of the strategic priorities.

The relative importance of the priority commodities has been discussed in the context of the GAF (see Tables 17 and 18). The relative importance of these commodities varies, depending on the measure used. Differences are particularly large in Egypt, given the history of price and other distortions. Table 23 shows the relative importance of these measures for the country's leading crops. Since the table does not include livestock, the proportions are higher for each commodity than if livestock were included. Note the very high proportion of water use by rice—three times its area weight. Also cotton's importance is 40 percent greater if economic value (international prices) is used rather than financial value (distorted domestic prices). Except for cotton, the priority commodities have already been growing more rapidly than the average for agriculture. Cotton, however, has suffered from negative policy and has declined to less than half its area of a few decades ago. It has only just recovered the bulk of its earlier yield levels.

Table 23: Relative Importance of Major Crops, 1990
(percent share)

Crop	*Crop Area*	*Water Consumption*	Value Added		*Gross Financial Value*
			Economical	*Financial*	
Maize	16.3	15.0	14.0	12.7	13.3
Wheat	16.2	8.7	17.2	14.9	14.2
L-Berseem	14.4	8.0	10.1	12.9	11.6
S-Berseem	7.2	2.6	2.1	2.7	2.8
Rice	8.6	25.6	7.0	8.1	8.4
Cotton	8.2	8.9	14.1	10.2	9.5
Sugarcane	2.3	9.2	2.9	5.3	4.6
Orchards	5.5	6.1	6.6	8.0	9.3
Vegetables	4.7	5.2	7.0	7.9	7.3
Tomatoes	3.1	3.4	6.8	8.0	7.3
Potatoes	1.6	1.7	1.5	1.9	2.9
Other crops	9.2	4.1	6.1	6.7	6.2

Source: Developed from World Bank (1993).

HORTICULTURE

Horticulture should obviously be given high priority in an accelerated growth strategy. It is initially of substantial importance, has a high value of output per feddan, is labor- intensive in production, and offers scope for extensive participation by small farmers. As long as incomes are growing slowly in Egypt, however, domestic demand growth will not be adequate for a rapid growth in output. The proportion exported will initially be so small that the export growth rate required for high overall growth of the subsector is unlikely to occur without a major effort at removing the various bottlenecks currently in the way of growth. It will be difficult to achieve the postulated growth rate within the next few years and hence the task will require special attention.

Comparative Advantage

The strategy team conducted focus group meetings with horticulture farmers in new land areas near Sadat City, in old new land areas, and old land areas in Ismaelia, as well as in Dumyata and Sharkia. The resulting information was matched against discussions with agricultural technologists and subjected to intensive discussion. Small farmers in horticultural production find producing for the domestic market highly profitable. The larger producers have higher labor costs and appear to have difficulty producing under the price regime of the

domestic market. Many also find it difficult to gain access to foreign markets. These problems are bound to increase once production growth exceeds the sluggish growth of domestic markets in the context of slow growth in per capita income. But, the foreign markets provide very high returns. Private sector firms with captive production for export are able to contract with small holders on a profitable basis and to ensure supplies to export markets. But the risks are great.

A careful analysis of data on production costs in Egypt shows those costs to be higher than prices in major export markets, except during specific periods (Harrison, 1993). During those periods, the Egyptian costs are well below the European prices and thus offer highly profitable export opportunities.

Egypt's comparative advantage in horticulture is based on well-drained and nutrient-rich soils with a potential for well-controlled water supplies, natural warmth for much of the year, and excellent levels of sunlight, along with proximity not only to European and Gulf markets but with its own highly concentrated mass market, only waiting for income growth to open up.

Output Composition

Horticulture initially occupies about 15 percent of the cropped area and contributes 25 percent of the value of total agricultural output (Tables 17 and 18). With a 6 percent growth rate, horticulture provides 33 percent of the agricultural growth (Table 18).

Currently, 95 percent of horticultural production is consumed on the domestic market and only 5 percent is exported. If per capita income grows at the rate of only 2 percent, domestic demand will only grow at 4 percent and will fall well short of that needed to achieve a 6 percent growth rate in output. Although horticulture is seen as an export-driven sector, initially domestic demand will account for 80 percent of the incremental growth. That is because the initial weight of exports is so small: only 5 percent of output. Once per capita incomes begin to rise at a substantial pace, domestic demand will grow rapidly, given the moderately inelastic demand for horticultural commodities.

Thus, in the short run, it is vital for exports to maintain a high rate of growth. As the export base expands, the growth rate could slow substantially and still achieve the 6 percent overall rate. Alternatively, by maintaining a rapid growth rate for exports, the overall growth rate would exceed 6 percent by a rapidly increasing margin. In addition, as per capita incomes rise, the growth in domestic demand will accelerate. Thus the horticultural sector will have to struggle to fulfill its promise in the short run, but will become the increasingly dominant source of growth in the long run. With a 4 percent rate of growth of area, it will take 18 years to double the area to 30 percent of the cropped area. That would still be substantially less than the proportion found in comparable counties in California.

Over 75 percent of all area planted to horticultural crops in Egypt is under five crops: tomatoes, potatoes, oranges, grapes, and onions.[1] The production, domestic consumption, and export of the first four crops have been increasing steadily in recent years.

The twelve countries of the European Union represent an important market for Egypt. Europe is the fastest growing of all the regional markets in the world. Spain has met much of the increasing consumption needs of this region. However, consumption by Western Europeans during winter months is much lower than levels elsewhere in the world at comparable income levels, and this indicates a significant potential market for Egyptian output. Despite the entry of Spain into the European Union, none of the countries in this community have the climatic conditions to produce fruits and vegetables year round. Despite the protective tariffs[2] under the Common Agricultural Policy, a significant percentage of the demand in the European Community, especially in the winter season, is met by imports from countries outside the Community. The GATT agreement is expected to bring protective tariffs down in this region, but horticultural exporters from countries such as Egypt will still need to find seasonal markets. It is exports to this region that give Egypt its most significant advantage because of its geographic proximity and ability to produce these crops year round.

In the long run, the countries of Eastern Europe and the former Soviet Union to which Egypt exported most of its fruits and vegetables in previous years[3] will also return to being lucrative markets as the domestic conditions in these countries stabilize. Egyptian exports of citrus to this region are increasing rapidly. Countries in the Gulf region are also significant markets for Egyptian fruits and vegetables. However, the overall size of the market is limited, and the competition from other Islamic countries in the region is strong.

Citrus is the leading fruit crop of Egypt. It is grown in both the Nile Valley and Delta areas and in the New Lands. Over 57 percent of the area is under navel oranges. Given the arid climate of Egypt, the oranges have a low juice content and are more suitable for direct consumption. Total acreage under oranges has increased rapidly in the past decade and was about 352,000 feddan in 1992. Much of this increase has come from the increased cultivation in the new lands. The yield per feddan is well below what can be achieved in such fertile soil and climatic conditions. This is attributed to the use of improper and inadequate cultural practices and the lack of input. Although the prescribed practices seem adequate, these are generally not followed. An intensive extension effort seems warranted because existing yield levels and domestic prices have put most navel orange producers in middle and upper Egypt and Damietta in lower Egypt at below break-even levels. The existing marketing system of "kelala," where the crop is purchased while still on the trees and the buyer then takes on the responsibility for all aspects of managing the crop, such as guarding, picking, and sorting,

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[1] Most of the following description of the potential of these horticultural commodities and the problems they face is drawn from the 1994 reports prepared by the MALR and ARC.

[2] This is done through a system of ad valorem tariffs and a reference price system. The tariffs are lower in periods when there is little or no production activity in the European Union. Additionally specially negotiated agreements exist with countries in the Mediterranean basin.

[3] This was done largely through State owned companies under barter agreements.

generally brings down producer prices and leaves the buyer with high marketing margins (some estimates indicate these to be around 47 percent). Much of the trade is therefore in the hands of the wholesalers. Improvements in harvesting, packing, and transportation methods can help to increase the value of this production. The Egyptian orange export season, from December to April, is very short. This is why more emphasis is now being put on increasing the production of valencia oranges and on finding other varieties that will make it possible to increase this season. Analyses of the export market potential indicate that Egyptian exporters can profitably enter the European markets.

Potatoes are Egypt's leading horticultural crop. Production is close to 2 million tons per year. This crop is currently experiencing exciting changes as the newly privatized industry takes over. Prices in the domestic market have soared since the early 1980s, and domestic consumption has nearly doubled. The large new growers in the new desert lands are providing much of the catalytic force in this change. Considerable emphasis is being put on setting up sorting, grading, and packing operations. Most of the crop grown in the new lands is for export, and this has halted to some extent the problem of brown rot in Egyptian exports. There is also an upsurge in the number of firms developing and supplying certified seeds.

Grapes are the third largest fruit crop in Egypt. The area and production has increased consistently. Because of the suitability of the soil, grapes are grown all over Egypt. Beheira Governorate accounts for nearly 40 percent of the total area under grapes. There is a wide variation in the yields of grapes. This is due in large measure to a lack of knowledge about appropriate cultural practices and the planting of cultivars and varieties that are not suitable for the area in which they are grown. Preharvest losses due to lack of appropriate technology, proper irrigation, and pest control problems and post-harvest losses due to mechanical damage, disease, and physiological disorder amounted to more than $44 million in 1992 (MALR, ARC, NARP, 1994). The acreage under varieties of seedless grapes is increasing. Domestic demand is expected to grow to about one million tons by the year 2000, and there is considerable profit potential in exporting to the Western European countries during May to July. More attention needs to be given to quality-control systems and to monitoring and developing potential markets.

Tomatoes are the most widely grown vegetable crop in Egypt. They represent about 40 percent of the vegetable production. Yields in tomato production increased dramatically during the 1980s and 1990s. Despite bouts with virus infection, increasing production has lowered domestic prices. However, the types of tomato demanded for export are not as resistant to the virus. Research thus needs to give top priority to this problem. A number of marketing systems are in effect, but greater refrigeration facilities need to be developed. Post-harvest losses are often sizable because of inefficient picking, handling, packing, and transportation. Another problem is that market information is inadequate and is seldom delivered in a timely manner, especially to the small farmer. Egypt needs to develop its export market for this commodity.

Several issues need to be addressed in order to develop the export market: in particular, a program of quality assurance standardization, and inspection is sorely needed. Food irradiation also needs to be developed to extend the market life of this product.

Policy

Because horticulture needs to achieve such a high growth rate from the outset, measures must be taken to assist that growth. Profitability must be high enough to encourage private exporters to establish the necessary institutions, make the investments, and take the risks involved in a rapid expansion into the export markets. Having a comparative advantage will not be enough. The required growth can only be achieved by moving ahead rapidly in exploiting that comparative advantage. The onus will be on public policy to ensure that (1) the foreign exchange rate is favorable to exports, (2) the private sector is actively encouraged, (3) public investments and policy changes help reduce transaction costs and decrease the costs of production and marketing, (4) an effort is made to use international organizations such as the World Trade Organization to ensure access to foreign markets, and (5) the public sector collaborates closely with private trade in developing and disseminating new technologies.

The government must play an important role in negotiating access to key markets and particularly those of Europe. The high growth rates in exports assume ready access to such markets. In the complex negotiations with the EC and the World Trade Organization, strong allies (e.g., regional partners and the United States) will be important as well as a small number of horticultural priorities.

The government should consider developing a horticultural export unit within the Ministry of Agriculture that would (1) oversee import and export regulations to ensure that they do not discourage private exporters; (2) ensure priorities for the research and extension system are set in close collaboration with the exporters; (3) provide initial continuity for the exporters association; (4) set priorities for bargaining with export market countries, particularly in the European Union with respect to restraints on Egyptian exports; (5) organize trade missions in cooperation with the appropriate foreign assistance agencies; (6) organize training programs for middle-management skills; and (7) analyze the problems of entry for foreign firms that would bring technical and management expertise to Egypt and facilitate the entry of such firms.

Exchange Rate

The exchange rate must not be overvalued and thus discriminate against the export sector in favor of domestic markets. This pitfall can only be avoided through constant monitoring, particularly to ensure that whenever domestic inflation exceeds that in overseas markets it is countered by devaluation. Inflation in Egypt was well above that in foreign

markets (U.S.) between 1987 and 1993 (Table 24). To bring it to a comparable level would have required a 50 percent devaluation in addition to the actual devaluation. With the large oil and foreign aid inflows, however, the currency will tend to be overvalued in relation to non-oil exports.

Technology

In the team's focus groups and related interaction with technical people, it became clear that public sector research needs to lead the way, in close collaboration with private exporters, in helping a greater number of farmers provide quality produce for the European market. Egypt needs to establish a technology improvement program that will include both public and private sector research if it is go bridge the technological gap with developed countries. That gap grows ever wider as the global economy expands and trade increases. A technical assistance program with close interaction between the public and private sectors can bring Egypt closer to the future of modern production and marketing technologies.

Table 24: Exchange Rate and Inflation Rate, 1981–93

Year	*Egypt CPI Index 1987=100*	*U.S. CPI Index 1987=100*	*Exchange Rate Egyptian Pounds per U.S. dollar*	*Index 1987=100*	*Exchange Rate X Ratio of Egypt and U.S. CPI*
1981	38.57	79.95	0.74	58.27	0.357
1982	44.29	84.87	0.81	63.78	0.423
1983	51.41	87.60	0.86	67.72	0.509
1984	60.17	91.38	0.93	73.23	0.612
1985	67.45	94.63	0.96	75.59	0.684
1986	83.88	96.39	1.07	84.25	0.931
1987	100.00	100.00	1.27	100.00	1.270
1988	117.66	104.01	1.76	138.58	1.991
1989	142.68	109.03	1.94	152.76	2.539
1990	166.59	114.19	2.23	175.59	3.254
1991	199.49	119.78	3.01	237.01	5.012
1992	226.69	123.41	3.32	261.42	6.099
1993	254.10	127.05	3.33	262.20	6.660

Source: World Bank World Tables, 1995.

The planned USAID agricultural technology development project is on precisely the right track. Its objective is to (1) emphasize the commodity priorities, in this case horticultural commodities; (2) help the private sector service export markets; (3) maximize what can be done in the private sector, and mesh applied public sector activities with that; (4)

emphasize the exporters association as the contact point for the private sector and the public institutions; and (5) emphasize on-farm efforts. As several of the exporters we met pointed out, farmers need to be organized and moved into appropriate technology, varieties, and especially qualities for export. The private sector probably cannot enure that exports targets will be met at an adequate pace without some public assistance from the agricultural research system.

Priorities

Above all, it is vital to concentrate research and marketing efforts on a small number of priority commodities. If the choices prove fruitless, there should be no qualms in turning to nonpriority commodities, which, when they prove themselves, can then go on the priority list. As the new trade economics makes clear, however, major scale economies can be achieved in research and marketing by concentrating on a small number of commodities. At present, citrus and potato are of aggregate importance in exports (Table 25). Onions and garlic are also significant. Analysis of price windows in the European market and domestic costs suggest that grapes and green beans could also be emphasized (Harrison, 1995). But this list is already too long if research and marketing are to be first rate.

COTTON

Cotton occupies only 8.2 percent of Egypt's crop area (it occupied nearly three times as many feddans three decades ago) and accounts for 9.5 percent of the value of crop output (Table 26). Valuation at international prices would raise that proportion on the order of 50 percent. In value of output, cotton is now only one-third as important as horticulture and about 14 percent as important as livestock. Cotton is about one-third as important in value of output as wheat and rice combined. Nevertheless, it should be considered a priority commodity for three notable reasons: (1) price discrimination has given cotton a far lower value than would be the case with international prices; (2) price discrimination and the philosophy behind it have restricted cotton to a much smaller area than would otherwise have been the case; (3) prices have discriminated against the higher-value cotton in which Egypt has a comparative advantage.

All three of these factors stem from the discrimination against cotton in public policy of the past few decades. That policy is a legacy of the 1960s, when the conventional wisdom was that primary commodities from developing countries faced inelastic demand and therefore their production had to be discouraged, in order to bring forth increased revenues. Malaysia was one of the few developing countries to have ignored that notion, with the result that its palm oil production and exports soared and helped finance an important part of its economic

transformation. Much later it achieved similar results with cocoa. In contrast, West African countries were abandoning both.

Table 25: Major Agricultural Exports by Value, 1988—91
(thousands of U.S. dollars)

Commodity	*1988*	*1989*	*1990*	*1991*	*1991 Percent*
Cotton lint	287,039	274,502	170,000	98,000	23.5
Milled paddy rice	17,190	7,550	19,000	48,700	11.7
Oranges	49,283	72,992	132,000	108,000	26.0
Potatoes	31,505	26,884	53,000	87,000	20.9
Onions, dry	12,442	9,692	8,800	9,900	2.4
Garlic	1,414	704	2,100	18,700	4.5
Tomatoes	2,927	4,227	5,200	6,400	1.5
Watermelons	3,150	2,737	6,700	7,700	1.9
Refined sugar	39	3,610	0	90	*
Molasses	11,561	8,363	8,363	6,100	1.5
Groundnuts, in shell	288	1,404	3,100	1,870	0.4
Cheese (whole cow milk)	2,462	3,797	5,000	7,500	1.8
Beans, green	2,881	3,936	5,100	6,400	1.5
Vegetables, dehydrated	8,948	7,515	9,300	9,800	2.4
Total	431,129	427,913	427,663	416,160	100.0

*** Less than 0.05%**

Source: Craig (1994). Derived from Parker (1992), unpublished data, Economic Research Service, USDA, collated from sources including FAO, CAPMAS, and Agricultural Counsellor, Cairo.

In Egypt, prices were kept well below international levels and other forms of discrimination were practiced. As a consequence, (1) the cotton area dropped by nearly 60 percent (Table 26); (2) the area devoted to the highest-quality cottons declined more than proportionately, creating a new opening for the United States and Pima cotton (Table 27); and (3) yields increased less than would be normal (Table 28). The first effect of the reforms was a quick increase in cotton yields. Cotton is given high priority on the assumption that area will increase with some lag and that there will be a shift to higher-value cotton.

It is notable that the domestic resource cost of cotton is one-half to two-thirds that of most other crops (Table 29). Table 30 shows the standard rotations and sheds light on the problem of the low returns to the normal follow-on crop to cotton (short berseem).

Research

The research system must be sharply focused on onfarm trials to get the value of production up quickly in ways that succeed under farm conditions. Several avenues need to be explored, such as methods of raising yields and shortening the season for extra-long-staple

fine varieties. Currently, cotton has a high value compared with the alternatives, but the remainder of the standard rotation, particularly short berseem, does not. Thus, it is important for researchers to find a higher-value crop for the period immediately after cotton.

Table 26: Cotton, Area, Yield, Production, 1950–93

Year	*Area (thousands of ha)*	*Yield* kg/ha*	*Production (thousands of ms)*
1950–52	829	1510	1252
1960–62	772	1605	1240
1970–72	568	2491	1415
1980–82	489	2690	1315
1990–92	376	2262	850
1990	417	1952	814
1991	358	2212	791
1992	353	2679	946
1993	372	2947	1096

* Yield and Production figures in terms of seed cotton, not lint. (Conversion ratio: 1 kg seed cotton = 0.3997 kg lint).

Source: Up to 1990, developed from the Center for Adult and Continuing Education, The American University in Cairo, 1992. For 1991 to 1993, FAO Production Yearbook, 1993.

Table 27: Relative Importance of Extra-Long-Staple and Other Cotton, 1965–89

Year	Percentage of Area			Percentage of Production			Yield in Kg/Ha	
	ELS	LS	Other	ELS	LS	Other	ELS	LS
1965	42	20	38	45	23	32	2,021	2167
1970	40	31	29	40	36	24	2,045	2376
1982	27	83	?	27	83	?	2,643	2693
1989	24	77	?	29	79	?	2,300	1914

Source: APCP.

Table 28: Change in Cotton Yields, 1950–90

1950s to 1960s	+0.61% per year
1960s to 1970s	+4.49% per year
1970s to 1980s	+0.77% per year
1960s to 1980s	+2.62% per year
1980s to 90-92	-1.72% per year
1980s to 91-93	-0.25% per year

Source: American University 1990; FAO, 1990–93.

Table 29: Economic Returns and Domestic Resource Cost, with Expected Yield Increases to the Year 2000, Various Commodities
(Egyptian pounds)

Crop	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost
Wheat	991.6	935.8	1,699.2	0.4
Long berseem	1,175.1	602.0	1,197.6	0.5
Short berseem	478.7	162.8	505.2	0.7
Beans	1,065.2	571.3	1,340.2	0.6
Maize	983.0	832.5	1,649.9	0.5
Rice	793.4	299.0	1,626.8	0.8
Cotton	1,549.2	2,017.7	3,350.7	0.4
Potatoes	923.0	361.7	1,177.2	0.7
Sugarcane	2,201.2	-341.9	1,846.3	1.2
Sugar beet	530.1	560.4	1,376.0	0.6

Source: World Bank (1993).

Table 30: Standard Rotations

Rotations	Financial Net Return	Economic Net Return	Value Added	Domestic Resource Cost
Short berseem	478.7	162.8	505.2	0.7
Cotton	1,549.2	2,017.7	3,350.7	0.4
Total	2,027.9	2,180.5	3,855.8	0.4
Wheat	991.6	935.8	1,699.2	0.4
Maize	983.0	832.5	1,649.9	0.5
Total	1,974.7	1,768.3	3,349.1	0.5
Wheat	991.6	935.8	1,699.2	0.4
Rice	793.4	299.0	1,626.8	0.8
Total	1,785.0	1,234.8	3,326.1	0.6
Long berseem	1,175.1	602.0	1,197.6	0.5
Maize	983.0	832.5	1,649.9	0.5
Total	2,158.1	1,434.5	2,847.5	0.5
Sugar	2,201.2	-341.9	1,846.3	1.2

Source: World Bank (1993).

Foreign Exchange

The foreign exchange regime must be made favorable to exporters, which means attempting to manipulate to a somewhat undervalued currency rather than one that is overvalued. The exchange rate is a far more complex problem than its relation to a single export, but the needs of cotton exports will be similar to those of other commodities. Note the data suggesting an overvalued currency in the discussion on horticulture.

Extra-Long-Staple Cotton

Egypt once thought that it had a monopoly on extra-long-staple, very fine cotton and that it faced inelastic demand for the finest varieties of cotton. The policies based on that assumption left an opening for several other countries to become major exporters of long-staple cotton. It appears that Egypt does not have a special advantage in that market, although it is surely competitive. Also as a result of past policies, the market for extra-long, extra-fine cotton was largely lost. The area devoted to extra-long staple cotton has dropped even more rapidly than the total acreage of cotton (Table 27).

Such cotton is expensive—the yield is lower or production costs higher, and the length of growing season is longer than for other varieties. However, in this world of rapidly rising incomes and the expanding markets for highest-quality goods, it would not be unreasonable to expect that a reliable supply of such cotton would elicit a strong market. Egypt has a unique opportunity. Whether the opportunity has macro implications will be determined by the market. But it would seem an especially high priority for Egypt to allow that market to operate. That means a free hand to the private sector, completely free prices, and absolutely no blocking of exports of such cotton to protect short-term employment. As a market developed and was encouraged by marketing efforts, it would have a major impact on the rate of growth of the value of cotton output. That potential adds urgency to a cotton priority.

LIVESTOCK PRODUCTS

Livestock play a key role in the farming system and in family income. The weight and growth rate are so large that livestock must play a major role in agricultural growth.

Eighty-six percent of milk and the milk products consumed are met by domestic production (Winrock, 1993). Smallholder production provides 85 percent of cattle and buffalo production (Winrock, 1993). Milk and its products and by-product meat account for over 60 percent of livestock production. The commercial sector accounts for only 3 percent

of livestock production (Winrock, 1993). Thus, strong weight is to be given to the livestock sector, but growth must take place in the smallholder sector. That, of course, has favorable implications for income distribution.

The livestock sector has poor prospects for growth in exports. However, the difference between the import parity and export parity price is large (Annex IV). Egyptian farmers have a strong opportunity in the domestic market. Dairy subsidies are rapidly being phased out in other countries, leaving the market to operate more freely. But the opportunity for the Egyptian small farmer depends on growth in domestic demand. Livestock products constitute 16 percent of total consumption expenditure and 30 percent of food expenditure. Dairy products represent about 30 percent of the livestock consumption (Winrock, 1993, p. 93).

Currently, the demand for livestock products is growing at about 4.5 percent per year, assuming an income elasticity of demand of 1.3 (Winrock, 1993) and 4.0 percent growth rate in GDP. Even that accounts for a better growth record in livestock than in agriculture as a whole. With a 6 percent GDP growth rate, domestic demand would grow at 7.2 percent per year.

The smallholder livestock sector now operates at unusually low levels of productivity even for a low-income country. Milk yields are very low, because animals, management, and health are all poor. However, several countries, including India demonstrate the potential for smallholder livestock under conditions similar to those in the Egyptian livestock sector. Some Governates in Egypt, for example, Damietta, have better than average yields in the smallholder sector and demonstrate some of the potential.

To increase its efficiency, the smallholder sector needs to take four steps: (l) the private sector needs help in expanding marketing services (for example, it needs feedmills to serve the smallholder sector, chilling plants for milk collection centers, and small-scale pasteurizing plants), and import restrictions on dairy equipment need to be removed and technical assistance provided; (2) applied on-farm research is needed to establish the best breeding management and feeding practices for small farmers, and that information needs to be fed out through on-farm research as well as through private sector operatives; (3) private veterinary services need to be encouraged with technical assistance, public fees for services that belong in the public sector as public goods, and credit for facilities for artificial insemination services (survey data show 85 percent of farmers favor crossing with exotic breeds; Winrock 1993); and (4) the credit system has to be made readily available to small farmers so that they can increase the size of their herds. At present, the smallholder sector is dominated by herds of only one or two animals, but many of those small farmers will gradually increase herd size to 5 or 10 animals. Credit facilities will contribute to that expansion. In addition, restrictions on the access of small farmers to concentrate feeds must be removed. Finally, women now play a major role in the smallholder livestock sector (43 percent of total labor in livestock is provided by women using 71 percent of women's work time (Winrock, 1993). Special attention must be given to making inputs, technical knowledge, and credit available to them and insofar as possible to open up marketing to women.

The demand for feed will soar with accelerated growth in the livestock sector. The use of concentrate feeds will increase disproportionately to the increase in output. At the same time, the cotton priority is likely to eat into both maize and berseem production. It will be important to have a research program on the best feeding practices and to integrate that into programs to increase yields of key feeds. The cotton program will increase the supply of cottonseed meal proportionately with livestock growth. Berseem receives very little attention in the research program; presumably yields could be increased, and perhaps alternative fodder crops could be grown. Regulation of the growing of berseem and related crops in the context of cotton pest control should be carefully reexamined by the research system. Maize yields should be increased with a prominent role to national and international seed firms playing a major role. Even with all those efforts, imports of maize will undoubtedly increase markedly with rapid growth of the domestic livestock industry. That is the case for virtually all fast-growth developing countries.

Since livestock demand is domestically driven, it is more efficient to fill at least the dairy and by-product meat demand with domestic livestock production and imported feed rather than imported livestock products. Note for example, the extremely high DRC for local cattle with berseem grown for fodder (Table 31). However, the DRC, even with particularly low productivity, for buffalo is 0.9 and it is 0.7 for exotic cattle.

Table 31: Competitiveness of Livestock Products, early 1990s

Animal	FNR# per animal	ENR# per animal	VA# per animal	Domestic Resource Cost	Domestic Resource Cost Berseem*
Cattle, Exotic	613.5	214.1	864.1	0.8	0.7
Cattle, Baladi	-201.8	-380.8	-105.8	na	6.5
Cattle, Buffalo	317.6	-9.9	540.1	1.0	0.9
Poultry, Home	0.7	0.2	5.2	1.0	na
Poultry, Comm	0.6	-0.2	10.3	1.0	na

FNR=Financial Net Revenue; ENR=Economic Net Revenue; VA=Value Added.

* DRC where farmer grows the berseem, rather than buys it as a marketed input.

Source: World Bank (1993).

Table 32: Percentage of Area under Selected Crops: Fresno, Imperial, and Kern Counties, California, Punjab, Pakistan, 1987, and Egypt, 1990

Crop	California			Punjab, Pakistan	Egypt
	Fresno	Imperial	Kern		
Total cropland (millions of ha)	0.404	0.164	0.298	5.6	5.1
Wheat	4	15	4	39	17
Cotton	30	5	37	13	11
Hay/fodder[a]	9	49	13	14	17
Vegetables and orchards	49	22	35	3	18
Other	9	9	11	31	37
Total	**100**	**100**	**100**	**100**	**100**

[a] Hay includes alfalfa, other tame grasses, small grass silage, green chop, and others.

Source: U.S. Department of commerce, Bureau of Census, 1987. Bureau of the Census and Government of Pakistan, 1990–91.

Questions may arise about the suitability of Egypt's climate for dairy animals and of using its highly productive resources for feed crops. As to climate, Southern California, India, and Pakistan all have highly profitable dairy enterprises in similar climates. The scope for management through shade provision and sprays should be developed, as it was in similar climates. In the short run, Egypt will no doubt stick with relatively heat-tolerant animals, but in the long run the more productive animals will prove to be manageable in Egypt's climate. As to crop comparative advantage, again, the Imperial valley of California is a heavy producer of alfalfa (49 percent of area, Table 32). India and Pakistan find a comparative advantage in berseem in similar climatic and irrigation regimes (14 percent of area).

CEREALS (WHEAT, MAIZE, RICE)

Cereals occupy over 40 percent of the cropped area and 23 percent of the value of agricultural output. They are important to food security as discussed in the next section of this report. They represent a lower intensity of land use than the other priorities, suggesting that area in cereals might generally not expand. However, there is probably considerable remaining potential to increase yields.

Wheat has a potential to increase area particularly if shorter season cotton varieties can be developed, as well as research-based potentials to increase yields, many has substantial yield potentials and relates well to the livestock priority. Although rice area must decline in favor of cotton, current high yield levels need to be maintained and gradually raised through effective research.

The focus of the strategy with respect to cereals is on the research/extension system to generate yield increase and to let the market operate in allocating area.

FOOD SECURITY

FOOD SECURITY IS IMPORTANT TO EGYPT. An important effect of the reforms has been the large increase in rice and wheat production and a decline in imports (Table 35). A strategy for achieving high agricultural growth necessarily increases the area in high-value crops at the relative expense of cereals. However, the addition of new lands allows the cereals area to be maintained, and with a high growth rate in yields, production growth will exceed consumption growth. Even though the Egyptian yields are high compared with other country averages, they are not high compared with countries with comparable resources (Table 40). Thus yields could achieve a 2.7 percent rate of growth.

The market will determine how yield growth and area are distributed among the three main cereal crops: rice, wheat, and maize. The rice area might decline by as much as one-third since it is a very heavy water user, but it is also grown on some very heavy and saline soils. It is estimated that about one million feddan out of the total rice area of 1.3 million feddan are on heavy and saline soils. In that case, rice exports may cease or even turn marginally to imports. Once Egypt turns to imports, import parity price will rule and discourage any further drop in production. All these trends need to be carefully watched to guide the research system. However, policy instruments must guard against forcing area into cereals. Because of food security concerns, some attention will focus on cereal production and the covering strategy must examine the impact on food security. However, food security is not merely a matter of increasing production and availability. It is a complex concept that is widely misunderstood. The concept of food security can best be explained in terms of the conceptual framework presented in Figure 3.

As this diagram shows, food security consists of three elements: availability, access, and use. It is important to understand that availability alone does not imply food security. Food availability has both spatial and temporal aspects that affect food access. Another factor critical to security is new technology, which helps sustain food production both in terms of quantity and quality. International trade, both inter- and intra-regional, can improve food availability, and in times of distress food aid has an important short-term role to play. The increasing awareness of micronutrients and their importance for human well-being has brought attention to the crucial role of micronutrient and food quality.

Economic access to food and the human body's ability to turn this food into good nutrition are further conditions of food security. While access to food relates to the ability to purchase food and/or consume food from own production, physiological access relates to the body's ability to use the food for good physical and cognitive achievement. This latter condition is dependent on a host of nonfood inputs into nutrition. The whole concept is made more complex by the interplay of a host of intrahousehold and gender-related factors that affect the entire range from food availability to food use.

Figure 3: Food Security: The Concept

FOOD SECURITY		
FOOD AVAILABILITY	FOOD ACCESS	FOOD USE
Enhance spatial and temporal access to food	Enhance economic access to food	Enhance physiological access to food
• Develop and adopt new technology for sustainable food production (quantity and quality)	• Enhance and protect ability to purchase food and/or consume food from own production	• Enhance ability of body to use food for good physical and cognitive achievement
FOOD SECURITY		

Source: Malik and Islam (1995).

FOOD AVAILABILITY IN EGYPT

Egypt has traditionally had high levels of per capita food availability for a country at its level of development. The per capita availability per day has been in excess of 3,000 calories. In 1991, the last year for which data were available to this team, the per capita per day availability was more than 3,700 calories. Considering the FAO-recommended norm of 2,440 calories per capita per day, this implies availability of about 152 percent in relation to the requirement. Most of these calories come from plant sources, and over 70 percent from cereals. Given the fact that poverty based on calorie-expenditure functions in Egypt is high, a fairly large proportion of the population seems to be acquiring less than the recommended intake levels. The extremely high average availability implies that a large proportion of the availability is either being fed to animals or going to waste. It is also possible, but less likely, that some proportion is smuggled across the border. Of the total availability of calories, animal products account for only 5.7 percent of the energy supply. The Food Balance Sheet for 1991 that relates to cereals reveals that of the total availability of 8,874,000 metric tons of wheat, only 4,375,000 tons were produced locally; the rest was imported. Similarly 733,000 metric tons of wheat flour and 1,297,000 tons of maize were also imported during this year. A large proportion of maize is fed to livestock. Further research obviously needs to be devoted to the whole issue of the extremely high per capita availability in the face of the high levels of calorie-based poverty. Data on these concerns are presented in Tables 33, 34, and 35.

Table 33: Trends of Per Capita Food Availability in Egypt, 1970–91

Year	*Total calories-Kcal Dietary energy supply-DES*	*Total protein - grams*	*Animal protein*	*Plant protein*	*Total fat*	*Animal fat*	*Plant fat*
1970	2,891	82.00	10.70	71.30	47.10	11.00	36.10
1974	3,142	87.20	10.80	76.40	53.20	11.80	41.40
1975	3,394	93.40	11.00	82.40	61.30	12.30	49.00
1976	3,340	91.90	12.50	79.40	61.00	14.10	46.90
1977	3,360	91.70	11.90	79.80	61.50	13.90	47.60
1978	3,052	94.40	13.30	81.60	65.40	14.10	51.30
1979	3,343	91.50	11.50	80.00	59.80	13.80	46.00
1980	3,386	95.50	14.50	81.00	56.00	15.50	40.50
1981	3,774	106.70	15.50	91.20	64.30	16.00	48.30
1982	3,562	98.20	14.00	84.20	62.50	15.10	47.40
1983	3,521	98.40	15.10	83.30	62.20	15.70	46.50
1984	3,599	102.30	13.60	88.70	54.40	14.50	39.90
1985	3,745	103.00	13.90	89.10	70.30	13.70	56.60
1986	3,501	90.60	14.00	76.60	78.20	13.70	64.50
1991	3,700	106.90	16.30	90.60	54.40	41.30	63.10

Source: Developed from Serial Food Balance Sheet of Egypt, Ministry of Agriculture. various issues.

Yield growth in the major Egyptian crops has been remarkable since the early 1980s. In 31 of the 32 major crops, Egyptian yields exceeded world averages and for 2 crops yields were the highest in the world. For several other crops, Egyptian yields were ranked second or third in the world (Tropical Research and Development, 1994). According to the TRD report, the food gap that was expected to increase rapidly following a 1981 study is actually showing signs of closing.[4] In fact, the gap projected to the year 2000, according to the situation in 1994, was only 17 percent of the gap projected for that year based on the situation in 1981. This is due to the sharp increase in production, especially since 1985, and a noticeable slowing down in the rate of increase in food utilization. Wheat production in Egypt has increased more since 1987 than in all of Egypt's history prior to this date. However, the data presented in Tables 33 and 34 indicate a heavy reliance on cereals in the Egyptian diet. As sectoral growth rates demonstrate, animal-based agriculture in Egypt has not been performing adequately. That is why more effort needs to be put into diversifying agriculture that is based on higher value added crops and activities. This is important also from the point of view of increasing people's access to the available food through increased incomes.

[4] The study also makes an important point i.e. that Egypt should not be expected to fully close the food gap but that it should concentrate on becoming self reliant or economically self-sufficient in food production.

Table 34: Contribution of Different Food Groups to Energy Supply, 1975–91
(percent)

Contributing Food Groups		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1991
Vegetable products														
Cereals		70.90	60.10	70.00	69.20	72.90	70.00	70.80	68.90	69.30	72.70	68.30	61.60	70.70
Legumes		4.10	4.40	4.00	3.40	3.30	3.70	3.60	3.60	3.20	3.60	3.70	3.60	1.83
Sugar and sweets		6.50	7.30	7.20	8.10	6.90	7.60	7.50	8.80	7.80	7.40	7.20	11.60	7.91
Vegetables		2.30	2.30	2.30	2.30	2.30	2.70	2.20	2.20	2.40	2.30	2.60	2.80	3.08
Fruits		2.80	2.90	2.90	2.50	2.70	3.10	2.70	3.00	3.10	2.90	2.90	3.70	3.97
Oil		8.00	7.60	7.50	8.10	6.20	5.90	6.60	7.30	7.30	5.20	9.30	10.90	4.45
Animal products														
Meat		1.10	1.20	1.20	1.10	1.00	1.20	1.20	1.20	1.00	1.00	1.00	1.40	1.93
Poultry	0.30	0.30	0.40	0.30	0.30	0.50	0.60	0.30	0.50	0.40	0.60	0.50	0.32	
Fish		0.20	0.30	0.30	0.30	0.20	0.30	0.30	0.30	0.30	0.80	0.30	0.30	0.46
Eggs		0.20	0.20	0.20	0.30	0.20	0.20	0.20	0.30	0.30	0.30	0.40	0.50	0.32
Milk and milk products		3.60	4.40	4.00	4.40	4.00	4.80	4.40	4.10	4.50	3.30	3.20	3.00	3.00
Percentage contribution of total animal products to "DES"		5.40	6.40	6.10	6.40	5.70	7.00	6.60	6.30	6.90	5.90	6.00	5.70	5.71

Source: Developed from Food Balance Sheets of Egypt (Ministry of Agriculture, 1991).

Table 35: Food Balance Sheet, Total and Distribution, 1991
(1000 metric tons)

	Total					*Distribution*						
	Production	*Import*	*Store*	*Export*	*Available*	*Animal Feed*	*Seed*	*Industry*	*Loss*	*For Human Consumption*	*Extraction Rate %*	*Edible portion*
Gross total												33035
Veg.sources												29032
Anim.sources												4003
Cereals												14902
Wheat	4376	4456	43	-	8874	-	166	-	355	8353	76.7	6407
Wheat flour	-	733	172	-	905	-	-	-	-	905	-	905
Wheat bran	1946	-	-	-	1946	1252	-	-	283	411	-	411
Barley	120	-	-	-	120	80	9	-	7	24	75.0	18
Maize	5122	1297	430	-	6376	1424	62	105	159	4626	94.6	4376
Sorghum	676	-	-	-	676	34	3	-	30	609	92.0	560
Rice	3448	-	120	98	3338	-	66	38	69	3165	70.3	2225

Table 35 (continued): Food Balance Sheet, per capita, 1991

	Annual	Per Day			
	Kg	Grams	Calories	Protein(gram)	Fat(gram)
Gross total	604.1	1654.4	3700	106.9	54.4
Veg.sources	530.9	1454.1	3496	90.6	41.2
Anim.sources	73.2	200.3	204	16.3	13.1
Cereals	272.4	746.2	2616	76.8	17.3
Wheat	117.2	321.1	1124	37.6	4.8
Wheat flour	16.5	45.2	160	5.2	1.0
Wheat bran	7.5	20.5	69	2.6	0.7
Barley	0.3	0.8	3	-	-
Maize	80.0	219.2	769	20.6	9.2
Sorghum	10.2	27.9	96	2.8	0.9
Rice	40.7	111.5	395	8.0	0.7

Source: Ministry of Agriculture, Department of Economic Affairs

ACCESS TO FOOD

The higher value added crops would put greater incomes in the hands of the Egyptian farmers and thus increase their access to the available food. This access would help to stem the growing poverty trends. Three nationally representative household surveys from 1974/75, 1982/83, and 1990/91 (see Table 36) indicate that poverty declined between 1974/75 and 1981/82 but by 1990/91 had increased from the levels in 1981/82. It seems that despite the high levels of per capita availability of food, nearly 38 percent of the urban population and over 25 percent of the rural population were below the poverty line in 1990/91, as indicated by the PO or head count values. The poverty gap (P1) is also larger in the urban areas than in the rural ones. The same pattern is true of the intensity of poverty measure (P2), which assigns a proportionately higher value to the poorest sections of society. An important aspect of the Egyptian poverty is its concentration in the Governorates of Upper Egypt, especially Minia, Sohag, and Assuit.

Table 36: Poverty Indices over Time, 1974/75–1990/91

	1974/75		*1981/82*		*1990/91*	
	Urban	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*
P0	39.72	28.60	34.32	22.07	37.59	25.34
P1	10.94	6.70	6.78	4.89	10.13	5.05
P2	4.36	2.43	3.56	1.83	3.73	1.49

Source: El Laithy (1994) calculated from the Family Budget Surveys of 1974-75 and 1981/82 and Income and Expenditure Survey of 1990/91, CAPMAS.

This can be seen from Tables 36 and 37. Not only is poverty measured in terms of the private expenditures criteria heavily concentrated in these Governorates, but also by the significantly lower levels of "public incomes" in these regions (see Ali et al., 1994). These "public incomes" greatly affect people's access to the nonfood inputs such as education, adequate sanitation, hygiene, and health care required to ensure nutritional security.

A significant proportion of the Egyptian population is urban. The urban population relies on employment for its livelihood. Government is the largest employer in the country. However, real wages in Egypt for government employees declined in 1992 to half those in 1973. In order to compensate for the declining real wages the government has been heavily subsidizing the supply of food. Food subsidies as a percentage of government expenditures —which had declined to about 2.5 percent in 1987/88—had risen to nearly 10 percent in 1991/92. The bulk of this subsidy goes for wheat and flour, followed by sugar and edible oils. The data for the food subsidies are presented in Table 38. Calculations based on the

CAPMAS Household Income Expenditure surveys for 1981/82 and 1990/91 indicate that the poorest expenditure groups do utilize a larger proportion of the subsidy. The poorest categories in the urban sector utilize a significantly higher proportion and this proportion has increased considerably over time for the lower expenditure categories especially in the urban sector. This can be seen in Table 38. Increasing incomes of the poor would reduce the burden of this subsidy on the Government. The shift to more employment-intensive activities in agriculture would be an important step in this direction.

In the interim, it is important to keep the subsidy on the essential food items. However, the across-the-board subsidy should be replaced with one that is targeted to the poorest members of society. The geographical concentration of poverty in Egypt presented in Table 5 can provide an effective targeting mechanism.

FOOD SECURITY IMPLICATIONS OF THE PRIORITIES FOR AGRICULTURAL GROWTH

The proposed high growth strategy emphasizes employment-intensive crops and activities. Each of the three priorities chosen in this strategy will increase incomes directly through increased employment and higher returns and indirectly through the multiplier effects that will be stimulated. Moreover, the emphasis on smallholder dairy will lead to the increased employment of women. Putting additional incomes in the hands of women will lead to improved caring facilities and hence to better nutrition of children and women both of which are vulnerable elements in society. The high growth rates projected in this strategy imply that the essential cereals will continue to grow faster than human consumption. Additional growth will come from the high value added cotton, horticultural crops, and small holder dairy. The increased acreage under cotton is expected to affect the area under rice. However, since total area in cereals is not expected to decline, the area under wheat and maize should increase. The favorable effects of the strategy on food security are important and work both through the increased employment and incomes as well as through the much needed diversification in the food availability.

Table 37: Contribution to National Poverty by governorate, 1981/82 and 1990/91 (percent)

	Urban 1981/82			*Rural 1981/82*			*Urban 1990/91*			*Rural 1990/91*		
	P0	*P1*	*P2*	*P0*	*P1*	*P2*	*P0*	*P1*	*P2*	*P0*	*P1*	*P2*
Cairo		22.48	21.48	20.78				35.17	36.61	38.83		
Alexandria	15.16	14.72	14.32				14.05	16.73	19.90			
Port Said	1.06	0.99	0.94				05.55	0.48	0.45			
Suez		1.72	1.56	1.46				1.63	1.63	1.46		
Urban												
Governorates	40.41	38.75	37.50				35.17	36.61	38.83			
Damitta	0.57	0.57	0.69	0.11	0.17	0.29	0.39	0.26	0.17	0.22	0.14	0.08
Dakhlia	4.34	4.45	4.62	6.64	6.17	6.77	3.20	2.46	1.93	4.44	2.70	1.77
Sharkia	4.63	5.24	5.51	8.28	7.42	6.73	2.79	2.22	1.81	9.21	7.29	6.43
Qalubia	5.51	4.99	4.80	9.03	8.90	7.70	7.60	6.97	6.28	1.36	0.81	0.47
Kafr Elsheikh	1.35	1.24	1.29	1.98	1.89	1.68	2.55	2.51	2.41	3.75	3.05	2.81
Garbia		5.13	5.31	5.40	3.91	3.91	3.73	3.44	3.04	3.02	1.43	0.48
Menofia	1.97	2.19	2.31	6.80	7.29	7.75	3.67	3.54	3.19	3.92	3.21	2.48
Behera		1.83	2.06	2.40	1.67	1.68	1.76	5.95	6.65	7.22	10.48	10.20
Ismailia	0.41	0.70	1.06	0.37	0.21	0.08	0.32	0.25	0.18	0.00	0.00	0.00
Lower Egypt	25.74	26.75	28.07	38.79	33.87	33.42	29.91	27.90	26.31	34.79	27.89	24.69
Giza		8.36	8.15	7.99	1.11	1.26	1.24	8.01	7.35	6.79	3.54	3.15
Beni-Suef	2.95	3.52	3.81	8.97	19.44	18.60	2.18	2.07	1.93	5.57	5.53	5.13
Fayoum		4.24	4.80	5.23	7.67	9.12	14.78	2.84	3.57	4.10	7.06	9.33
Menia		4.31	4.76	4.85	12.05	22.69	20.36	3.86	3.98	4.04	17.35	18.90
Assuit		3.91	4.05	4.09	12.89	14.31	13.61	5.48	6.56	7.42	12.96	17.14
Sohag		3.99	3.80	3.42	8.78	7.43	6.01	5.01	5.13	4.97	9.78	10.50
Qena		1.55	1.76	1.93	5.33	5.10	4.99	4.17	4.05	3.88	5.49	5.13
Aswan		1.12	0.88	0.81	2.86	2.67	2.96	2.32	1.98	1.61	0.94	0.51
Upper Egypt	30.73	31.73	32.13	59.66	71.76	72.47	33.88	34.70	34.23	62.69	70.19	47.07
1Frontier	3.41	2.77	2.30				1.04	0.79	0.64	2.52	1.93	1.24
1Total	**-**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Note: 1981/92 the Rural poverty line was LE 125.34.
iii: In 1990/91 the Urban poverty line was LE 697.45.
Iv: In 1990/91 the Rural poverty line was LE 437.62.

Table 38: Direct food subsidies, 1970–92

Year	*Wheat and Flour*	*Maize*	*Edible Oils*	*Sugar*
		(£E million)		
1970/71	20.9	0.8	10.4	8.0
1972	15.1	0.4	15.8	6.0
1973	79.0	4.4	16.8	19.0
1974	216.4	16.5	55.3	68.9
1975	260.9	31.1	72.2	20.8
1976	171.6	23.1	43.2	6.1
1977	149.1	406.0	54.6	n.a.
1978	222.8	53.8	137.4	n.a.
1979	588.3	38.5	20.2	n.a.
1980/81	901.2	111.2	235.0	211.0
1981/82	807.1	160.1	259.7	169.3
1982/83	758.0	299.1	201.5	133.7
1983/84	861.5	294.1	337.5	119.5
1984/85	614.7	264.0	395.3	134.3
1985/86	448.7	310.3	331.5	195.7
1986/87	289.8	136.1	263.6	258.5
1987/88	235.6	8.7	7.8	341.8
1988/89	543.3	n.a.	243.5	470.4
1989/90	615.4	n.a.	245.2	643.8
1990/91	677.0	-	287.0	698.0
1991/92	1,057.0	-	629.0	991.0

Source: von Braun et al. (1982); Rizk (1992).

Table 39: Proportion of Subsidy in Food Items Purchased by Expenditure Quartiles, 1981/82 and 1990/91 (Egyptian Pounds)

	Urban Expenditure Quartiles					*Rural Expenditure Quartiles*				
	0.25	0.50	0.75	1.00	All	0.25	0.50	0.75	1.00	All
1990/91										
Expend.at mkt.price	134.47	157.02	162.56	165.20	154.61	33.24	36.02	37.39	33.29	36.42
Actually paid										
Subsidy	54.85	64.40	66.97	69.76	63.75	14.04	15.34	15.69	14.84	15.48
Total expend.	79.62	92.62	95.59	95.44	90.87	19.20	20.68	21.69	18.44	20.93
Subsidy/exp(%)	473.93	728.14	1009.40	2048.07	1064.05	419.21	514.43	711.15	1159.75	707.09
1981/82	16.80	12.72	9.47	4.66	8.54	4.58	4.02	3.05	1.59	2.96
Expenditure at										
market prices	25.26	29.20	30.11	31.43	28.86	8.40	8.94	9.12	8.82	9.01
Actually paid										
Subsidy	11.13	13.27	13.81	14.86	13.18	2.80	3.05	3.19	3.12	3.14
Total expend.	14.13	15.93	16.30	16.56	15.68	5.60	5.89	5.93	5.70	5.88
Subsidy/exp(%)	173.80	304.00	457.87	991.62	435.56	112.45	181.23	264.73	522.94	251.28
	8.13	5.24	3.56	1.67	3.60	4.98	3.25	2.24	1.09	2.34

Source: El Laithy(1994)

Table 40: Comparative Average Yields of Major Crops in Egypt and Selected Countries, 1979–90

Crop/Country	1979-81	1988	1989	1990
Wheat				
Egypt	3,192	4,751	4,941	5,209
Morocco	894	1,735	1,493	1,365
China	2,047	2,968	3,043	3,179
Turkey	1,852	2,186	1,758	2,120
*Netherland	6,280	7,227	7,598	7,716
Corn				
Egypt	3,947	4,965	5,380	5,301
Morocco	602	903	993	1,160
China	3,038	3,928	3,879	4,142
Turkey	2,168	4,014	3,929	4,000
USA	6,474	5,311	7,300	7,434
*Netherland	12,912	23,811	25,714	25,714
Rice (Paddy)				
* Egypt	5,707	6,064	6,488	7,288
Morocco	3,937	4,451	6,300	4,125
China	4,244	5,281	5,500	5,728
Turkey	4,706	5,150	5,000	4,700
Potatoes				
Egypt	17,399	37,247	22,413	20,946
Morocco	14,167	20,424	16,706	16,923
China	10,888	11,518	11,067	11,588
Turkey	16,681	22,397	21,711	21,622
*Netherland	37,752	41,974	41,532	40,206
Seed Cotton				
Egypt	2,646	2,071	1,921	2,296
Morocco	1,623	2,232	2,646	1,288
China	1,613	2,251	2,186	2,395
Turkey	1,967	2,284	2,098	2,418
*Israel	3,547	3,437	3,488	3,848
Tomatoes				
Egypt	12,247	24,942	23,238	24,571
Morocco	40,657	33,814	32,588	32,982
China	14,254	15,881	15,831	16,089
Turkey	32,941	37,500	38,333	39,000
USA	42,629	49,753	54,720	55,577
*Netherland (greenhouse)	155,236	333,529	365,176	361,111
Cucumber				
Egypt	15,792	16,604	15,847	16,216
Morocco	-	-	-	-
China	12,412	15,846	16,054	16,292
Turkey	15,968	17,391	17,391	18,826
*Denmark (greenhouse)	117,892	384,615	384,615	384,615
Grapes				
Egypt	11,782	11,945	12,938	11,600
Morocco	4,033	4,209	5,539	4,659
China	5,046	5,827	6,794	6,671
Turkey	4,378	5,678	5,745	5,700
India	19,135	20,741	20,929	21,189
*Netherland (greenhouse)	24,474	28,571	28,571	28,571
Sugar Cane				
Egypt	82,996	95,887	97,065	94,737
Morocco	83,563	73,020	64,537	73,057
China	54,170	56,118	54,003	59,897
Turkey	-	-	-	-
*Zimbabwe	103,775	100,423	116,839	115,323
Onions				
Egypt	33,158	26,480	17,451	21,154
Morocco	11,991	17,964	18,023	18,286
China	12,522	15,256	15,758	15,853
Turkey	14,247	17,936	17,215	19,620
*Korea Rep.	34,597	47,459	54,026	50,875

* Country with highest average yield in 1990. Source: FAO Yearbook, Production, Vol 44, 1990.

FERTILIZER IN AGRICULTURAL STRATEGY

THE CONTEXT

AMONG DEVELOPING COUNTRIES, EGYPT HAS A LONG history of using chemical fertilizer. The first use of Chilean nitrate dates back to 1902 and even domestic production of single superphosphate began as early as 1936 (El-Fouly, 1993). In fact, until 1950s Egypt was the only developing country with more than 10 kgs/ha of fertilizer consumption (Lamer, 1957). By the early 1990s, this had reached about 350 kgs of nutrients per hectare of agricultural land—a level higher than in virtually all developing as well as developed countries (Table 41). And this, in turn, has placed Egypt among the top 5 to 10 countries of the world in per hectare yields of major crops (Table 42). Also, more than 90 percent of total fertilizer supply in recent years has come from domestic fertilizer plants. All these facts are emphasized to point out that Egypt is not a typical developing country with the usual formidable problems of either raising the level of fertilizer application, or enlarging aggregate fertilizer supply.

At the same time, the above facts are somewhat misleading as an indicator of the stage of development and sophistication in Egypt's fertilizer sector. At high rates of application, raising economic efficiency and ensuring environmental soundness of fertilizer use are obviously an absolute must for sustainable growth in agricultural production. This depends not only on removing fertilizer subsidies to prevent excessive use but also on raising the sophistication in fertilizer systems—on all demand, supply, and technical support sides. Here, Egypt presents the paradox of a very high level of fertilizer use and relatively poor development of systems that are crucial in raising economic efficiency and ensuring environmental soundness of fertilizer use. This is clear from several features of the fertilizer scene: deficiencies in farmers' fertilizer practices such as imbalanced application of different nutrients, high levels of nitrates in water, limited range and low nutrient content of fertilizers available to farmers, lopsided emphasis on nitrogenous fertilizers in supply and distribution systems, inadequacy of soil-testing laboratories, and poor quality of extension services.

Clearly, all these aspects bear heavily on both efficiency and the environmental impact of fertilizer use, especially because the use has already reached a very high level. A scrutiny of Table 42 indicates that many countries have attained yields comparable to Egypt with lower levels of fertilizer use. Furthermore, some of these may not be using as much organic manure as Egypt. All this suggests that inadequate application of plant nutrients is not the most binding constraint to growth in per hectare yields of crops. We consider raising efficiency of use to be the single most important fertilizer-related challenge for the sustainability of future agricultural growth—from both an economic and environmental view.

Table 41: Level of Fertilizer Use in Egypt and Some Other Countries, 1991 and 1979

	Agri. Land Fertilizer Rate 1991	&PC Land Fertilizer Rate 1991	Agri. Land Fertilizer Rate 1979	&PC Land Fertilizer Rate 1979	Agri. Land Change in Fert.Rt. '79-'9	&PC Land Change in Fert.Rt. '79-'9
	kilograms per hectare					
Egypt	349	349	212	212	137	137
S.Korea	437	456	376	384	61	72
Japan	341	390	428	478	-87	-88
Netherlands	266	574	341	805	-75	-231
Belgium	246	462	293	540	-47	-78
Denmark	210	227	239	263	-29	-36
Norway	198	225	284	320	-86	-95
France	183	289	185	312	-2	-23
Israel	180	239	69	206	111	33
Germany	173	249	277	402	-104	-153
U.K.	118	318	121	324	-3	-6
Italy	118	166	134	189	-16	-23
Ireland	116	706	102	606	14	100
Switzerland	104	353	91	465	13	-112
Yugoslavia	99	151	61	110	38	41
Austria	85	197	110	248	-25	-51
Pakistan	72	89	42	52	30	37
Greece	70	165	64	149	6	16
India	70	75	28	30	42	45
Spain	62	94	53	82	9	12
Czekoslovakia	61	82	252	335	-191	-253
China	60	308	40	129	20	179
Hungary	58	71	226	281	-168	-210
U.S.A.	44	100	48	111	-4	-11
Turkey	44	64	39	53	5	11
Canada	29	47	27	41	2	6
New Zealand	27	939	38	1212	-11	-273
Syria	22	52	9	21	13	31
Mexico	16	63	12	49	4	14
Morocco	11	34	11	29	0	5

Agr Land is total agricultural land(including permenant pastures)
A&PC Land is total arable and permenant cropped land
Source: FAO Production and Fertilizer Yearbooks, various years.

Table 40: Fertilizer Use and Yields in Selected Countries, 1991-93

	Frt Rt '91/2*		Wheat	Maize	Rice	Cotton	S.cane	Potatoes	Tomatoes
	AgL*	APC*							
	kg/ha		Yield - kg/ha, 1993						
Egypt	349	349	5351	6418	7724	2947	103333	21250	21844
Selected Neighboring Countries									
Morocco	11	34	681	530	5000	1183	61781	15266	39535
Syria	22	52	2618	3175	5000	3244	45000	19800	20789
Turkey	44	64	2189	4545	5017	2507		24219	38438
Israel	180	239	2400	4787		4591		36583	72740
Selected Asian Countries									
India	70	75	2323	1644	2694	861	63810	14619	14839
Pakistan	72	89	1964	1313	2686	1502	43438	12281	
China	60	308	3443	5006	5962	2256	58779	11673	25904
Japan	341	390	3474	2400	4578		71038	31667	52817
S.Korea	437	456	1111	4500	5812	972		20000	38235
Selected European Countries									
Hungary	58	71	3059	3543	2400			13187	20000
Czekoslov.	61	82	4235	4875				23302	19414
Spain	62	94	2457	6191	6285	2753	85000	18741	47525
Yugoslav	99	151	3401	2801				5920	9779
Greece	70	165	2350	9896	7228	2921		20500	45777
Italy	118	166	3479	8288	5752			21141	42859
Austria	85	197	4586	7994				22344	70631
Norway	198	225	5352					24851	286800
Denmark	210	227	6994					32609	315385
France	183	289	6477	8085	4900			35269	68481
Germany	173	249	6466	8273				38322	41975
U.K.	118	318	7250					41460	282202
Switzerland	104	353	6038	9200				48806	92949
Belgium	246	462	6675	8842				41176	
Netherland	266	574	8540	25000				46380	457143
Ireland	116	706	6753					29545	100000
Selected Other Countries									
Canada	29	47	2204	6632				26667	41304
Mexico	16	63	4187	2375	3824	2097	78589	16351	25797
U.S.A.	44	100	2579	6321	6179	1780	72190	35679	54973
NewZealan	27	939	4892	9500				27128	60000

* AgL is total agricultural land, APC is total arable and permenant cropped land. FrtRt'91/2 is fertilizer rate in1991/92

Source: FAO Production and Fertilizer Yearbooks, various years.

This cannot be overemphasized, given fertilizer's agronomic as well as economic importance in yield-based agricultural growth, and the political economy of policies that have to generate growth in agricultural production through higher yields.

Unlike the situation in developed countries, raising the economic efficiency of fertilizer use in Egypt goes beyond price policy reforms. In developed countries, there is a balance between the high level of fertilizer use on farms and technological sophistication in various off-farm systems that support this level. The latter includes not only fertilizer supply and distribution systems but also agricultural research and extension, plus facilities such as soil-testing services. In such an environment, price policy reforms are generally sufficient to address the questions of economic efficiency and environmental concerns at high levels of fertilizer use. This is because the off-farm are capable of offering technically feasible and economically viable solutions to farmers under the new price environment as the experience of developed countries in the last decade reveals. However, when various off-farm systems are underdeveloped, their improvement is just as crucial as price policy reforms for a decisive impact on the efficiency of fertilizer use.

To evaluate the experience of policy reforms objectively and also to identify priorities in the agenda for <u>further</u> policy reforms, it is necessary to ask two questions. First, what accounts for the paradox of the high level of fertilizer use and underdeveloped fertilizer systems? Second, to what extent the policy reforms now under way are tackling the questions of economic efficiency and environmental soundness of fertilizer use? The first question is important to understand the genesis of the strengths and weaknesses of the processes behind the impressive growth in fertilizer use in Egypt that has raised crop yields to world-class levels, as shown in Table 42. This understanding is crucial in objectively evaluating the experience with fertilizer policy reforms.

THE PARADOX: HIGH USE LEVEL AND UNDERDEVELOPED SYSTEMS

Until late 1980s, the growth in Egypt's fertilizer consumption was governed by the modalities of a centrally planned economy rather than by farmers' decisions in response to price signals of a free market. Thus, its pace and pattern were determined by the importance the government attached to fertilizers in achieving the targets of production of different crops, the vigor with which it enlarged total fertilizer supply, and the efficiency of the distribution system it established to implement its allocative decisions.

In contrast to many countries (especially in Africa), Egypt has made determined efforts to rapidly push up fertilizer use—for both food security reasons and also to increase foreign exchange earnings through agricultural exports. This included not just fertilizer subsidies but also investment in public sector fertilizer plants, creation of PBDAC's monopoly in fertilizer imports and handling of domestic fertilizers, and establishment of the credit-linked fertilizer delivery system. It is important to understand that all these institutional mechanisms served Egypt well when the principal concern was to induce <u>all</u> farmers to adopt fertilizer, to

push them to use it on all crops, and to raise its rate of application for a decisive impact on yields of virtually all crops. It cannot be denied that the system accomplished all this. Nor are they mean achievements when compared with the performance of most other developing countries in raising per hectare yields of crops through vigorous growth in fertilizer use.

However, such growth also meant that the supply and distribution systems came into existence as a result of the government's decisions and direct involvement. Furthermore, workings of these supply-side systems as well as actual fertilizer use by farmers were determined by administrative prices and bureaucratic procedures rather than by demand and supply-side forces operating under competitive market pressures. Thus, the high level of fertilizer use, which is comparable to that in developed countries, was achieved without comparable experience of market-oriented fertilizer demand, supply, and distribution systems. In the absence of pressures for cost-effectiveness in all these systems, little attention was given to developing the ethos and activities that emphasize the technical and economic efficiency of fertilizer use (for example, soil-testing facilities, concerns for total factor productivity rather than just high yields in research and extension systems).

POLICY REFORMS: MAJOR ACCOMPLISHMENTS BY 1994

The policy reforms changed the operating environment for fertilizer sector activities in the most fundamental sense until the recent developments in 1995. Before the reforms began in 1989, the total volume of fertilizer use and its geographical pattern as well as distribution among crops were decided by centralized decisions in a command economy. After the reforms, they were the outcome of some four million farmers' decisions on fertilizer use. Furthermore, in the new environment, there were no statutory controls on cropping patterns or marketing of output. The pricing of crops and fertilizers was market-based, and a budgetary fertilizer subsidy was virtually eliminated by 1994/95 (Table 43). Also, farmers had no compulsions to accept a part of the production credit in the form of fertilizers. In spite of all these changes, there was no setback to the number of farmers purchasing fertilizer, or to the total volume of consumption. We do not view the lack of growth in total fertilizer consumption as a sign of weakness on the demand side both because of the prevailing high level of use and also because of the transitional changes in the wake of policy reforms.

Table 43: Budgetary Subsidies on Fertilizers, 1989/90 to 1994/95

Fiscal Year	Million LE
1989/90	176
1990/91	194
1991/92	76
1992/93	33
1993/94	38
1994/95	20

Source: MALR. Vol. 1, 1995.

Similarly, there were fundamental changes on the supply side also. Before the reforms, the micro level supply of fertilizers was an outcome of allocative decisions of the government and the flow of fertilizers in the established credit-linked distribution networks of PBDAC, which was the sole agency handling all fertilizers. After the reforms, the geographical pattern of distribution was determined by a market-oriented fertilizer distribution system in which private dealers and cooperatives virtually replaced PBDAC in three short years (see Table 44).

Table 44: Changes in the Relative Importance of PBDAC, Cooperatives, and Private Dealers as Sources of Fertilizer Supply to Farmers, 1992 to 1994

Survey Period and Source	Urea	AN	SSP
	percent purchased by farmers		
Summer, 1992			
PBDAC & Cooperatives	65	75	76
Private dealers	35	25	24
Winter, 1992/93			
PBDAC & Cooperatives	43	53	46
Private dealers	57	47	54
Summer, 1993			
PBDAC	11	17	13
Cooperatives	28	25	30
Private dealers	61	58	57
Summer, 1994			
PBDAC	8	9	7
Cooperatives	36	30	30
Private dealers	55	61	63

Source: MALR, Vol. 1, 1995.

A few other findings of the surveys carried out by MALR as a part of Tranche VII Monitoring and Verification Report on Performance under the Agricultural Policy Reform Program are also noteworthy. Table 45 shows the farmers' preferred source for fertilizer supply before the developments of 1995. Note that the preference in favor of private dealers has increased over time, but this has been at the cost of PBDAC. Also note that there is no decline in the percentage preferring cooperatives, and that they are preferred by about the same percentage of farmers as private dealers. Thus there was a healthy beginning in developing a competitive distribution system with private dealers and cooperatives. It also meant that PBDAC's ground-level presence in the direct supply of fertilizers to farmers was not all that critical until the 1995 disruption to the aggregate fertilizer supply.

In all four surveys carried out between 1992 and 1994, the major reasons given by farmers for their choice of supplier were (1) concern for availability (either type, or quantity, or timeliness); (2) concern about quality; and (3) availability of credit. Note that despite (3), the preference for PBDAC as a fertilizer retailer had weakened over time. This could be due to a change in PBDAC's own policy to switch from providing of credit in kind to cash credit.

It could also be due to the availability of credit from private dealers, since more than half of the sample dealers (both licensed and unlicensed) reported giving some credit. This also indicates the scope PBDAC has in using dealers in providing farmers with credit to purchase inputs. There was no mention of price among the reasons behind a preference for a supplier. This is consistent with the findings on negligible differences in the prices paid by farmers to private dealers, cooperatives, and PBDAC in both 1993 and 1994.

Table 45: Farmers' Preferred Source for Fertilizer Supply, 1992 to 1994

	PBDAC	Cooperatives	Private Dealers
		percent of respondents	
First Choice			
Summer, 1992	36	40	25
Winter, 1992/93	24	43	32
Summer, 1993	23	39	38
Summer, 1994	17	43	40
Second Choice			
Summer, 1992	31	45	22
Winter, 1992/93	27	45	28
Summer, 1993	28	36	27
Summer, 1994	12	38	36

Source: MALR, Vol. 1. 1995.

Finally, two other findings of the Tranche VII Monitoring surveys are also worth noting: small marketing margins and the lack of evidence of monopolistic or oligopolistic pricing, despite the small number of private distributors procuring fertilizers from factories. All this evidence clearly suggests that the reforms had succeeded in developing a market-oriented competitive distribution system within a relatively short period.

Even though certain aspects of policy reforms like privatization of public sector fertilizer plants were lagging behind, we consider the above transformation of the operating environment quite fundamental. Within a short period of about three years, the reforms virtually replaced the PBDAC-operated fertilizer distribution system which implemented that the centrally planned fertilizer use by a system by a market-oriented system in which decisions on fertilizer use were taken by farmers, and fertilizer distribution was handled by private dealers and cooperatives. And, as pointed out above, farmers were satisfied with the new system. This is indeed a remarkable achievement when compared with the experience of many developing countries with fertilizer policy reforms.

This achievement is also a crucial building block to pursue the priorities in agricultural strategy we are proposing. This is because the pertinent issue concerning fertilizer use in Egypt is not further increases in the rates of application for continuous growth in crop yields. The prevailing rates are already very high (Tables 41 and 42). At such levels, indiscriminate increase in rates is not the way to further improve yields. Quite the contrary. What is

critically needed is to maximize technical and economic efficiency in fertilizer use to safeguard the environment and increase total factor productivity in agriculture. Clearly, this can be achieved only in a decentralized, market-based, operating environment that emphasizes economic calculations in fertilizer-related activities. Viewed thus, by 1994 the policy reforms had laid the foundations of a decentralized fertilizer system that is far more appropriate to deal with issues at high rates of application than the centrally controlled system that prevailed before the reforms.

DEVELOPMENTS IN 1995 AND SETBACK TO REFORMS

There has been a setback to fertilizer policy reforms in 1995. All available evidence points out that this has been due to disruption to aggregate fertilizer supply. This, in turn, was due to sizeable export of urea and ammonium nitrate by domestic plants (all in public sector) during late 1994-early 1995 to take advantage of very favorable world fertilizer prices. (For a brief account of these events, see the Tranche VII Monitoring and Verification Report, Vol. II, annex VI, pp. 34–38). In the wake of reports on fertilizer shortages, the factories were asked by the Minister of Public Enterprises in February to withhold deliveries of any fertilizer to private distributors. This disrupted fertilizer flows in the distribution networks at the time of top dressing on wheat. The resulting hardships to farmers further aggravated the typical political economy problems with fertilizer policy reforms. Eventually they brought back PBDAC in the fertilizer distribution system. We understand that this arrangement is only until mid-1996. However, the long-term implications of this development are unclear and there is an atmosphere of uncertainty in the minds of private dealers interested in the fertilizer sector activities.

STRATEGIC ISSUES AND PRIORITIES

Here we are guided by the most important requirement regarding fertilizer use in future agricultural growth of Egypt: how to raise economic efficiency and ensure environmental soundness of fertilizer use. From this perspective, what was accomplished even before the 1995 setback is a necessary, but not a sufficient, step in fertilizer policy reforms. This is because continuous improvements in the efficiency of fertilizer use depends not only the right set of price signals to farmers but also two other factors. The first is a research-based agricultural extension system. It is needed to provide location-specific technical guidance on fertilizer use to farmers. Obviously, without such guidance even rational farmers cannot be expected to implement optimal fertilizer practices. Second, supply and distribution systems must be adequately developed to provide farmers with the types of fertilizers, micro-nutrients, and trace materials recommended by the extension system.

Both these systems are woefully underdeveloped in Egypt. Their rapid development is absolutely crucial because further growth in physical volume of production must be cost-effective to raise farmers' incomes as well as to succeed in export markets. Although fertilizer is but one input, raising the efficiency of its use is a sure and concrete step towards ensuring the cost-effectiveness of agricultural growth. This is because of fertilizer's importance in the cost structure. Also because of its high visibility, the emphasis on efficiency of fertilizer use will have a favorable impact on cost-consciousness in agricultural policies.

We recommend a three-pronged strategy for rapid progress in the above directions: (1) a public mechanism should be employed to prevent major disruptions in aggregate fertilizer supply; (2) a research-based extension system should be developed with a strong mandate to raise the technical and economic efficiency of fertilizer use; and (3) reforms should be expedited in the domestic fertilizer industry and distribution systems that are crucial to enhance its capability for a sophisticated role.

Public Mechanism to Prevent Major Disruptions in Aggregate Fertilizer Supply

After carefully weighing all considerations, we have come to the conclusion that such a mechanism is just as necessary as the other two elements of the strategy. A public mechanism to prevent disruptions in aggregate fertilizer supply does not run counter to the goal of developing a market-oriented, truly competitive, fertilizer sector. In fact, it is fully consistent with the experience of many developing countries.

The real success of policy reforms in Egypt lies in accelerating agricultural growth with maximum economic efficiency. Two steps must be taken to ensure this in the case of fertilizers: the right kind of price signals must be sent to farmers, and the emphasis should be on the expeditious development of the off-farm support systems mentioned above. For rapid progress in these matters, it is absolutely essential to have mechanisms that can prevent disruptions in aggregate fertilizer supply from having an adverse impact on (1) agricultural production, (2) the smooth flow of fertilizers in the multi-agency distribution networks that had come into existence and gained credibility with farmers by 1994, and (3) the government's faith in and commitment to fertilizer policy reforms.

Because fertilizer is highly visible and also universally used by farmers, even the perception of a fertilizer shortage would have powerful negative effects. Such perceptions invariably generate needless controversies on the merits of policy reforms. Furthermore, they distract policy-makers, administrators, and commercial interests in fertilizer systems from the more complex tasks in implementing the policy reforms. This is an all-too-common pattern in developing countries. Egypt is no exception, as is clear from the experience of early 1995 described above, and from its persistent influence on policy-oriented thinking in different circles.

Hence, it is essential to establish a public mechanism to prevent any disruptions in the supply of fertilizer. The case is further strengthened by vagaries in the world fertilizer market and time lags in augmenting the supply even through imports. The objective should be to

prevent destabilization in the aggregate supply of major nutrients (nitrogen, phosphorus and potash), and not specific products (like urea and ammonium nitrate). Also, the mechanism should be confined to releasing fertilizer supply only to those involved in fertilizer distribution. In other words, it is not meant as an additional direct supply line to farmers. The multi-agency system that has come into existence is both competitive and competent in handling the flows of fertilizers in the distribution networks. This is clear from the experience of 1992, 1993 and 1994. Furthermore, the system encompasses both private dealers and cooperatives. To ensure healthy competition between them, it is absolutely essential to prevent disruptions to aggregate supply of fertilizer. When supply in the developing world is disrupted, for whatever reason, governments tend to intervene in fertilizer distribution, usually in favor of cooperatives or public distribution agencies. This is because of fertilizer's importance in both agricultural production and the political economy. Therefore, prevention of disruption to aggregate fertilizer supply is needed to avoid setbacks to policy reforms aiming at establishing market-oriented competitive fertilizer distribution system.

A subsidiary unit under PBDAC may be suited for the above purpose. This is because of PBDAC's experience in fertilizer imports, and also in macro planning and management of fertilizer distribution. Furthermore, PBDAC has the physical infrastructure for the buffer stocks of fertilizers and could be expected to manage the working capital implications of the scheme with professional competence. The role of PBDAC envisaged here is fundamentally different from its historical role when it monopolized the management of aggregate fertilizer supply as well as its distribution. It is also different from the present situation when it is involved in direct sale of fertilizers to farmers. In the mechanism we are recommending, there is no direct sale to farmers by the public agency responsible for running the buffer stock scheme. All its sales are to private dealers and cooperatives only.

A public mechanism on the above lines will have a far-reaching positive impact in two other ways. First, it will force policy makers to focus on the real challenges in agricultural growth and fertilizer use. Second, it will speed up the development of a competitive distribution system, since there would be no periodic and arbitrary government interventions to deal with either real fertilizer shortages or political difficulties. In fact, the program of privatizing the public sector's fertilizer plants may also gather momentum because there would be a public mechanism to prevent any disruption to the supply of a vital input.

Development of a Research-Based Extension System

Starting with the 1976 USDA mission on "Constraints to Increased Production," many studies have expressed concern about the poor state of agricultural extension services in Egypt. Its major weaknesses are (1) poor coordination between research and extension, and also in the extension activities among MOA/ARC and several other organizations (e.g., National Research Center, Desert Research Center, Water Research Center, agricultural and veterinary colleges and universities); (2) inadequate organizational structure for effective

coordination; and (3) heavy involvement (until 1980s) in regulatory and service functions, which distracts the system from its educational mission.

The agricultural policy reforms have abolished some of the regulatory programs and functions. Thus it has been possible to make significant progress in overcoming some of the above weaknesses in recent years, but the fundamental problems responsible for poor quality of extension service persist.

Reforms in the extension system must now be geared toward (i) developing research-based messages that will focus attention on cost-effectiveness and economic efficiency, and (ii) using these messages in farmers' education. To accomplish this, E. T. York, Jr., Jim Ross, and Leticia Solaun have proposed the following strategy in their 1994 report to the USAID.

To achieve effective coordination between research and extension, these two functions should be brought together, each with a director, in one unified organization under a director-general. The next step would be to create two divisions for extension functions: a technical support division, and an implementation division. The first division would interact with the research division of the unified organization, assess research results, and develop messages for farmers. In other words, its main responsibility would be to focus on what to extend: the message. The responsibility of delivering these messages would fall on the implementation division. It would carry out these functions through the personnel at the governorate, district, and village levels.

The thrust of the above strategy and recommended organizational structure are fully consistent with the agricultural strategy we are proposing. All of this will help focus on commodity-specific research-based extension efforts in accelerating agricultural growth. Such an extension system is precisely what is needed to raise the efficiency of fertilizer use and address environmental concerns such as nitrate leaching to groundwater due to technical deficiencies in fertilizer practices. Therefore, we strongly endorse the above recommendations. Once in place, the system should be utilized through intensive interactions, technical support, mandate, workplans, and the like, in order to focus its activities on high-priority tasks. This must include raising technical and economic efficiency of fertilizer use through an emphasis on all relevant aspects of soil-fertility management.

We cannot emphasize enough the need for rapid progress on this front. It would have a direct impact on farmers' fertilizer practices, where there is scope for both raising economic efficiency and ensuring environmental soundness. It would also create farmers' demand for appropriate fertilizers and micronutrients. The importance of research-based this to complement the third prong of the fertilizer strategy should not be overlooked.

Sophistication in Fertilizer Industry and Distribution System

As pointed out earlier, historically, the fertilizer industry and distribution system in Egypt have been geared to delivering a growing volume of fertilizers (mainly nitrogenous) to farmers at administered prices under the modalities of a centrally planned economy. With the policy reforms, these systems are becoming increasingly market-oriented. To complete this

process, the public sector fertilizer plants will, of course, need to be privatized. Our recommendation to establish a public mechanism to prevent disruptions in the total supply will expedite the privatization of public sector plants by alleviating the legitimate concerns of the government.

At the same time, it is important to note that putting fertilizer use in Egyptian agriculture on a sound footing requires considerable further development of the domestic fertilizer industry and distribution system. In specific terms, these systems must be capable of supplying fertilizers containing different nutrients (in various grades and forms), and not just a few straight fertilizers like urea, ammonium nitrates, and single super phosphate, which contain just one nutrient. To move in this direction, it will be necessary to establish fertilizer mixing plants in domestic industry. Furthermore, the systems must be capable of supplying, through domestic production and imports, micronutrients, trace elements, and fertilizers suitable for foliar application. Finally, the long-term aim should be for these systems to provide technical guidance and soil-testing services to farmers.

At present, fertilizer systems in Egypt are woefully underdeveloped. There is an urgent need to remove the atmosphere of uncertainty created by the events of 1995, and thus encourage private investment for development and sophistication in fertilizer supply and distribution systems. Our recommendation to create the public mechanism to ensure adequate flow of fertilizers supply in multi-agency distribution networks will speed up the development of a competitive distribution system because it would remove periodic and arbitrary government interventions to deal with political economy problems of fertilizer shortages. At the same time, it is important to understand that private sector investment in fertilizer systems ultimately depends on farmers' demand for a variety of products and services. The research-based extension system will generate this demand through providing the relevant technical knowledge to farmers.

SUMMING UP

Fertilizer policy must move in the directions outlined above to maximize the contribution of the proposed priorities in the agricultural strategy to overall economic growth, expansion of employment, and export earnings. As anywhere else, these contributions would depend on both accelerated growth in the physical volume of agricultural production as well as maximum cost-effectiveness. Fertilizer policies must therefore have the correct orientation, especially because rates of fertilizer application are already very high, and there appears to be considerable scope for further growth in per hectare yields of crops through more efficient fertilizer use. Further improvements in yields thus depend on an all-out effort, along the line discussed above, to raise the efficiency of use rather than promote indiscriminate growth in per hectare rates of fertilizer application—especially of nitrogen.

IMPLICATIONS OF THE STRATEGY FOR RURAL FINANCE AND PBDAC

THE SUCCESS OF THE HIGH-GROWTH STRATEGY proposed in this study depends on the existence of a well- functioning rural financial market. In particular, the horticultural and dairy enterprises will require credit in a diverse set of activities, in addition to the main production activity. Rural financial intermediation typically assumes credit disbursement, insurance services, and savings mobilization. The insurance services reduce the risks associated with the adoption of new technologies, and savings mobilization provides relatively inexpensive local funds so that the lending agency does not have to borrow from expensive outside sources and can therefore keep its cost of credit down.

In Egypt, as in a number of other developing countries, rural finance unfortunately consists of credit disbursement only. The Principal Bank for Development and Credit (PBDAC) is the main source of agricultural credit in the country. Very little is known of the informal sources of rural credit, although a few recent studies indicate the existence of Gamayias (Revolving Savings and Credit Schemes) and informal merchant credit, especially for inputs (see, for example, Management Consulting Center, 1995; and Adams et al., 1994). The PBDAC dominates the formal sources of credit and supplies nearly 80 percent of the institutional agricultural credit in the country.

Its extensive network of branches and agencies, which spread to nearly every village in the country, and years of extremely close interaction with the Egyptian farmer indicate that this agency plays an extremely important role. Traditionally, its monopoly over the distribution of inputs and the collection of output gave it a unique position in ensuring extremely high rates of repayment. Table 46 shows how the share of the PBDAC in rural credit disbursement in Egypt has remained consistently high despite the entry into the rural sector of commercial banks such as the Watani Bank. The drive toward privatization and the delinking of the input supply and output procurement activities of the PBDAC have not affected its role as the main supplier of institutional credit in Egypt. The data in the table indicate an increasing role for PBDAC in agricultural lending relative to the commercial banks and the business and investment banks. Agricultural lending by the PBDAC increased from LE 3,277 million to LE 4,583 million between 1989/90 and 1993/94. It has not increased at the same rate for the other sources. It is therefore clear that most of the formal rural finance hinges on the functioning of the PBDAC.

Total lending in the Egyptian economy has increased at an even greater rate than the PBDAC lending over this period. This is largely the result of the major policy reforms undertaken by the government of Egypt in recent years. Given the tremendous

potential of Egyptian agriculture, especially the developing horticulture trade and livestock subsectors, the lower rate of growth indicates that investors are not taking advantage of this potential, as they are in the other nonagricultural sectors.

Four major policy reforms have affected, and will continue to affect, the future viability of the PBDAC and the development of a strong rural financial market. The withdrawal of PBDAC from the provision of agricultural inputs and the liberalization of the output markets, which has thus been depriving the PBDAC of its unique function in enforcing repayments, have already been mentioned. However, the recent problems with the escalating prices of fertilizer and its short supply have forced the government to reconsider the PBDAC's functions. The use of the floor price to ensure cotton cultivation and procurement has also brought the PBDAC back into its central output procurement role. It is not clear whether the PBDAC will continue to play a role in these areas over the long term and what the extent of this role will be. Obviously, if input distribution is PBDAC's most profitable operation, its financial strength depends on continuing this activity. If PBDAC is to function only as a financial institution, it will be essential to look at the banking functions separately and continue the search for collateral substitutes and alternative lending policies.

Two other reforms also have serious implications for the PBDAC. The changing land tenure legislation, which gives the landlords the right to terminate their leases, implies that tenant farmers will have dwindling access to this important source of finance. Previously the PBDAC would lend to official tenants on the basis of this long-term lease. With the liberalization of interest rates on loans and savings deposits and the significant reduction in the rate of inflation, real interest rates were positive in 1992 for the first time in two decades. However, since the Egyptian government phased out interest rate subsidies for the PBDAC, the increased real interest rates meant that the PBDAC's borrowing that are financed primarily through interbank loans became increasingly costly.

Table 46: Agricultural Lending by Formal Sources and as a Proportion of Total Lending 1989 to 1994

	89/90	*90/91*	*91/92*	*92/93*	*93/94*
			millions of LE		
Commercial banks	968	1,227	965	1,183	1,206
Business & inv. banks	149	169	164	151	171
PBDAC	3,277	3,936	3,907	4,206	4,583
Total agri. lending	4,394	5,332	5,036	5,540	5,960
Total overall lending	48,789	60,831	58,249	67,594	79,834
Agri as % of overall	9.0	8.8	8.6	8.2	7.5
PBDAC as % of total agri.	75.0	74.0	78.0	76.0	77.0
PBDAC as% of overall	6.8	6.5	6.7	6.23	5.78

Source: Central Bank of Egypt.

In terms of the proposed strategy of high-growth agriculture resulting from the growth of the priority high value added areas of extra-long-staple cotton, and smallholder horticulture and smallholder dairy, the credit requirements are expected to grow at rates faster than they have in the past. This is due partly to the increased growth rate of agriculture as a whole and partly to the additional credit requirements resulting from the development of the associated agribusinesses. PBDAC's loan portfolio over the period 1980/81 to 1991/92 has grown at an aggregate real rate of 7 percent per year. Investment loans have grown at a rate of 9 per cent, while seasonal loans have grown at 5 percent (see Table 47, which also highlights the changing relative proportions of the two components, with investment loans increasing in importance over time). The new strategy will require a greater emphasis on investment credit because of the requirements in horticulture and the dairy sector. The increase in the production of field crops is expected to come from increased efficiency in input use and hence from more or less constant credit requirements in this area. However, the increased credit requirements are expected to arise in areas in which the bank does not lend at present. This introduces another interesting problem. The bank currently lends only for a specific set of activities with fairly rigid requirements. The new growth would require the development of new linkages and activities. The bank will therefore have to be more flexible and responsive to these changes.

Table 47: PBDAC Loan Portfolio, 1980/81-1991/92
(millions of LE)

	Seasonal		*Investment*			*Annual %*
	Value	*Percent*	*Value*	*Percent*	*Total*	*Increase*
1980-81	211.7	56.9	106.6	43.1	372.3	43.1
1981-82	271.6	45.0	337.4	55.0	609.0	55.4
1982-83	316.9	47.6	347.1	52.4	664.0	52.3
1983-84	325.3	47.2	363.9	52.8	689.2	52.8
1984-85	358.0	31.2	776.4	68.8	1134.3	68.4
1985-86	433.6	27.3	1157.2	72.7	1590.8	72.7
1986-87	676.7	29.1	1651.5	70.9	2328.2	70.9
1987-88	807.0	35.3	1480.3	64.7	2287.3	64.7
1988-89	986.6	33.0	1999.8	67.0	2986.4	67.0
1989-90	1885.5	44.7	2334.5	55.3	4220.0	55.3
1990-91	1757.2	38.2	2847.1	61.8	4604.3	61.8
1991-92	1896.2	43.5	2459.7	56.5	4355.9	56.5
Trend Growth						
Nominal	22		26		24	
Real(def)	5		9		7	

Source: Compiled and computed from PBDAC—Finance Sector.

With the withdrawal of the interest rate subsidies to PBDAC, the issue of its overall profitability becomes increasingly important. Data from 1991/92 on PBDAC's financial structure indicate that it relies heavily on commercial bank overdrafts and local and foreign loans to make up its lending (see Table 48). Although there has been an increase in deposits, it continues to rely on costly commercial bank overdrafts. More recent data were unfortunately not readily available, but private communications indicate that (1) the emphasis on savings mobilization has increased and (2) the ratio of commercial bank overdrafts to assets continues to be substantial. The bank thus needs to step up its drive to mobilize savings.

Table 48: PBDAC's Financial Structure, 1990/91-1991/92

			Change	
Description	*1990/91*	*1991/92*	*Positive*	*Negative*
a. Ratio of deposits to total assets	25.1%	30.0%	4.9%	
b. Ratio of commercial bank overdrafts to total assets	26.3%	26.2%		0.1%
c. Ratio of local & foreign loans & other credit balances to total assets	23.6%	26.4%	2.8%	
d. Ratio of own sources to total assets (capital + reserves + provisions)	14.9%	18.2%	3.3%	

Source: same as Table 45.

a. Ratio of Deposits to Total Assets:

This ratio indicates the contribution of all deposits in financing total operations. It reached 30% in 1991/92 versus 25.1% in the previous year; an increase of 4.9%. Despite this increase, the proportion is small and indicates that PBDAC is relying on costly outside borrowing or other sources to finance its operation.

b. Ratio of Interbank Borrowing to Total Assets:

A significant proportion of its operations are being financed through borrowing from commercial banks. The ratio of borrowing from commercial banks in financing the total operations was 26.2% in 1991/92 as against 26.3% in the previous year, which amounts to a decrease of 0.1%. In absolute terms, however, PBDAC's borrowing from commercial banks increased.

c. Ratio of local and foreign loans and accounts payable to Total Assets:

Local and foreign loans and accounts payable also account for a substantial proportion of financing the total operations of PBDAC. This ratio was 26.4% in 1991/92 versus 23.6% in the previous year, an increase of 2.8%. Again expressed in absolute terms, this implies a large increase in local and foreign loans to finance PBDAC's operation.

d. Ratio of self-funding to Total Assets:

This ratio indicates the contribution of own sources (capital + reserves + provisions) in financing total uses.

The bank's own sources increased to 18.2% in 1991/92 versus 14.9% in the previous year, which represents an increase of 3.3%.

The trends in savings mobilization can be seen in Table 49.

Table 49: Development of saving deposits during the period 1980/81-1991/92 (thousands of LE)

Years	Current & Savings	Term Deposits	Total
1981-82	150,350	153,350	303700
1982-83	234,473	141,805	376278
1983-84	294,478	179,258	473736
1984-85	348,534	225,954	574488
1985-86	433,193	273,705	706898
1986-87	583,855	321,276	905131
1987-88	659,080	393,395	1052475
1988-89	697,660	466,316	1163976
1989-90	848,799	565,074	1413873
1990-91	918,874	613,343	1532217
1991-92	992,000	874,000	1866000
Trend Growth %			
Nominal	18	18	18
Real(def)	1	1	1

Note: PBDAC by law cannot accept current accounts from individuals.
Source: Compiled and Computed from PBDAC—Finance Sector.

(1) APCP: Attitude of saving and deposits customers toward PBDAC and other competing banks, unpublished study, 1993.

The data clearly show that deposits have not grown at the same rates as lending. However, the estimates for 1995 indicate that savings mobilization has grown faster than lending. An important impediment to deposit mobilization is the legislative restriction on PBDAC to accept current deposits from individuals. The traditional attitude of considering the bank merely a conduit for the disbursement of credit also inhibits the savings mobilization. Savings mobilization is extremely important to PBDAC. A perusal of the data in Table 50, especially the comparative data for 1994, indicates the very narrow margins within which PBDAC must operate, given the interest rates it has available to cover its transaction costs. In order for PBDAC to be financially viable in the long term, it needs access to cheap deposits. In addition, it needs to increase its interest charges on some of its lending portfolio. The latter is not an easy task in view of the political consequences.

In the context of the high growth agriculture strategy, three important potential problems associated with the rural credit market in Egypt need to be reemphasized. First, the rigid portfolio of loans and lending procedures needs to be made more flexible and responsive to the changing needs. An example of this rigidity is the fact that

PBDAC did not lend against letters of credit. Given the increasing emphasis on trade for agricultural growth, this is extremely restrictive to the development of agribusiness and trade. Second, the search for effective collateral substitutes for land needs to be speeded up, especially in the light of the changing land tenure legislation.

Table 50: PBDAC Interest Rates, 1990 to 1995

Year	*90*	*91*	*91*	*92*	*92*	*93*	*93*	*94*	*95*
Month		*(01)*	*(07)*	*(03)*	*(10)*	*(03)*	*(06)*	*(01)*	*(01)*
Inputs									
Crop	15	16	16	17.5	16	15	15	15	14
Fruit	16	17	17	18	17	15	15	15	14
Veg.	15	18	18	19.5	18	15	15	15	14
Investment									
Short	16	16	18	20	19	17	17	17	15
Med/Long	17	16	18	21	17	17	17	17	15
Comm.	-	20	23	23	21	20	18	18	15
Land Reclamation[5]	6	8	11	12	10	9	9	9	9
Comparative Rates[6]									
Short term treasury								14.8	
bills								12.5	
Short term bank								16.9	
deposits									
Discount rate									

Source: PBDAC Credit Department.

Savings and loans schemes and group lending are alternatives that have worked in other countries.

Third, the separation of the input supply and output procurement functions from the banking functions will imply a reduced capacity to enforce repayment at levels that the PBDAC has maintained previously. The close and longstanding relationship of the Bank with its clientele and the existence of such an extensive network of bank operatives at the local level could be used to maintain the repayment levels. If output markets

[5] ***These rates are shown here as of November 1993 published Egyptian Monthly Bulletin, December 1993.***

[6] ***These rates are shown here as of November 1993 published Egyptian Monthly Bulletin, December 1993.***

continue to function well, then the long-established repayment discipline of the Egyptian farmer will ensure effective repayments.

The extensive network of the PBDAC can be used in several positive ways to ensure the success of the proposed strategy. The bank can act as an effective extension agent and purveyor of technology which can be packaged with the credit. There are efforts afoot already for the bank to act as a selling agent for insurance companies. This would increase its role in financial intermediation, improve its financial viability and provide and important catalatic role in the adoption of the high growth technology. The role of PBDAC is crucial in another aspect. Other financial institutions in the rural sector would not be as interested in lending to the small farmer and operators as they would to the larger actors in this area. This is based purely on profitability considerations. PBDAC therefore becomes important for its safety net role in food security and poverty alleviation.

A NOTE ON NEW LANDS AND THE LOSS OF OLD LANDS

EGYPT HAS INCREASED THE IRRIGATED LAND AREA BY 20 percent in the past 30 years (1952–91) and by 8 percent from 1987 to 1991 (Table 51). It has done so largely by bringing new lands into cultivation. As all these lands were of average productivity; about half of the increase in productivity in this period would be expressed by the new lands. But yield increases have been much larger than the low level it implies. For the most part, the new lands are considered to be of lower productivity than the old lands. This is partly due to soil characteristics and partly to less reliable water supplies, particularly to the small farmers. These problems have been less onerous, in practice, for the larger holdings than the smaller ones and clearly less so for horticultural crops. Thus, management of the new lands needs to be improved, especially to ensure that all farmers have a reliable water supply, source of credit, and marketing services and to emphasize horticulture. This is particularly the case for the small farmers who are most affected by uncertain water supplies. Under these constraints, the impact on aggregate productivity during this period has been modest at best. A full discussion on new lands is provided in Annex I.

Table 51: Cropped Area by Feddan 1952, 1987, and 1992
(in thousands)

Period	1952	1987	1992
Winter	4,368	5,098	5,759
Summer	3,026	4,842	5,139
Nili	1,824	863	722
Summer+Nili	4,850	5,705	5,911
Total(all 3)	9,214	10,803	11,670
Orchard	94	616	896
Total(W+O)	4,458	5,741	6,655
Total(S+N+O) maximum area in use	4,944	6,321	6,087

Source: Social Consultants International, 1994.

The productivity of existing new lands will increase in association with the commodity priorities. The expansion of new lands is built into the GAF as a small fraction of the planned expansion, and thus is very conservative.

While it is argued that yields are considerably lower on the new lands, that is not true of the key horticulture crops (Table 52). Thus, with reliable water supplies and good management, the value of output per feddan should actually average higher on the new lands, given a much higher emphasis on horticultural crops.

However, it must be recognized that if water should become scarce on the old lands because of a combination of the diversion of water to new lands, a reduction in total availability, and increased pollution, the effect on output would be devastating. One reason for the success of the Egyptian irrigation system is that there is ample water. In deficit systems such as those of Pakistan and certain parts of India, water allocation is very inefficient. Production there cannot reach its full potential because the institutional systems are not able to allocate the scarce water optimally. The most devastating effect is uncertainty in water supplies that reduces intensity. This is a problem that requires careful analysis. For this reason, a conservative assumption is made that new lands will come in at a rate sufficient to balance the loss of old lands and to cover the increased area of cotton and horticulture. The loss of old land is probably now down to a level of 15,000 to 20,000 feddans per year. Thus, an assured increase of 30,000 feddans is implicitly assumed in the GAF.

Table 52: Estimated Yield Per Feddan, Selected Crops, New and Old Land, Various Categories, 1992-93

Crop	*Means New Land*[1]	*Mean Superior NL Farmer*[2]	*New Land Feasible Level*[3]	*National Mean*[4]	*Agroindustrial Farm*[5]
Wheat (A)	7	12	18	14	11
Maize (A)	8	11	30	19	29
Rice (T)	2	3	4	3	-
Berseem (T)	23	30	30	23	16
Tomatoes (T)[6]	18/9	28/15	15	14/11	20
Potatoes (T)	14	-	-	9	6

1 This is the mean for small farmers including investors, graduates, small holder, but excluding large industrial farm enterprise (1993).
2 Top achieving 5 percent of small and medium size farms (1993).
3 Estimates of technically feasible yields based on new land research data and scientists estimate (1993).
4 National means (1991-92).
5 Very large farms mostly with significant post harvest operations.
6 Winter\Summer crop data shown.
N.B. Where multiple figures are shown in a column, the first is for the winter crop and the second for the summer crop.

PRIORITY ACTIONS

THE STRATEGY SET FORTH IN THIS REPORT HAS THREE COMMODITY output priorities (cotton, horticulture, and smallholder livestock) and an input efficiency priority (particularly fertilizer and pesticides). Another central concern is food security. Table 53 presents a matrix of the priorities on one axis and a set of action areas on the other. The action areas are: policy, technology, marketing, credit, and household income. The five action areas are subjectively ranked in terms of their importance to each of the priorities. A final column in the table adds up the ranks for an overall ranking. An asterisk indicates the action areas considered essential to the priority. Such a subjective system provides a useful basis for discussing the priorities for action.

The matrix sets forth policy, technology, and marketing as the key action set. In simple addition, policy ranks behind the other two. But it also has a broad, overall impact as well as a specific subsectoral relevance.

Table 53: Priority and Action Matrix, Relative Importance

Action area	*Cotton*	*Horticulture*	*Livestock*	*Food Security*	*Input Efficiency*	*Sum of Ranks*
Policy	1*	3	5	2	1*	12
Technology	3	2*	2*	1*	2*	10
Marketing	2*	1*	4	5	4	11
Credit	4	5	3	3	3	18
Household income	5	4	1*	4	5	19

* Essential to the priority.

POLICY

The overriding policy issue is how to choose the areas of emphasis, the priorities. The object of this report is to open the debate on that issue. It is only when that is done that the other policy actions become meaningful. The other two overriding issues that crop up throughout this analysis are privatization, the purpose of which is to open markets, and the foreign exchange rate. Much of the strategy and priorities set forth here depend on being able to shift with changing markets and price relationships. These require the agility of private

firms, open markets, and a flexible exchange rate. Current Egyptian policy, particularly in agriculture, has been moving rapidly on each of these fronts.

Basic public policy must enable cotton to play its effective role in accelerated growth. Most important, a free play must be given to the private sector to develop a market for extra-fine staple cotton. This is an important source of growth in the strategy, and it certainly cannot occur unless Egypt becomes a reliable supplier. Before that can happen, the private sector must be free to market and export at least the highest grades of cotton. Public policy could even be geared to ensuring a stable supply for exports.

Public policy is also critical to the increases in input efficiency. That requires flexibility in the marketing and supplying of fertilizer so that appropriate changes in the product mix can occur. It also means that the government must play a monitoring role to ensure adequate supplies, at least until free markets have demonstrated a sustained ability to consistently operate without market failure. The supply and regulations governing pesticides must be similarly monitored.

In horticulture, public policy is important to negotiating trade openings in key markets for key commodities, freeing the private sector to export, and helping to ensure the continuity of supply. The difficulty of trade negotiations is immense. The priorities will help direct that effort. In addition, working with other countries (e.g., coinciding interest of the United States and Egypt is trade matters) would be very helpful.

The key public policy issues for livestock are to ensure a level playing field for the large-scale expansion of private marketing that is needed to adequately handle the large increase in volume of marketing.

TECHNOLOGY SYSTEM (RESEARCH AND EXTENSION)

At first glance, it may seem surprising that the technology system ranks so high in the proposed strategy, given the current emphasis on policy and marketing. But on closer examination, it will become clear technology is an essential ingredient of all five priority subsectors.

Cereals (Food Security)

The growth in cereals output considered important to food security must be achieved with no increase in the area devoted to those cereals. The only way the growth target can be met is to achieve a very high increase in yields of the major cereals, particularly wheat and maize. Nearly half of that yield increase is to come from pushing back the frontiers of knowledge at the same pace as in developed countries, and the rest from catching up with the highest yield areas in the world. Both those sources of yield growth require a first-rate

research system. It is notable that yields of the three major cereals have increased very rapidly in the reform period, indicating that the system for moving yield-increasing technology to farmers for the basic cereals is working. Thus, the emphasis needs to be on pushing up experiment station yields, under conditions comparable to those on farms. That includes a much greater emphasis on on-farm research. The technology program planned by USAID is on course, including its emphasis on interacting with the best research in the United States through a USDA participation and in interactions with the International Research Centers. Breeding for shorter season cotton varieties even while maintaining quality could be an important means of increasing wheat production.

Livestock

Productivity of smallholder livestock, particularly in the dairy sector, is very low, by the standards of developing countries with large smallholder dairy sectors, such as India and Pakistan. It could be argued that the area needing most attention is extension, but such extension must be based on trials of feeding, management, and even breeds, under small farm conditions. That calls for a strong applied research program carried out largely through on-farm trials with small farmers. Such applied research therefore needs to be substantially strengthened.

Horticulture

While market development is critical to development of new crops and niches for export, the bulk of the horticultural production in Egypt lies in commodities facing important technology problems. Those problems are largely tied in with marketing problems, and they must be solved on farm by a research system sensitive to farmers' actual problems. For example, the citrus industry suffers from serious problems of low yields and inappropriate varieties; grapes have disease and time-of-harvesting problems; potatoes have serious disease problems. All the export commodities require attention to health-related regulations in receiving markets. There are also serious problems of storage and other marketing losses to consider. These all require research treatment. The orientation of the USAID technology program is correctly pointed toward setting the priorities and the operating procedures that are needed. Particularly important is close interaction with the private sector.

Input Efficiency

Increased efficiency in input use is a major component of the agricultural growth strategy. Farmers need various support systems to help them increase the productivity of fertilizer and pesticides, both of which increase in importance with the strategic emphasis on cotton and horticulture. Farmer efficiency cannot improve without on-farm testing of improved pesticide, water, and fertilizer practices. The distinction between research and extension is, of course, fuzzy in this context, but solid technical knowledge and experimentation are central to the effort.

Cotton

Cotton, too, requires a strong research effort if it is to continue to raise yields; it needs a push on higher-yielding varieties of extra-fine cotton; and, if efficiency is to increase, a major effort must be made to increase the efficiency of fertilizer and pesticide use. This has important environmental implications as well.

The most difficult aspect of cotton profitability derives from its long growing season. That is particularly a problem for the finest varieties of cotton. One effect is to make a standard rotation one of cotton plus short berseem, the latter providing low returns. Thus, research must give major emphasis to a farming system approach that works not only on cotton, but on other commodities as well, e.g. wheat. The purpose is to increase the value of output from the rotation, not just an individual crop.

Water

Water management problems will inevitably increase over time. The strategy is initially water conserving because the cotton area expansion will certainly be significantly at the expense of rice, with a substantial saving of water. The strategy does not emphasize sugarcane, the other heavy user of water. However, as pointed out in the treatment of new lands, that effort is likely to put additional demands on the water supply, and pollution and urban uses will inevitably increase.

Thus, the research system must turn its attention increasingly to means of conserving water and do so through on-farm research so that it is practical from the point of view of the farmer. Failure to move quickly in this area is likely to have immense negative impact as water scarcity increases with the likely consequence of poor management of the problem as political factors weigh more heavily than economic factors in allocating water.

Summing Up

The research system must focus on the priorities identified in the overall strategy for development; and the central goal must be to undertake a major expansion of on-farm research. It must focus on the technological elements that are critical to growth.

MARKETING

The importance of marketing is a primary theme throughout this report. Indeed, it contains an annex laying out the broad thrust of the marketing needs and the environment in which they must be provided. The highest marketing priorities lie in horticulture and cotton.

Horticultural marketing needs to be improved radically for the domestic market, as well as for exports. In the export market, windows of opportunity for exports need to identified, and tours of key market centers conducted to increase the awareness of marketing needs—each as now fostered by USAID. Foreign collaborations need to be encouraged and nurtured. The government needs to work with the private sector in developing and enforcing adequate standards, and the research system needs to work with the marketing agencies and farmers to increase the quality of products and the orientation toward market needs.

Cotton marketing needs to be encouraged through private sector initiatives designed to market the highest-quality fine cotton in foreign markets, with the expectation that eventually the domestic textile industry can step into those markets. It is essential that those marketing efforts be matched by public policies that will help make Egypt a reliable supplier of the best quality cotton exports. Private exporters therefore need to work close with the government in identifying zones for specific cotton varieties.

The marketing of inputs must be coordinated with research results in order to increase input productivity and with public monitoring of input supplies. All public barriers to the expansion of the private marketing of milk need to be removed and positive encouragement given to the development of a large, competitive private sector serving a rapidly expanding production base.

CREDIT

The commodity priorities of the strategy for agricultural growth are purchased input and hence are credit-intensive. Small farmers must participate fully in the input-intensive sectors if the strategy is to succeed. Credit systems therefore need to be further refined and developed. The emphasis on input productivity and efficiency is intended to allow output to

grow rapidly with little or no growth in input quantities. But the choice of inputs, the timing of their use, and many other factors must first be improved. The credit system has historically played an important role in these processes and will need to remain active on that front. PBDAC will continue for some time to play the dominant role in these activities.

Attention must be given to areas not now emphasized by PBDAC. Those are deposit mobilization, to keep interest costs down, and intermediate term credit to the livestock and horticultural sectors.

HOUSEHOLD INCOME GROWTH

All the livestock growth and over three-fourths of the horticultural growth is dependent on the growth of the domestic market. That accounts for 43 percent of the total growth in the strategy. Nearly two-thirds of that domestic demand–driven growth comes from per capita income growth, assumed to be 3.3 percent per year. In other words, 27 percent of the growth is directly related to increased per capita income. The assumption of a 3.3 percent rate of growth for per capita income, or 5.4 percent growth for GDP, is considered reasonable, particularly in view of the expected growth rate under the agricultural strategy, which should reach 6 percent or more. The lag in agricultural response to the income growth should be modest. But, it should be remembered that growth does beget growth and that public policy must focus on the various aspects of achieving those growth objectives.

SUMMING UP FOR POLICY AND ACTION

The priority strategy can have enormous success in the right environment: one consisting of favorable policies, open markets, vigorous private entrepreneurs, a technology system that makes it possible to pursue priorities, public encouragement of private marketing through ancillary activities, a vigorous rural credit system, and growth in per capita incomes to provide the demand pull for a major portion of the agricultural sector, even as other sectors of the economy undertake a supply-push approach.

IMPLEMENTATION

Implementation of the strategy requires three actions: (a) modification; (2) a high-level oversight person or body; and (3) a monitoring unit to be the eyes and ears of oversight.

ANNEX I: NEW LANDS AND ASSOCIATED TABLES

M. R. El-Amir

Annual Additions Made to Crop Land and Additional Planned in the Future

According to Egypt's agricultural development strategy for the 1990s, agricultural land resources are to be augmented by the reclamation of 3.1 million feddans of land, of which 2.9 million feddans are planned to be from Nile waters and 200,000 feddans from groundwater. In addition, improved drainage and control of salinity is needed on about 725,000 feddans of land. Development of new land will be confined to the private sector. The 250,000 feddans of land belonging to public companies will be disposed of by selling to investors, employees, and new graduates.

Data in Table A-3 indicates the annual additions to reclaimed lands in the new land from 1982/83 to 1991/92. The general means of acres reclaimed annually is about 104,000 feddans and it is obvious that the mean in the first five years is much less than that of the second five years (37,961 versus 170,070 feddans).

Table A-4 indicates information pertaining to the achievement of the 1987–1992 plan in land reclamation, including areas reclaimed in each region, investments, and irrigation methods designated (sprinkler, drip, surface) in each area.

Table A-5 indicates the third five years, 1992–1997, for land reclamation including regions, areas, role of public and private sectors. Table 5 indicates areas to be reclaimed up to 2000 including regions.

Table A-6 indicates the developments of reclaimed lands in the period 1952–1993/94.

The Cropping Pattern and Yields on the New Lands Compared With the Old Lands

The capacity of the farmer to manage alternative crops with different soils and irrigation systems is a critical factor affecting yields. This and his ability to market fruits and vegetables determine his rotation and crop choices and overall profitability. In these cases, livestock become important to attain minimum acceptable returns. Under these situations, farmers still have the opportunity and choice among wheat, barley, broad beans, and berseem in winter and maize, peanuts, sunflower, seed watermelon, and soybeans in summer. Farmers who have resources and production and marketing skills may add fruits and vegetables. A high percentage of fruits and vegetables increases returns if there is good access to marketing. Vegetable producers have the choice of using protected cultivation which need high investment, more labor, and better management. In return, protected cultivation increases

yields of higher value products per feddan and per cubic meter of water, and usually this type of cultivation is common among large farmers.

Table A-7 indicates the cropping pattern in the new lands and in the old land. It is obvious that there is plenty of choice among new land farmers in each season depending on their resources, managerial and technical attitudes, and market access.

A comparison of crop yields between old lands and new lands shows that some fruit yields were as high in the new lands as in the old lands in 1993.[7] Most vegetable yields were lower on small farms in the new lands, but higher yields were reported for some crops such as tomatoes and potatoes. Most field crop yields were lower in the new lands, with considerable variation among crops. Soybean yields were higher in the new lands.

Experiences of successful farmers indicate that oil seed crops have an advantage on sandy soils. Most fruits and vegetables can do as well, or better on new lands compared with old lands. Most cereal crops seem to be less productive on new lands. Table A-8 shows areas, yields, and production of a variety of crops in new lands compared with old lands. Of course, the national yield estimates suffer from the aggregation problem, but data indicated in the table is consistent with what has been reported before. Most legumes have close yields in the new lands compared with those in the old lands, also some oil, mostly oilseeds, yields are close to yields in the old land and it is higher in the soybeans. The same situation exists in onions.

Perhaps a more realistic and closer estimate for yields would be estimates derived from field surveys collecting information from separate more homogenous groups of farmers. Table A-9 shows the results of a field survey.[8] Yields per feddan of several crops have been estimated for the following groups of farmers: (a) average of small farmers, (b) superior farmers, (c) agroindustrial farm enterprises, (d) farming systems group estimates of feasible small farmer production in new lands, and (e) average production in old lands. The results indicate the significant difference between yields achieved by each group—an example would be the difference between yields of wheat for the mean new land farmer and the mean superior new land farmer (7 versus 12).

Relative Share of New Lands in the Production of Different Crops

Data in Table A-10 indicates the relative share of the production of new lands from major field crops compared with the total production in Egypt. It is important to notice that the share of new lands is important in Alfalfa (49 percent), winter green forage (74 percent), winter tomatoes (11 percent), sugar beets (16 percent), and some vegetables like eggplant and pepper.

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[7] *New Land Development Study*, Vol. 1: Main Report, April 1994.

[8] *New Lands Development Study*, Vol. 1: Main Report, MOA, Egypt, April 1994.

Data in Table A-11 indicates the share of new lands in the total area and production of vegetables in Egypt. Compared with the old land, the new land produce 20 percent of the winter vegetables and 22 percent of the summer vegetables.

Data in Table A-12 shows the share of the new lands in the production of fruits in Egypt. In 1993, new lands represents 28 percent of total orchards area and 15 percent of the total production of orchards in Egypt. New lands produce 70 percent of apples, 28 percent of olives, 34 percent of peaches, and 13 percent of bananas.

Cropping Intensity in New Lands Compared with Old Lands

Data in Table A-1 indicates that cropping intensity in the new lands is estimated at 1.46 in 1993 (cropping area ÷ cultivated land or number of crops per year per unit of land area). This is compared with 1.86 in the old land. Climatic conditions in Egypt permit a cropping intensity of non-permanent crops of two or more in new lands. Small farmers use over 90 percent of their lands for cropping. Larger farmers leave larger part of their lands idle in summer when costs of water are high and water shortages are common.

According to indicative planning (Table A-2), the cropping intensity in the new lands are estimated at 1.9 from 1993/94 to 1995/96.

Value of Output in the New Lands and Old Lands

Table A-13 includes data pertaining to the value of plant production, value of inputs for plant production, and the new income from plant production in 1991 and 1992. In 1992, the value of plant production in the new lands represents about 6.3 percent of the total value of plant production increasing from 4.5 percent in 1991.

The same table includes information about the value of animal production in both the new and old lands, value of inputs for animal production, and net income from animal production. For example, the value of animal production in the new lands represents 3.2 percent of the total value of animal production and 3.7 percent in 1992. The relative net income from animal production in the new valley increased from 4.3 percent in 1991 to 4.5 percent in 1992.

The same Table A-13 includes information about the value of agricultural production in Egypt in 1991 and 1992, and the value of plant production components.

Table A-14 includes information regarding the value of animal production components in the old and the new lands in 1991 and 1992.

The Annual Loss of Old Land to Urbanization

According to the study,[9] the total area reclaimed from 1952 through 1989 is nominally reported to be about one million feddans. However, several studies suggest that there is a difference between nominal and actual net area crop yield. It has been estimated that only 60 percent of the reclaimed land was cultivated.

Estimates of old land lost to urban use differ from one source to another and varies between 20,000 to 60,000 feddans annually. Actually, the loss may have been high in the early years and up to the mid-1980s, but after the increased effective control of land diversion from cropping to other uses, the reasonable current estimate would be less than 20,000 feddans (15,000 to 20,000 feddans). It is expected that the trend of lost fertile land will decrease in the future. In the same period, the desert reclaimed land at the national level is about 600,000 feddans. The total loss from 1972 to 1990 in the Delta as measured by the land satellite data has been estimated at 50,000 feddans. Assuming 70 percent of the reclaimed area is in the Delta, the area changing from desert to crop land could be about 580,000 feddans. Part of the increase in the cropped area in the new land came from previously reclaimed areas which have been cultivated.

An examination of crop statistics reveals that there is an increasing trend in the cropped land in various seasons especially in the case of orchards. It has been suggested that major increases occurring between 1986/87 and 1991 in total cropped area cannot be explained by mere reclamation of new lands. About 660,000 feddans not in use in winter of 1987 was brought into cultivation by 1991 most likely due to the significant changes in price policy towards market economy. Reclamation made some lands available in the process. Summer and nili increased by 500,000 feddans from 6.3 million in 1987 to 6.8 million in 1991. Total winter crop area plus orchards increased by 940,000 feddans in the same time. It was found that farmers in the new lands crop less land in summer than in winter, because of water shortages and costs.

[9] *New Lands Development Study*, Vol. I: Main Report, April 1995.

Table A–1: Cultivated Area, Cropping Area, and Cropping Intensity in the New and Old Lands, 1992 and 1993

	Cultivable Area (feddan)		Cropping Area (feddan)		Cropping Intensity (percent)	
	1992	1993	1992	1993	1992	1993
New lands	497,642	646,906	518,852	994,800	1.04	1.46
Desert governorates*	449,920	390,776	472,982	416,354	1.05	1.07
Old lands	6,172,770	6,141,006	11,497,620	11,418,814	1.86	1.86
Total Egypt	7,120,332	7,178,688	12,489,454	12,779,968	1.75	1.78

Source: Ministry of Agriculture, Economics Sector, Central Administration for Agricultural Economies, Annual Bulletin of Agricultural Economic Statistics, 1992, 1993, Table 29, p. 44.

* Include new valley, matrouh, north Sinai, south Sinai, and Red Sea governorates.

Table A-2: Indicative plans for cropping areas in the new and old lands, 1993/94 to 1995/96

	AREA (Feddan)		
	1993/94 (%)	1994/95 (%)	1995/96 (%)
Old lands	6,265,000 (81.8)	6,264,000 (81.0)	6,264,000 (80.2)
New lands	1,395,000 (18.2)	1,450,000 (19.0)	1,550,000 (19.8)
Total	7,660,000 (100.0)	7,714,000 (100.0)	7,814,000 (100.0)
	CROPPING AREAS		
Old lands	11,947,000 (83.8)	11,959,000 (83.5)	12,044,000 (83.4)
New lands	2,315,000 (16.2)	2,370,000 (16.5)	2,395,000 (16.6)
Total	14,262,000 (100.0)	14,329,000 (100.0)	14,439,000 (100.0)
	INTENSITY (based on indicative planning)		
Old lands	1.91	1.91	1.93
New lands	1.63	1.63	1.55
Total	1.86	1.86	1.85

Source: Ministry of Agriculture, Economic Sector, unpublished data.

Annual Increase in Area in New Land Based on Indicative Planning (Feddan)		
1993/94 (Base)	1994/95	1995/96
1,395,000	1,450,000	1,550,000
— (0)	+55,000	+100,000
Annual Increase in Cropping Area in New Land Based on Indicative Planning (Feddan)		
1993/94 (Base)	1994/95	1995/96
2,315,000	2,370,000	2,395,000
increase	(+55,000)	(25,000)

Table A–3: Evolution of Reclaimed Areas, 1982/83 to 1991/92

Year	Area Reclaimed (feddan)	
1982/83	43,120)	Mean = 104,015
1983/84	45,630)	
1984/85	45,130)	
1985/86	33,503)	Mean (37,961)
1986/87	22,425)	
1987/88	153,600)	
1988/89	162,500)	
189.90	158,000)	Mean (170,070)
1990/91	189,700)	
1991/92	186,550)	
Total area reclaimed	1,040,158	

Source: General Authority for Reconstruction and Agricultural Development.

Table A-4: Achievement of the 1987-1992 Plan in Land Reclamation in Egypt: Area, Region, Investment, and Irrigation Method

Region	Area (feddan)	Investments Incurred (LE 1.000)	Irrigation Method
I. **Expansion and New Projects**			
Sinai and East of Canal Projects:			
East of Bitter Lakes	7,000	44,350	Drip
West of Suez	14,700	23,477	Sprinkler
South of Hussainia Plain	61,500	68,560	Surface
North of Hussainia Plain	15,000	16,350	Surface
South of Port Said	36,000	41,000	Surface
South of Port Said Plain	48,000	55,285	Surface
El Mataria Elsalam	8,000	18,152	Surface
Modereit El-Shabab	22,000	68,000	Sprinkler
Total	**212,200**	**335,174**	
Middle Delta Projects:			
West of Burollos	5,000	9,500	Surface irrigation
West of Delta Projects:			
West of Nubaria	2,000	36,400	Sprinkler and drip
Bustan Extension	75,000	191,992	Sprinkler
El-Nasr Canal Belt	65,400	127,208	Sprinkler
Desert Road Farms	1,000	—	Drip
Sugar Beet	37.600	240,955	Surface
Total	**181,000**	**596,555**	
Middle Delta Projects:			
Elsaf and Ghamaza	40,000	66,956	Sprinkle, drip
Kibli Karoun	3,200	22,144	Drip
West Beni Sulf	6,000	15,000	Sprinkler
West Gerga	5,000	7,960	Sprinkler
East Assuit	5,000	10,855	Sprinkler
Total	**59,200**	**122,915**	
Upper Egypt Projects:			
Awlad Touk East	10,000	35,800	Sprinkler and drip
El Marashda	17,000	27,400	Sprinkler
Wadi Elsa-aida	28,000	70,721	Sprinkler
Wadi El-No'ora	65,000	86,300	Drip-sprinkler-surface
Total	**120,000**	**220,221**	
New Valley Projects:			
El Farafra and Abu Menkar	25,000	56,300	Surface
Shark El-Owainat	3,000	48,826	Sprinkler
Total	**28,000**	**105,126**	
Grand Total	605.400	1,389.491	

Source: General Authority for Development and Agricultural Projects.

Table A-5: Third Five-Year Plan, 1992-1997 for Land Reclamation (in feddan)

Project	Areas in 1992-1997 Plan		
	Public Sector		Private Sector
	Targeted Expansion Projects	New Projects	
Sinai	127,000	153,000	----
Total	280,000		
East of Delta	69,700	17,000	82,000
Total	168,700	----	
Middle Delta	13,000	----	49,500
Total	62,500	----	
West of Delta	66,000	----	176,500
Total	242,500		
Middle Egypt	32,300	----	15,000
Total	47,300		
Upper Egypt	----	----	10,000
Total	10,000		
New Valley	5,000	30,000	26,000
Total	61,000		
Grand Total	313,000	200,000	
	872,000		

Source: Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Central Administration for Agricultural Economics, General Administration for New Lands.

Table A–6: Areas to be Reclaimed Until 2000

Region	Area (Feddan)
East of Delta, West of Suez Canal and Sinai:	1,548,500
Middle Delta	168,400
West of Delta	375,000
Middle Egypt	119,700
Upper Egypt	158,500
Northwest Coast:	5,000
Sewa Oasis	23,000
Baharia Oasis	45,000
Farafra Region	140,000
Dakhla Region	60,000
Kharga Region	40,000
South of Kharga	135,000
Total	2,818,100

Source: Ministry of Agriculture and Land Reclamation, Office of the Minister, Land Reclamation Plan.

Table A–7: Development of Reclaimed Lands (1,000 Feddan), 1952–1994

Period	Reclaimed Area
From 1952 to 1967/68	1,278.0
From 1968/69 to 1970/71	87.1
From 19791/72 to 1991/92	1,118.4
1992/93	200.0
1993/94	180.0
1952 to 1993/94	2,863.5

Source: CAPMAS, Annual Statistical Bulletin, 1995.

Table A–8: Cropping Pattern in the Old and the New Lands, 1993 (feddan)

Crop	Total (Egypt) (1)	Old Lands (2)	Desert Govern. (3)	New Lands (4)
Wheat	2,171,330	1,829,212	157,454	184,664
Barley	143,775	62,001	44,376	37,398
Permanent Beseem	1,717,228	1,668,846	7,588	40,794
Beans	297,156	251,378	4,949	40,829
Lentils	20,093	17,541	1,761	791
Fungreen	15,143	14,966	122	55
Chickpeas	20,353	20,348	1	4
Lupines	8,300	7,466	6	828
Linen	28,922	28,922	----	----
Onion	34,985	29,083	652	5,250
Garlic	18,706	18,615	----	91
Sugar beets	39,950	34,012	----	5,938
Potatoes (Nili)	97,220	97,121	99	----
Tomatoes	154,251	129,776	3,257	21,218
Other vegetables	206,882	165,548	2,681	38,713
Other crops	47,463	46,507	649	307
Total winter crops	5,021,757	4,421,342	223,535	376,880
Corn	1,663,037	1,595,531	794	66,712
Sorghum	335,519	333,528	1,115	876
Rice	1,281,790	1,276,295	5,490	5
Peanuts	110,903	31,269	118	79,516
Sesame	68,000	54,862	775	12,363
Soya beans	43,631	43,294	----	337
Onions	9,796	8,094	34	1,668
Sunflower	69,749	65,051	273	4,425
Yellow corn	16,861	711	----	16,150

Table A–8: Cropping Pattern in the Old and the New Lands, 1993 (feddan)

Crop	Total (Egypt) (1)	Old Lands (2)	Desert Govern. (3)	New Lands (4)
Potatoes	53,775	53,728	47	----
Tomatoes	125,029	89,425	1,470	34,134
Other vegetables	331,888	275,721	10,653	45,514
Other crops	161,253	156,681	1,997	2,575
Total summer	4,271,231	3,984,190	22,766	264,275

Source: Ministry of Agriculture, Economic Sector, General Administration for Agricultural Economics, Agricultural Economics Statistics, 1993.

(3) + (4) = Data comparable to "New Lands" in other references. Desert governorates include New Valley, Matrouh, North of Sinai, South of Sinai, and Red Sea Governorates.

Table A–9 Area, Yield, and Production of Plant Crops in Old and New Lands. 1992

Crop	Area (Feddan)		Yield		Production	
	Old Lands	New Lands	Old Lands	New Lands	Old Lands	New Lands
	(1000 feddans)		(unit)		(1000 unit)	
Grains						
Wheat (A)	1,789	303	15.86	8.01	28,364	2,430
Barley (A)	78	170	11.96	4.98	934	845
Corn (A)	1,949	17	18.45	14.50	35,969	249
Sorghum (A)	352	4	15.44	8.90	5,435	33
Yellow corn (A)	1	---	19.62	---	17	---
Rice (T)	1,210	5	3.22	1.93	3,899	11
Total	5,379	499				
Legumes						
Dried beans (A)	382	8	3.56	3.50	1,474	28
Lentils (A)	14	1	4.65	1.41	65	1
Lupines (A)	7	---	5.24	4.48	37	0.251
Chickpeas (A)	14	---	4.77	8.00	67	0.024
Fenugreen (A)	11	---	5.25	3.97	64	1
Green beans (T)	34	---	4.28	5.27	147	2
Total	462	---				
Fibers						
Cotton (M. Kenter)	840	---	7.15	---	6,006	---
Linen (straw) (T)	29	---	2.74	---	81	---
Flax (T)	3	---	1.12	---	6	---
Total	872	---				
Oilseeds						
Peanuts (A)	31	0.376	13.10	11.35	402	4
Sesame (A)	52	2.451	4.36	3.80	231	10
Linen seed (A)	---	---	4.43	---	131	---
Sunflower (T)	62	0.211	0.889	0.502	56	0.106
Soybeans (T)	51	0.519	1.13	1.51	59	1

Table A–9 Area, Yield, and Production of Plant Crops in Old and New Lands, 1992

Crop	Area (Feddan)		Yield		Production	
	Old Lands	New Lands	Old Lands	New Lands	Old Lands	New Lands
	(1000 feddans)		(unit)		(1000 unit)	
Flax seed (T)			2.48	---	2	---
Total		4				
Sugar Crops						
Sugarcane (T)	271	---	43.24	---	11,708	---
Sugar beets (T)	31	7	20.13	16.04	625	119
Total	302	7				
Onions						
Full mature onion (T)	45	2.924	7.23	7.14	958	21
Green onion (T)	5	0.010	5.62	1.30	34	0.013
Pickle onion (T)	1	---	1.503	---	1	---
Black seed (A)	1	0.115	2.11	2.47	2	
Total	52	3				
Green Forage						
P. Beseem (feddan)	1,659	9	---	---	---	---
S. Beseem (feddan)	721	---	---	---	---	---
Alfalfa (feddan)	5	12	---	---	---	---
Other forage (feddan)	228	3	---	---	---	---
Total	2,613	24	---	---	---	---

Table A–9 Area, Yield, and Production of Plant Crops in Old and New Lands, 1992

Crop	Area (Feddan)		Yield		Production	
	Old Lands	New Lands	Old Lands	New Lands	Old Lands	New Lands
	(1000 feddans)		(unit)		(1000 unit)	
Beseem seeds (A)	(152)	---	1.98	---	301	
Other field crops (T)	5	0.021				
Fuel crops (dried stems (Load)	(6,203)	(36)	8.24	8.60	51,188	314
Hay (load)	(2,474)	(482)	9.96	4.89	25,145	2,355
Total field crops	9,881	546				
Vegetables						
Winter (T)	330	53	9.07	5.86	2,996	308
Summer (T)	477	10	10.68	5.58	5,102	54
Nili (T)	233	2	9.89	7.75	2,307	14
Total (T)	1,040	65	10.00	5.87	10,405	376
Vegetable seeds		---				
Fruits						
Citrus (T)	276	77	---	---	2,299	127
Other fruits (T)	251	303	---	---	1,634	681
Palm trees and products (T)	32	21	---	---	542	62
Fruit seedlings						
Cut wood trees						
Total	559	401	---	---	---	---
Medicinal and perfumes (feddan)	39	1	---	---	---	0.223
Total plant production	11,519	1,013	---	---	---	---

Source: Ministry of Agriculture, Economic Sector, Central Administration for Agricultural Economics, unpublished data.

(A) = ARDAB
(T) = metric ton

Table A–10: Estimated Yield Per Feddan by Crop in New Land, Scientist Estimates, Old Land and Very Large Farms

Crop	Mean New Land[1]	Mean Superior NL Farmer[2]	New Land Scientist Estimate[3]	National Mean[4]	Very Large Farms[5]
Field Crops					
Wheat (A)	7	12	18	14	11
Maize (A)	8	11	30	19	29
Rice (T)	2	3	4	3	
Barley (A)	4	---	15	7	8
Sorghum (A)	6	---	20	15	10
Sesame (A)	2	4	7	4	4
Beseem (T)	23	30	30	23	16
Cotton (Kenter)	4	6	8	7	---
Peanuts (A)	11	15	20	13	14
Sunflower (T)	1	---	2	1	1
Alfalfa (T)	40	---	60	25	23
Onion (T)[6]	4.0/5.0	---	20	10	10
Broad beans (A)	4	7	10	5	7
Sugar beets (T)	14	---	30	21	8
Vegetables					
Tomatoes (T)[6]	8/9	28/15	15	14/11	20
Potatoes (T)	14	---		9	6
Green pepper (T)[6]	3/3	---	10	8/6	15/30
Green beans (T)	2	---		4.4	2
Watermelons (T)[6]	3/5	---	10	9	22
Eggplant (T)[6]	3/6	---	12	10/8	3
Cantaloupe (T)	6	10	6	8	13
Cucumber (T)[6]	6/6	11	7	7/6	6/33
Green Peas (T)[6]	1/8	---	3	4	---

Table A-10: Estimated Yield Per Feddan by Crop in New Land, Scientist Estimates, Old Land and Very Large Farms

Crop	Mean New Land[1]	Mean Superior NL Farmer[2]	New Land Scientist Estimate[3]	National Mean[4]	Very Large Farms[5]
Fruits					
Apples (T)	5	---	22	5	6
Grapes (T)	4	5	12	6	4
Bananas (T)	---	---	25	12	20
Oranges (T)	---	---	25	11	15
Tangerines (T)	---	---	15	11	---
Peaches (T)	4	---	12	5	4
Pears (T)	5	---	25	5	---
Mangoes (T)	2	---	10	4	---
Figs (T)	1	---	4	5	2
Olives (T)	2	---	9	3	1
Apricot (T)	---	---	12	7	---

Source: New Lands Development Study, Vol. 1: Main Report, National Agriculture Research Project, New Initiatives Component, Ministry of Agriculture and Land Reclamation, USAID, Egypt, April 1994.

[1] Mean Small Farmers, including investors, graduates, smallholders (1993).
[2] Top achieving 5 percent of small- and medium-size farms (1993).
[3] Estimates of technically feasible yields based on new land research data and scientists estimates (1993).
[4] National mean (1991-1992).
[5] Very large farms with significant post-harvest operations.
[6] Winter/summer crop data shown.

Table A-11: Relative Share of the New Lands Production at the National Level, 1992

Crop	Production		
	New Land (unit)	Total (unit)	Relative Share (%)
Wheat (A)	1,663,982	30,786,647	5.0
P. Berseem (T)	45,860	42,225,421	0.1
Barley (T)	190,040	1,778,422	11.0
Broad beans (A)	11,192	1,387,136	0.8
Lentils (A)	26	65,933	---
Fenugreen (A)	961	57,866	2.0
Chickpeas (A)	4	67,293	---
Lupines (A)	188	37,165	0.5
Onion (T)	14,940	276,112	0.5
Garlic (T)	26	65,933	---
Sugar beets (T)	119,326	743,933	16.0
Tomatoes (T)	170,725	1,607,494	11.0
Corn (A)	81,416	31,648,501	0.3
Sorghum (A)	13,519	5,260,501	0.3
Peanuts (A)	2,637	404,662	0.7
Sesame (A)	9,068	235,795	4.0
Alfalfa (T)	292,377	600,474	49.0
Green forage — Nili	4,656	876,699	0.5
Green forage — summer	6,458	1,330,154	0.5
Green forage — winter	4,000	5,441	74.0
Squash (T)	5,606	103,405	5.0
Green peas (T)	63,821	173,216	2.2
Eggplant (T)	9,488	95,020	10.0
Pepper (T)	10,377	64,656	16.0
Strawberry (T)	13	25,106	---
Cucumber (T)	954	24,910	4.0
Green beans (T)	3,219	46,425	7.0

Source: Ministry of Agriculture, Economic Sector, Central Agency for Agricultural Economics, Annual Statistical Bulletin, 1992.

Table A-12: Share of the New Lands in Area and Production of Vegetables in Egypt by Season, 1993

		Area (feddan)	Production (ton)
Winter vegetables			
(1)	New Land	59,931	568,073
(2)	Old Land	295,324	2,876,603
	(1)/(2) x 100	20%	20%
(3)	Desert governorates	5,878	42,554
(4)	Total Egypt	361,133	3,487,230
(5)	(1)/(4) x 100	17%	16%
Summer vegetables			
(1)	New Land	48,718	529,752
(2)	Old Land	232,878	2,383,581
	(1)/(2) x 100	21%	22%
(3)	Desert governorates	2,151	14,275
(4)	Total Egypt	283,747	2,927,608
(5)	(1)/(4) x 100	17%	18%

Source: Ministry of Agriculture, Economic Sector, Central Administration for Agricultural Economics. Annual Statistical Bulletin, 1993.

Table A-13: Share of New Lands in National Production of Fruits, 1992 and 1993

Crop	Area (000 feddan)		Production (ton)	
	1992	1993	1992	1993
Total orchards in new land	251,159	252,317	553,802	688,926
Total orchards in Egypt	906,508	911,002	4,740,464	4,486,054
% new land	28%	28%	12%	12%
Citrus in new land	74,771	75,065	121,228	89,684
Citrus in Egypt	352,892	348,340	2,425,976	1,857,306
%	22%	22%	5%	5%
Grapes in new land	58,883	59,321	110,613	145,022
Grapes in Egypt	137,851	138,972	658,061	726,082
%	43%	43%	17%	20%
Mangoes in new land	7,915	7,915	2,922	4,550
Mangoes in Egypt	53,672	53,875	178,817	196,775
%	9%	9%	13%	13%
Bananas in new land	3,051	3,057	51,436	51,463
Bananas in Egypt	33,839	32,795	396,497	405,237
%	9%	9%	13%	13%
Figs in new land	5,533	5,533	7,310	8,375
Figs in Egypt	41,877	42,158	153,373	159,512
%	13%	13%	5%	5%
Gwafa in new land	3,836	3,836	8,460	14,956
Gwafa in Egypt	29,775	30,506	233,330	213,041
%	13%	13%	4%	7%
Pomarade in new land	1,309	1,309	920	1,813
Pomarade in Egypt	5,395	5,563	34,067	33,728
%	24%	24%	3%	3%
Apricot in new land	254	254	35	397

Table A-13: Share of New Lands in National Production of Fruits, 1992 and 1993

Crop	Area (000 feddan)		Production (ton)	
	1992	1993	1992	1993
Apricot in Egypt	6,956	6,996	44,833	40,687
%	4%	4%	---	1%
Pears in new land	4,183	4,183	13,899	13,899
Pears in Egypt	17,962	18,267	92,925	81,081
%	23%	23%	15%	17%
Apples in new land	49,067	49,067	172,540	248,896
Apples in Egypt	69,976	69,828	260,797	354,311
%	70%	70%	66%	70%
Peaches in new land	14,227	14,227	46,141	77,283
Peaches in Egypt	69,664	69,907	110,567	226,700
%	20%	20%	42%	34%
Prunes in new land	819	819	308	777
Prunes in Egypt	8,089	8,130	30,698	53,382
%	10%	10%	1%	1%
Olives in new land	23,301	27,201	17,985	31,811
Olives in Egypt	53,985	63,796	94,991	111,687
%	43%	43%	19%	28%

Source: Ministry of Agriculture, Economic Sector, Central Administration for Agricultural Economics, Agricultural Economics Statistical Bulletins, 1991 and 1992.

Table A-14: Agricultural Income (Plant, Animal, Fisheries) in Old and New Lands , 1991-1992 (LE million)

	Old Lands		New Lands		Total	
	1991	1992	1991	1992	1991	1992
Value of plant production	18,489	19,946	881	1,339	19,370	21,285
(%)	(95.5)	(93.7)	(4.5)	(6.3)	(100.0)	(100.0)
Value of inputs for plant production (%)	2,233	2,408	106	149	2,339	2,557
	(95.5)	(94.2)	(4.5)	(5.8)	(100.0)	(100.0)
Net income (%)	16,256	17,538	775	1,190	17,031	18,728
	(95.4)	(93.6)	(4.6)	(6.3)	(100.0)	(100.0)
Value of animal production	6,765	8,063	227	314	6,992	8,377
(%)	(96.8)	(96.3)	(3.2)	(3.7)	(100.0)	(100.0)
Value of inputs for animal production (%)	4,591	5,103	130	176	4,721	5,279
	(97.2)	(96.7)	(2.8)	(3.3)	(100.0)	(100.0)
Net income (%)	2,174	2,960	97	138	2,271	3,098
	(95.7)	(95.5)	(4.3)	(4.5)	(100.0)	(100.0)
Value of agricultural production (%)	26,422	29,265	1,228	1,698	27,650	30,963
	(95.6)	(94.5)	(4.4)	(5.5)	(100.0)	(100.0)
Value of inputs (%)	6,934	7,625	244	329	7,178	7,954
	(96.6)	(95.9)	(3.4)	(4.1)	(100.0)	(100.0)
Net agricultural income (%)	19,488	21,640	984	1,369	20,472	23,009
	(95.2)	(94.1)	(4.8)	(5.9)	(100.0)	(100.0)
Value of field crops (%)	12,420	13,995	259	358	12,679	14,353
	(98.0)	(97.5)	(2.0)	(2.5)	(100.0)	(100.0)
Value of vegetable production (%)	3,137	2,898	52	170	3,189	3,068
	(98.4)	(94.5)	(1.6)	(5.5)	(100.0)	(100.0)
Value of fruit production	2,660	2,875	569	810	3,229	3,685
(%)	(82.4)	(78.0)	(17.6)	(22.0)	(100.0)	(100.0)
Other crops (%)	273	178	---	1	273	179
	(100.0)	(99.4)	---	(0.6)	(100.0)	(100.0)

Source: Ministry of Agriculture, Department of Agricultural Economics, unpublished data.

Table A-15: Value of the Components of Animal Production, 1991 and 1992 (LE million)

	Old Lands		New Lands		Total	
	1991	1992	1991	1992	1991	1992
Cattle meat (%)	2,924 (94.8)	3,339 (94.2)	159 (5.2)	205 (5.8)	3,083 (100.0)	3,544 (100.0)
Poultry meat (%)	1,019 (98.5)	1,111 (95.9)	16 (1.5)	48 (4.1)	1,035 (100.0)	1,159 (100.0)
Dairy (%)	1,894 (98.6)	2,554 (98.8)	27 (1.4)	32 (1.2)	1,921 (100.0)	2,586 (100.0)
Poultry eggs (%)	475 (98.5)	443 (97.4)	7 (1.5)	12 (2.6)	482 (100.0)	455 (100.0)
Wool and hair (%)	19 (86.4)	39 (76.5)	3 (13.6)	12 (23.5)	22 (100.0)	51 (100.0)
Bee honey and wax (%)	51 (83.6)	75 (100.0)	10 (16.4)	0.032 (---)	61 (100.0)	75 (100.0)
Manure (%)	383 (98.7)	502 (99.0)	37 (1.3)	5 (1.0)	420 (100.0)	507 (100.0)

Source: Ministry of Agriculture, Economic Sector, unpublished data.

Table A–16: Cropped Area by Feddan, 1952, 1987, 1991, 1992, and 1993 (000 feddans)

		1952	1987	1991	1992	1993
(1)	Winter	4,364 (86)	5,098 (100)	5,759 (113)	5,807 (114)	5,777 (113)
(2)	Summer + Nili	4,850 (85)	5,705 (100)	5,911 (97)	5,776 (101)	6,034 (106)
(3)	Summer + Nili + winter	9,214 (117)	10,803 (100)	11,670 (108)	16,583 (107)	11,811 (109)
(4)	Orchards	94 (15)	616 (100)	896 (145)	907 (147)	911 (148)
(5)	Sum of (2) + (4) maximum area in use	4,944	6,321	6,807	6,683	6,945
(5)	Sum of (1) + (4)	4,458	5,714	6,655	6,714	6,688

Sources: (1.) 1952, 1987, 1991: New Lands Development Study, Vol. 1: Main Report, Egypt, 1994. (2.) 1992, 1993: Ministry of Agriculture, Economic Sector, Central Administration for Agricultural Economics, Agricultural Economic Statistical Bulletin, 1992 and 1993.

Table A-17: Indicative Cropping Pattern in the Old Land Plan, 1994/95 and 1995/96

Crop	Area (000 feddan)	
	1994/1995	1995/1996
Grains		
Winter crops:		
Wheat	2,000	2,100
Barley	80	80
Summer crops:		
Corn (summer + Nili)	2,000	2,000
Sorghum (summer + Nili)	300	370
Rice	1,000	1,000
Yellow corn	150	100
Total	5,380	5,650
Legumes:		
Beans	350	350
Lentils	20	20
Chickpeas	10	10
Lupines	15	15
Fenugreen	15	15
Total	415	415
Fibers:		
Cotton	900	900
Linen	30	30
Total	930	930
Oilseeds:		
Peanuts	30	35
Soya beans	100	70
Sesame	50	50
Sunflower	100	75
Total	280	230

Table A-17: Indicative Cropping Pattern in the Old Land Plan, 1994/95 and 1995/96

Crop	Area (000 feddan)	
	1994/1995	1995/1996
Sugar crops:		
Sugarcane	275	275
Sugar beats	50	70
Total	325	345
Vegetables:		
Winter vegetables	325	325
Summer vegetables	480	480
Nili vegetables	160	160
Potatoes (Nili)	120	120
Total	1,085	1,085
Forage Crops:		
Permanent beseem	1,550	1,400
Short beseem	800	800
Total	2,350	2,350
Others:		
Onion	50	50
Garlic	20	20
Other crops	560	555
Total	630	625
Orchards	564	564
GRAND TOTAL	11,959	12,044

Table A-17: Indicative Cropping Pattern in the Old Land Plan, 1994/95 and 1995/96

Crop	Area (000 feddan)	
	1994/1995	1995/1996
Winter Season		
Permanent Beseem	200	100
Wheat	200	400
Barley	200	250
Lentils	5	5
Onions	15	15
Vegetables	275	150
Sugar beets	10	10
Others	130	95
Total	1,035	1,025
Summer + Nili Season		
Corn	70	100
Sorghum	25	30
Peanuts	60	80
Sesame	50	40
Sunflower	50	25
Vegetables	350	300
Soya beans	15	10
Green forages	100	175
Others		85
Total	720	845
Alfalfa	50	25
Orchards	365	500
West Coast + Sinai (Wheat)	200	525
Total cropping area	2,370	2,395

Source: Ministry of Agriculture, Economic Sector, Central Administration for Agricultural Economics. unpublished data.

ANNEX II: STRENGTHENING AGRIBUSINESS

M. R. El-Amir

Introduction

In order to deal with the strategy for Egyptian agriculture, capable of achieving the anticipated goals for agricultural development, it is useful to consider the agricultural industry from the agribusiness view. This implies that agriculture is composed of three interrelated sectors: the farming sector, the prelinkages or the prefarming sector, and the post-harvest sector. While the farming is the pivotal sector directly involved with input-output relationships and farm management decisions, the two other sectors with agribusiness ties relating the three sectors are of vital importance. The pre-harvest sector deals with manufacturing and trade in farm inputs (fertilizers, chemicals, machinery, fuel, seed, feed, credit, etc.) The post-harvest sector deals with marketing and manufacturing of agricultural outputs. With the economic policies and agricultural economic policies geared towards market-driven forces, the states' role started to set the conducive environment for the working of a free market economy. Under these circumstances, it is important to shed lights on the nature of interrelationships among the various sectors of the agricultural industry in Egypt and to identify the major bottlenecks expected to face agricultural development in the near future. The following points represent a brief summary of the situation.

- The line of causation with regard to the agricultural economic activities starts with the final consumer markets where final effective demands (both in the domestic and international markets) and supplies interact to generate price signals. These price signals find its way to the farming and farm supply sectors. The generation of the conducive and relevant price signals and the movement of these signals among the relevant network of markets in the agricultural sector depends on the efficiency and competitive forces in these markets.
- While the ultimate goal is to move towards privatization and free market economy in the Egyptian agricultural industry, the operational movement is to move first towards "liberalization" of both public and private activities during the "transitional phase." The reasons for that are as follows:
  (a) The dominant role of the Egyptian government in the agricultural industry since the 1950s in all three sectors—in particular, in the farm supply sector (credit facilities, input provision and distribution, feed, machinery, seed, etc.), farming sector (what to produce, how much to produce, where to produce, and how to market output), and the post-harvest sector (cooperative

[government] marketing system, processing industries [wheat and rice milling, sugarcane refineries, etc.]), domestic marketing activities, and exportation of major products.

(b) In the short run and during the transitional phase, and since things happen gradually and not "overnight," one can talk about both public and private sectors working under free market conditions. In fact, one can identify some complementary features among public and private sector firms in the transitional phase. Especially in the early stages of the transitional period. The private sector does not own needed packages of infrastructures to undertake activities. The public sector own these infrastructures and usually render relevant services to the private sector (examples are the port and inland silos needed to store imported wheat and yellow corn, milling facilities needed for wheat and rice, etc.). During the transitional period, the criteria to encourage or discourage both public and private firms and institutions would be "efficiency" in undertaking activities from the national point of view.

- The outcome of the experiences gained during the last two or three years in the agricultural production, processing industries, domestic marketing, as well as foreign trade, indicate the following:
  (a) the role of the private sector has increased significantly in the activities of the farm supply, farming, and post-harvest sectors;
  (b) attempts to capitalize on the lack of competitive features in some commodity markets by the private sector (lack of relevant market information, quality controls) and monitoring activities resulted in monopolistic behavior and market failures;
  (c) in several cases, the public sector behavior in the market demonstrated lack of ability to cope with the free market forces and hence the realization of losses.
- This experience calls for a more active role for the government in monitoring market activities at this phase. Currently, free marketing is a common goal for many countries around the world. However, the optimum set of policies, institutional set ups, and projects needed to achieve this goal differ from one country to the other. In each country, the appropriate measures have to be tailored to suit the particular circumstances of each country. Unfortunately, there is no general or ready-made package to be applied in all cases.

  The role of the state aims at creating conducive environment for the free market economy, to monitor market activities and address monopoly forces and market failures. This states' role is like the umpire's role in the ball game. This requires clear and known rules for the game by all parties concerned.

AGRIBUSINESS CONCEPT

As mentioned above, agriculture is composed of three interrelated sectors: the farming sector; the farm supply sector, including marketing and processing of farm inputs; and the post-harvest sector, including domestic and international marketing and the processing industries.

With the dramatic changes in Egyptian economic and political environment in the past decade, moving toward market-driven forces, profitability becomes the major objective of farmers and business throughout the economy. In this new environment, producers receive guidance from the final demand signals indicating end users preferences and wants. These signals find there way to post-harvest farming and farm supply sectors of the agribusiness sectors, i.e. final demand derives commodities through agribusiness sectors. The efficiency of producers to allocate their scarce resources under this free market conditions depends on the efficiency and competitiveness of the market. The role of the government institutions and employees under free marketing is to create a legal and regulatory environment conducive to economic efficiency and competition. It includes the provision of those services which private firms find it unprofitable to provide for themselves like education, vocational training, development and transfer of innovative technologies, production, trade and relevant economic statistics and information.[10]

In view of the experiences of 8 East Asian countries documented by a World Bank study (*The East Asian Miracle*, 1993), extremely high and sustained rates of economic growth have been achieved. The average rate of growth in Japan, the Republic of Korea, Hong Kong, Singapore, Thailand, Indonesia, Malaysia, Taiwan, China was about 5.5 percent. The study indicated that high rates of private domestic investment and rapidly growing human capital were the principal engines of growth and that these countries have provided a stable macroeconomic environment in the framework of a price-coordinated economy, promotion of domestic and international competition within a legal framework, an emphasis on exports, and an absence of price controls and price distortions. Agricultural policies stressed productivity changes through technological innovations and in excessive rural economy taxes. These results have been supported by the experience of Chili in 1973.

The liberalization of Egyptian economy as well as the liberalization of world agricultural markets presents great opportunities for Egypt. A major component of the requirements to exploit these opportunities in Egypt includes the development of agribusinesses with the goal of increasing the degree and effectiveness of coordination affecting productivity of the whole system as long as constraints and bottlenecks at any level of the system may lower overall system productivity, and conversely productivity increases

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[10] See, for example: Kelly Harrison, "Privatization and Costs and Efficiency of Marketing, Processing, and International Trade," Agricultural Policy Conference, Taking Stock Eight Years of Egyptian Policy Reforms, Ministry of Agriculture and Land Reform, PBDAC/APCP and USAID, March 20-28, 1995, Cairo, Egypt. Also, Kelly Harrison et al., "Market-Oriented Development for Major Horticultural Crops in Egypt," MOA, ARC, NAR, *Panorama*, Vol. 1, May 1994.

in one part of the system would increase efficiency and productivity of the whole system. After more than forty years of government intervention in agricultural economy and agribusiness system in Egypt, two major concerns are identified, farmers and business firms in agribusiness are free now to produce what they decide, they are not so far in position to take market-oriented decisions. This comes as a logical sequence of several reasons most important among which are: (a) farmers do not have enough experience and training to take such decisions; (b) they lack available reliable information regarding production, yield, and price of alternative crops in order to assess alternative crop-rotations-profit abilities; (c) there have been no effective efforts by the government to collect, analyze, and disseminate information about domestic and international markets for the benefit of farmers, market agents, and businessmen; (d) little effective research and extension work have been geared to guide farmers production decision at regional levels. It could be said that efforts should be directed by the government to assist farmers and market agents, processors, and exporters to become more market-oriented through education, information, research, and extension efforts. This will help change the behavior of participants in the agribusiness system in Egypt, both public and private, to appreciate the importance of being market-oriented and to gear commodity systems toward final market demand and quality expectations, coordinating actions needed to meet demands, and to pursue adjustments to maintain competitive situation in the market over time.

COMMODITY SYSTEM APPROACH

The following section focuses on three commodity subsectors, namely horticultural crops, extra long staple cotton, and smallholding livestock. The objectives are to provide an understanding of how the commodity subsystem are organized, potentialities for each commodity subsystem, the steps necessary to achieving the desired results, the critical bottlenecks to rapid increase in horticultural exports, and existing institutional set up in each case.

Horticultural Crops

Egypt is located at crossroads connecting east and west, as well as Europe to the north and Africa to the south. It has ideal climate and growing conditions for horticulture. International trade in horticultural products is expanding significantly. Between 1982 and 1991, the value of world trade in fruits and vegetables from $30 billion to $63 billion, i.e. 103 percent. There is strong evidence that the trend will continue. Major improvements in post-harvest technology, handling, and transportation greatly enhanced the ability to deliver fresh produce to distant consumers. The countries of the European Union (EU) are the world's

largest major importers of fresh fruits and vegetables. Their import growth rate is estimated between 1982 and 1991 at 143 percent. Spain has been the supplier of much of this increase after being admitted to EU in 1985. However Spain, Italy, and other EU countries on the Mediterranean have climatic limitations which prevent economical production of most fruits and vegetables during the winter season. Spanish production costs are rising rapidly. Therefore, there are profitable market windows for Egyptian fruits and vegetables during certain times of each year when non-EU countries can compete. The fact that Egypt is located at geographical proximity to the EU market is an important factor since transport costs for refrigerated fresh fruits and vegetables can be quite high and could exceed production costs. Less transportation costs in case of Egyptian exports to Europe could be the decisive factor in competition. Under the Uruguay GATT negotiations, the EU's restrictive trade measures and domestic production subsidies is expected to be reduced, making Egypt more competitive. Egypt has shipped fresh fruits and vegetables to all European countries, as well as Eastern European, former Soviet Union, Arabian Gulf states, East Africa, and to Asia/Pacific countries. Evidence suggest that Egypt can increase exports to those regions in the future. Prior to 1986, fresh fruit and vegetable exports in Egypt were mostly handled by state trading companies and principle sales arrangements were based on barter or counter trade with East Europe and the Soviet Union. Private sector has gradually taken over the main exporting function and has developed new commercial markets. Potatoes are the major vegetable export shipped mainly to the United Kingdom. Oranges represents the major exportable fruit shipped mainly to the Gulf states in recent years. In addition to the Western European market, in the longer run Eastern Europe and the former Soviet Union offer a huge market potential for Egyptian horticultural crops. Egypt's private sector doubled exports of citrus to this market during 1989-1991 compared with 1982. The Gulf and Arab markets and the southeast African markets could be expanded. It is expected that some Egyptian products could also be exported to the fast-growing Asian markets.

World Bank and Kelly Harrison's studies suggest that the most important engine of growth for Egypt in the next decade will be agricultural exports and in particular horticultural crops.[11]

Needed Developments in the Egyptian Horticultural Export Industry

To exploit opportunities available for the Egyptian horticultural exports, the following factors must be taken into considerations:

- The key is long-term commitment and investment in a carefully-planned market-oriented business. Exporters must identify relevant market windows, locate reliable and effective importer, determine ultimate consumer requirements (varieties preferred, quality levels expected, type of packing, quantities supplied per unit of time, and

[11] Kelly Harrison et al., "Market-Oriented Development for Major Horticultural Crops in Egypt," *Panorama*, Vol. 1, May 1994.

prices expected), discover least cost appropriate transportation method for each product, selection of a marketable variety with good post-harvest handling characteristics, and high-yield varieties assuring adequate return to the growers, local transporter, international transporter, importer, as well as exporter.

- Promotion of the exporter organizers' marketing arrangement consisting of larger farmers or nonfarm exporters with packing, fast cooling and export facilities, making contracts to export products from nearby farmers. This arrangement is emerging in Egypt especially in the new lands. Advantages of such arrangement include economies of scale in product marketing, security of regular demand for the output of farmers and for regular supply for the exporters. The development of such arrangement requires conducive government policies, training, technical assistance, market information, and export promotion programs.
- Promotion of the emergence and evolution of trade associations which serve as focal points for cooperation among participants in the marketing system working together as strategic partners improving their own profits by sharing information that will make all more efficient and more able to benefit from economies of scale operations. This is logical since the chain of production/marketing activities is only as strong as its weakest links. This induces commodity subsector participants to strengthen all links in the chain through cooperation to maximize profits for all.
- There should be a well-defined and clear role for the government in the market economy to create a macroeconomic legal and institutional environment promoting efficiency and equity among the market participants and assure that competitive forces are strong enough to avoid monopoly forces. Certain government regulations are needed to impose order on market participants and to promote the common good. The government undertakes actions promoting efficiency of the marketing system and considered costly for individual firms like basic research, education, training, information, and market infrastructure.
- There is a need to re-educate and re-orient many of the public institutions and those who manage them in order to cope with the new move towards market economy as these institutions have been geared to function for several decades under central government control of economy.

Institutional Set-Up

1. General Union for producers and exporters of horticultural crops
2. Egyptian export promotion center
3. Trade representation office (commercial attaches)
4. General organization for export and import control
5. Plant protection and quarantine
6. Government research, extension, and information
7. Agricultural research

8. Extension education
9. Management information
10. Financial institutions

General Union for Producers and Exporters of Horticultural Crops

Established in 1971, composed of public and private sector units, working in the field of horticultural production, cooperative societies and private-sector farm or producers of horticultural crops. The objectives are: (1) *scientific development of horticultural crops*—increasing horticultural crop areas in both public and private sectors, developing exports of horticultural crops; (2) *increasing horticulture producers income*—the responsibilities of the union include (a) conducting an annual study of foreign market demand for horticultural crops, (b) contracting foreign importers for Egyptian horticultural crops, (c) disseminating market information to all members and coordinating between members to achieve export goals, (d) providing needed facilities for members, (e) providing members with technical assistance in production and marketing stages, (f) establishing grading and packing houses, and (g) controlling local marketing. The union was given privileges to achieve its goals. However, little progress was made toward the goals. It is recommended to give the lead to the private sector.

Egyptian Export Promotion Center

Established in 1979 under the supervision of the Ministry of Economy and Foreign Trade. The objectives of the center are: (1) collection and dissemination of trade information to assist exporters; (2) to carry out studies and analysis of export potential; (3) preparation of technical and organizational recommendations needed to develop production and to eliminate obstacles in the way of exportation; (4) organizing training programs for the export sector; (5) collaboration with international and national organizations in the field of export promotion; and (6) cooperation in studies related to export incentives.

The center carried out the following functions: organizing trade missions, participating in trade fairs and exhibitions, organization buyers and sellers meetings, and organizing tours for Egyptian manufacturers and exporters. The center has not been effective in achieving its goals.

Trade Representation Office (Commercial Attache)

Commercial representatives are nominated by and responsible for the Ministry of Economy and Foreign Trade. They join Egyptian embassies in countries with significant political, economic, and commercial relationships with Egypt. The major role of the trade representative is to strengthen and promote economic and trade relationships with other

countries. The Cairo Trade Office tries to use overseas representatives to help Egyptian exporters identify export opportunities, seeking potential buyers for Egyptian exports. They help Egyptian exporters understand market regulations, quality demands, packaging and quantities demanded. They help arrange contacts with foreign buyers and in planning business trips for export promotion. The trade office helps participation of Egyptian exporters in overseas trade shows and exhibitions. Recently, the trade office is organizing a new international trade information system, maintaining access to international trade centers of horticultural products with the objective of providing updated information to Egyptian exporters.

General Organization for Export and Import Control

Established in 1961. An organ of the Ministry of Economy and Foreign Trade since 1975. It is responsible for inspection of food imports, and quality control of export and import of commodities. The latter function is conducted through a network of laboratories where mandatory tests are carried out on samples from imports and exports (to assure that commodities meet certain standards). This organization has authority to intervene in the affairs of the business community involved in international trade as follows: (1) maintenance of a register of all imports and exports for verification; (2) issuing a certificate of origin accepted by EU; and mandating the shipping, packaging, and labeling methods.

Plant Protection and Quarantine

This is a part of the plant protection department of the Ministry of Agriculture. Its role is to protect Egyptian agriculture from foreign pests and diseases, to perform sanitary inspections at the request of foreign governments, and to enforce Egyptian standards. There are 18 agricultural quarantine points in Egypt scattered in sea ports and airports.

Government Research, Extension, and Information

Most government-funded researches are carried out by the agricultural research centers (MOALR) and by the colleges of agriculture. The results of research activities are impressive. There is continuing need for agricultural research. In particular, multidisciplinary research teams, focused on market-oriented problems is needed at this stage and must be encouraged. In order to build a strong agricultural export industry, government must fund and encourage research. Priorities are given to the development of high-yielding varieties with marketable characteristics, resistance to plant diseases and pests, and good post-harvest handling characteristics. There are needs for researches in production costs and profitability under different conditions. Farmers and exporters need access to export market analysis as

well as domestic market analysis. Research systems pertaining to foreign and domestic markets analyses are very little and need to be encouraged.

CITRUS SUBSECTOR

Citrus is the leading fruit crop in Egypt. Total planted area increased from 197,000 feddan in 1981 to 348,340 feddan[12] in 1993 out of which 67,200 feddan in the new lands. There are two distinct areas of commercial citrus in Egypt: the Nile Valley and the Delta area, and the other is in the new lands. The technology used to produce citrus is significantly different in each area. In the old valley, citrus is produced in small lots 2-5 feddans in size. Soil is very fertile and cultural practices are performed by hand. In the new lands, citrus is produced on larger-sized plots, the soil is sandy and require more fertilizer. Irrigation is largely drip systems.

The yield per feddan of all varieties is below what could be achieved in a country like Egypt. There is considerable evidence that yields could be substantially increased due to the lack of inputs and intensive extensive efforts.

Yield of oranges per feddan is greater in the old valley than in the new lands. It is suggested that, with certain changes in technology, the yields per feddan may be greater in the new lands.

Annual cost of production (operating costs) are significantly higher in the new lands (estimate at LE 3,500 per feddan in the new lands compared with LE 2,770 per feddan in the old valley).

This is due to the higher costs of operating and maintaining the drip irrigation system in the new lands, while irrigation is considered free in the old valley. Profit analysis in the old valley indicates that, at a current price of LE 400 per ton, the break-even point is attained at a production level of seven tons per feddan. This implies that many farmers are not making profits and they survive only because they own their lands and do not pay "cash" rent. As for the new lands, assuming a price of LE 300 per ton, none of the producers will attain break-even point. Under the current level of farmgate prices, citrus producers are able to attain break-even point if they produce 9 tons per feddan. Ignoring land rents shifts the break-even point to seven tons per feddan.

This explains the situation of smallholders and graduates not able to apply necessary recommendations to use more inputs. Therefore, most of the small investors found it difficult to continue. Larger investors who can afford to use more inputs, get more yields, and hence make profits from citrus in the new lands.

The most common marketing system of citrus is the "kilala" system where the purchaser takes responsibility for the orchard before full maturity of fruits. Usually farmgate

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[12] Agricultural Economics, Annual Bulletin, Agricultural Economic Sector, Ministry of Agriculture, 1993, Cairo, Egypt, Table 108, p. 286.

prices under this system are generally low as the producer avoids undertaking some marketing services like guarding, picking, sorting, transportation, and packing. In addition, this system is linked to the credit needs of producers. There is a tendency in each production area for a merchant to monopolize marketing operations which is not in favor of producers.

General observations indicate that the percentage marketing margin is about 47 percent. Wholesalers perform the functions of buying, selling, packing, and financing. Grading is done by retailers.

Mechanical damage in the domestic marketing of fruits is caused mainly during harvesting, packing, and transportation. It is therefore recommended to improve packing, roads, and equipped vehicles essential for efficient transportation.

Projection of domestic and total production up to the year 2000 indicates that existence of exportable surplus of oranges estimated at one-half million tons by the year 2000. The last decade has witnessed a significant changes in the Egyptian orange export market. While the former Soviet Union and Eastern European countries were the main importers absorbing more than 60 percent of Egyptian oranges in 1978/88, Russian imports decreased to 34,000 tons by 1992/93. In the same time, Saudi Arabia and the Arab Gulf states became the main importers of Egyptian citrus. Saudi Arabian market expanded from 41,000 tons in 1987/88 to 136,000 tons in 1992/93. Because the Egyptian orange market is very short (December to April), Egyptian growers should plant more earlier or later maturing varieties to expand the export season.

Market windows are available for Egyptian exporters in the German, United Kingdom, the Netherlands, and Belgium markets throughout the year.

FRUITS AND VEGETABLES AGRO-INDUSTRIES

There are two major state-owned fruit and vegetable processors. In addition, there are several small-scale private processors, including tomatoes and potato processing joint ventures with international companies.

Fresh fruit exporters are considered also agro-industries, because they undertake important post-harvest steps like grading, selection, packing, fast cooling, and transportation.

Development of Market System

In addition to the public-sector companies, private exporting and processing companies are emerging and will continue to emerge with the characteristics needed for successful exporters of fruits and vegetables. They must control every stage in the production and marketing processes to assure the delivery of the product buyers demand. Marketing begins when the grower decides what variety of produce and when to plant.

COTTON SUBSECTOR

Cotton has long been one of the most important crops in Egypt. It has been a major source of foreign exchange and of income for farmers. Cotton is a key determinant of crop rotation in Egyptian agriculture. Most, if not all, of Egyptian cotton production is extra long and long staple varieties (extra fine cotton varieties).

Production of cotton declined significantly from 1980 to 1989 as a result of law farmgate prices. Lint cotton exports decreased from 1970 to 1992, because of the lack of competitive prices in the international market. State-owned textile mills increased their use of extra fine cotton on the expense of exports. Egypt would market share of extra fine cotton shrank from about 60 percent in the 1980s to about 11 percent in 1992. This was accompanied by increases of the shares of other countries producing long staple cottons.

The Marketing System

The almost complete domination of the marketing and processing systems of cotton by public sector came to an end recently. Private companies started to emerge in the fields of marketing and processing in addition to the private companies existing already in knitting and garment production.

Agro-industries

The state cotton companies have been organized under four different holding companies. Each holding company has at least one affiliated company specialized in trading, ginning, and manufacturing. All companies are involved in spinning and weaving. Many are engaged in knitting, dyeing, finishing, and ready-made garments. About 25 manufacturing companies are large, vertically integrated. Most of the companies suffer from over capacity of spinning and over-investment. Private-owned and -managed companies dominate in knitting and garment production segments. There are large numbers of small firms in the industry.[13]

Exports

The rapid decline in raw cotton exports, as mentioned, was caused by Egyptian administrative uncompetitive pricing system in the international market. Egypt still has an

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[13] Ministry of Agriculture and Land Reclamation, PBDAC/APCP, USAID, Kelly Harrison, "Privatization and Costs and Efficiency of Marketing, Processing, and International Trade," Agricultural Policy Conference, March 1995.

international comparative economic advantage in the production and international trade of extra fine cotton. Egyptian textile products could also be competitive in the international market. This would be achieved if the market-oriented approach is followed by the participants in the system (both public and private) in Egypt. That means all behavior in the export of ELS cotton from Egypt should be oriented toward identifying profitable market demand and quality expectations with appropriate prices and coordinating actions to meet that demand and to continue over time making necessary adjustments required to stay competitive in the world market.

A Note on the International Demand for Egyptian Cotton

The setting of inappropriate high administrative prices resulted in the decline of demand for the Egyptian ELS (extra long staple cotton), decline of cotton production levels, and encouraged the development of foreign export cottons which compete with Egyptian types (Acala and pima cotton) in the United States, China, India, former Soviet Union, and Israel.

The demand for Egyptian cotton in recent years has been more elastic than before, because of the availability of close substitutes. In addition, the size of the market has shrunk over the past decade. This trend could be reversed provided that a complete restructuring of the marketing policies and liberalization of the cotton industry, and a breeding and agronomic R&D programs for cotton is carried out to improve fiber attributes of the Egyptian cotton, reduce production and marketing cost, and increase yields (Ministry of Agriculture, 1992). The recent policy changes freeing prices, eliminating subsidies, and beginning the liberalization process are an excellent start towards correcting the situation in the Egyptian cotton industry. The strategy suggested to achieve the liberalization goal includes two phases. Phase I includes implementing measures with respect to policies, institutions, and liberalization of companies or operating divisions attractive to market-oriented participants, down-sizing spinning segments of the industry. Phase II involves restructuring and divesting companies less attractive to market-oriented participants. It includes implementing management controls with technical partners or negotiating performance contracts between GOE and the public companies to raise company performance and market value.

To assist in the implementation of that strategy, an economic intelligence system is needed to provide decision-makers with the information needed to make profitable decisions (product characteristics and quality, pricing, promotion, physical distribution, production, and marketing technology). The time needed to achieve these goals will depend on the ability to address the technical and economic problems. More important, the time needed to neutralize the political problems resulting from reduced industry employment associated with the implementation of the new system. In an efficient market-oriented environment, many employees can be re-employed in labor-intensive garment activity and in other parts of the industry. The implementation of similar market-oriented strategy in other parts of the food and fiber systems in Egypt will create more jobs as the agribusiness part of the economy moves towards exploiting its comparative advantages in domestic and international markets.

Table A–18: Estimates of Elasticities of International Demand for Egyptian ELS and LS

Author	Period	Elasticity
Tigpen (1978)	1955-1976	ELS — 0.66
Heckerman, Khesh, and Kein El-Din (1982)	1970-1980	ELS — 1.24
Levy (1983)		ELS — 1.42 LS — 1.66
World Bank (1991), weighted elasticity		ELS — 2.18

Source: Ministry of Agriculture, PBDAC/APCP. 1992. "An Assessment of the Potential Liberalization of the Cotton Production, Trade, and Ginning Sector.

* It has been noted that elasticities are generally higher for the developed countries than for the developing countries reflecting the use of more modern processing facilities enabling spinners in these countries to respond more rapidly to changes in prices of cotton.

SMALLHOLDER LIVESTOCK SECTOR[14]

The cattle herd in Egypt is maintained primarily for milk production with meat production of secondary importance. About 90 percent of the animals are owned by smallholder farmers with 1-3 cows per farm. Most small farm livestock enterprises return significant earnings over labor costs and represent a profitable way to market family labor, otherwise not contributing financially and to utilize farm by-products and waste economically. Livestock and livestock products are important for income flow point of view since they can be marketed between crop harvests and can provide supplements to the family diet. It has been estimated that the farmer's IRR increased on smallholder farms in Ismailia from 14 to 24 percent when a typical livestock enterprise was added and that the typical average value of livestock production per small farm with livestock was LE 300 to LE 500 per feddan. Most small farm livestock was a low cash input enterprise. Almost half of the smallholders had livestock but very few graduates have livestock. Finance is a main reason for many smallholders to keep livestock (MOA, 1994). Generally forage and grain per feed are produced on the farm. mixed feed used for meat production by small farmers is very limited. The meat supply is generated by the slaughter of culled cows that are no longer fit for milk production and the sale of calves. Normally, the smallholder farmers slaughter young calves for veal at weights of 70-80 kilograms in order to maximize marketable supplies of milk and to generate cash from the sale of veal. In the mid-1980s, GOE became concerned about the

[14] Kelly Harrison, "Privatization and Costs and Efficiency of Marketing Processing and International Trade," Agricultural Policy Conference, MOA, PBDAC, PCPC, and USAID, March 1995.

short domestic meat production and the waste of resources in terms of domestic meat yields as a result of slaughtering very young calves before economically optimal weight. The government, therefore, developed the National Calves Fattening Project to encourage the growing and fattening of calves through an integrated system of subsidies. That project succeeded in expanding domestic meat production and in reducing meat imports. The project was modified in 1993.

Because all feed must be produced using irrigated land that have more profitable uses currently, there is a concern as to how much meat small farmers will be able to produce in the future. Projections based on the past are not useful, because price relationships and hence profitability of various alternatives will change after freeing farmgate prices and government controls over land use. Roughage availability, cost, and least-cost ration formulation will be critical in this situation.

Farm animals are typically purchased by wholesalers at livestock markets, arrange for slaughter at a public or private slaughter house and sell the product to butchers and other retailers. Private facilities are called off, slaughter houses handle about a third of domestic slaughter.

Some studies indicate that few wholesalers (12-15) control the Cairo and Alexandria markets through which 45 percent of the red meat is sold. They use their superior market information to maximize their own profits and squeeze the margins of other participants (producers and retailers).

Agro-industries

The total feed mill capacity in Egypt is estimated at 4.5 million tons per year. Over the last five years, capacity has never exceeded 50 percent. Most of the mills are state-owned. Twenty-one feed mill produce ruminant feeds. Until 1992, feeds were subsidized. Currently, and consistent with the adopted policy, feed prices have been liberalized completely, i.e. are not subsidized.

- There are approximately 405 slaughter facilities in Egypt, of which 300 are official slaughter houses.
- There are 8 industrial plants in Cairo and Alexandria, which handle 40 percent of total slaughter. Four modern slaughter houses have been developed to improve the sate of technology and hygienic standards, but they are not used up to the installed capacity.
- There are 110 licensed meat processing plants, mostly handling imported meats.

Market Development

Liberalization and privatization of state-owned feed mills and slaughter houses will create an opportunity for market evolution most likely by slaughter plants.

The state has an important role to play to develop the industry, including encouragement of calf grow-out and fattening, liberalization of feed mills and slaughter houses, enforcement of a new set of plant hygiene regulations, developing tariff system consistent with GATT regulations to prevent the importation of products at prices below full cost of production, provision of educational programs for system participants in methods and benefits of vertical coordination and integration, and provision of information on current and future demand, production, imports, exports, prices, and market structure evolution to increase the efficiency of agribusinesses.

ANNEX III: THE LABOR MARKET IN EGYPT

R. El-Saadany

1. About 57.556 thousand persons are estimated to be living in Egypt at January 1994. According to 1986 census population was given as 48254 thousand persons of which 24.7 million were males and 23.5 were females up to 56.0 percent of total population live in rural areas.

2. According to the 1986 census, 63 percent of the population are among 12 years old and 65. Children under 6 are almost 20 percent, youths among 6–12 years are 15 percent and almost 3 percent are 65 years old and more.

3. The proportions of the population who are members of the labor force were 28.2 percent in 1986, but the components by sex are such that 47.8 percent of males and 8.9 percent of females of the age group 6 years and above are considered in the labor force. This means that out of all the population of Egypt, above age 6 less than half of the males and less than one tenth of the females are members of the labor force, as shown in Table A-19.

4. Thus labor force of Egypt in 1986 was 13,6 million persons of which 11.5 millions' males and only 2.1 million are females.

Perhaps one of the significant aspects of these figures is that 63 percent of the female labor force (1333 thousand females) are in Urban areas as compared to only 44 percent of the male labor force. (Table A-19)

Table A–19: Urban/Rural Population, Labor Unemployment by Sex, in 1986

Items	Population (000)	Labor Force (000)	%	Unemployment (000)	%
Urban M	10,909	5,106	46.9	562	11.0
F	10,307	1,333	12.9	464	35.0
Sum	21,216	6,439	30.4	1,026	16.0
Rural M	13,800	6,401	46.4	596	9.0
F	13,238	770	5.8	388	50.0
Sum	27,038	7,171	26.5	984	14.0
Total M	24,709	11,508	47.8	1159	10.0
F	23,545	2,102	8.9	852	40.0
Sum	48,254	13,610	28.2	2011	15.0

Source : CAPMAS, Census of Population, 1986.

5. Although the male labor force ratio is much higher than the female labor force in 1986, the difference between the two ratios has been narrowing by time as may be seen from Table A-20. The decrease in the male ratio is attributed to higher emigration incidence among males than among females, whereas the increase in female participation ratios, in the labor force may be due to rise of female education.

6. The Egyptian labor force has increased between 1976 and 1986, in 10 years from 10982 thousand to 13610 thousand at an implicit rate of 2.2 percent annual increase.

Table A–20: Differential Ratios of Labor Force (6 Years and Over) to Total Population by Sex 1960, 1976 and 1980

Year	Males	Females	Total
1960	55.0	4.8	30.1
1976	53.6	5.5	30.0
1986	46.7	8.9	28.2

Source: CAPMAS.

7. According to 1986 census:

Unemployment in Urban Egypt is	1,026,820	=	16 %
Unemployment in Urban Egypt is	984,537	=	14 %
Unemployment in total	2,011,357	=	15 %
Unemployment in males in Urban labor force		=	11 %
Unemployment in males in Rural labor force		=	9 %
Unemployment in female in Urban labor force		=	35 %
Unemployment in female in Rural labor force		=	50 %

Unemployment in males 1.1 million represent 10% of male labor force
Unemployment in female 0.85 million represent 40% of female labor force
Unemployment ratio is about 15% in 1986.

8. Number of jobs filled during 1976–1986:

Unemployment in 1976 equal 7.7 %

= 10.982 mill. x 0.077 = 845614 Persons

Adding this to the increase in size of force during 1976–1986 (2,627,891 persons) and deducting the number unemployed in 1986 (2,011,357 persons), this gives the number of jobs filled in these 10 years

2,627,891 + 845,614 – 2,011,357 = 1,462,148 persons
(i.e., less than 15,000 jobs per year.)

It has been estimated that the number of new jobs needed every year to absorb the growth in the total labor force annually cannot be less than 450,000 jobs per year, this means that the number of unemployed will *ceteris paribus* increase.

9. Labor force in Egypt are distributed:

(A) By economic activity (sectoral distribution)

(B) By occupational category

Table A-21 shows the distribution by economic activity, agriculture is the largest and most popular absorbing sector from 57 percent to 48 percent to 38 percent across the years 1960 to 1986.

Table A-22 shows the occupational distribution of labor force since 1960. It shows a decreasing trend of farmers and sales men.

Table A–21: Sectoral Distribution of Egypt Labor Force, 1960, 1976 and 1986

	1960	1976	1986
Sectoral Distribution			
Agric. Fishing and Hunting	57.1	47.7	37.6
Mining and Quarrying	0.3	0.3	0.4
Manufacturing industry	8.1	13.3	12.2
Gas, Electricity & Water	0.2	0.6	0.7
Construction	2.1	4.1	6.7
Commerce, Restaurants & Hotels	8.7	8.4	7.0
Transportation, Storage & Communications	3.3	4.7	5.3
Finance. Insur. and Busin. Services	0.9	0.9	1.8
Social Services	17.8	18.2	21.5
Not Specified	1.5	1.8	6.8
Grand Total %	100.0	100.0	100.0
Grand Total (000)	7,677.5	10,229.0	12,148.0

Source: CAPMAS.

Table A-22: Occupational Characteristics of the Egyptian Labor Force 1960, 1976 and 1986

Occupational Characteristic	15 Years and Above		
	1960	1976	1986
Professionals	3.2	7.8	11.7
Admins. & Managerial	0.5	1.2	0.9
Clerks	4.6	7.6	7.7
Sales Men	8.2	6.8	4.8
Services	9.8	8.8	6.3
Farmers, Fishing, Hunting	54.0	43.6	32.1
Production & Related Process	18.2	22.2	21.5
Not Specified	1.5	2.0	15.0
Total	100.0	100.0	100.0
Grand Total (000)	6,783.3	9,238.4	12,854.0

Source: CAPMAS.

THE GROWTH OF SUPPLY AND DEMAND OF AGRICULTURAL AND NON-AGRICULTURAL LABOR

Table A-23 shows that agricultural labor force has increased between 1986 and 1991 annually by about 0.7 percent, while labor force in non-agricultural sectors increase by about 4.2 percent annually. As a result the contribution of agricultural labor in the national economy has declined from 38.7 percent in 1986 to 34.7 percent in 1991. The higher rate of increase in the non-agricultural sectors and the relative decline in the percentage of labor in agriculture are due to the migration from rural to urban areas.

Table A-24 gives the labor requirements of crops and livestock subsectors and indicates that crop production of 1991 required 60 percent, 29 percent and 82 percent of the total men, women and child's labor requirements of the Egyptian agriculture, while the requirement of the livestock subsectors amounted 40 percent, 71 percent and 18 percent of the total need for the three categories of agricultural labor. These show that livestock production depends largely on the labor of women.

Table A–23: Supply of Agricultural and Non-agricultural Labor Force, 1986–1991 (000 Laborers)

Items	1986 M.	W.	CH.	Total	1991 M.	W.	CH.	Total	Gr.Rate
Agric Sector	4,064	125	344	4,533	4,208	130	356	4,694	0.7
Non Agric. Sector	5,984	1,052	156	7,152	7,384	1,227	221	8,832	4.2
National Econ.	10,048	1,177	500	11,725	11,592	1,357	577	13,526	2.9

M. = Men, W. = Women, CH. = Children
Source: Chemonics International, verification reports, 1994.

Table A–24: Total Demand for Agric. Labor during 1991 (Million of Days)

Month	Crop Requirement M.	W.	CH.	Livestock Requirement M.	W.	CH.	Total Requirement M.	W.	CH.
November	26.8	6.3	8.0	18.9	18.9	1.7	45.7	25.2	9.7
December	29.2	5.0	6.0	23.2	21.3	1.7	52.4	26.5	7.7
January	26.9	4.4	6.0	29.2	22.3	3.4	56.1	26.7	9.4
February	33.2	5.6	7.2	28.3	21.5	3.4	61.5	27.1	10.6
March	25.0	3.8	4.0	30.1	23.2	3.4	55.1	27.0	7.4
April	46.5	4.0	4.5	29.2	22.3	3.4	75.7	26.3	7.9
May	61.6	4.2	13.7	26.6	22.3	3.4	88.2	26.5	17.1
June	52.8	14.6	36.0	20.6	18.9	1.7	73.4	33.5	37.7
July	25.9	16.0	16.2	20.6	18.0	1.7	46.5	34.0	17.9
August	25.6	5.0	4.0	20.6	15.5	1.7	46.2	20.5	5.9
September	26.7	20.3	22.0	16.3	13.7	1.7	43.0	34.0	23.7
October	40.6	5.7	6.0	16.3	13.7	1.7	56.9	19.4	7.7
Total	420.8	94.9	133.6	279.9	231.8	28.9	700.7	326.7	162.9
Percent	60.1	29.0	82.2	39.9	71.0	17.8	—	—	—

Source: Chemonics International, verification reports, 1994.

ANNUAL GROWTH OF EGYPTIAN POPULATION, AND FORECASTING

Table A-25 gives information about the growth rates of population between census years and the distribution of population between rural and urban areas.

The growth rate between census years during the last 80 years has fluctuated with increasing tendency until it reached its peak point (2.8 percent annually) between 1976–86.

Table A-26 shows that growth rate of population (the natural increase) slowed-down after 1986 to reach 2.13 percent in 1993. The ministry of population announced that natural growth rate of population in 1993-1994 amounts only 2.0 percent.

* Projections for the year 2000 assuming 2.0 percent growth rate till the year 2000 gives:

Size of population in 2000 = 68419 thousand persons.

* Projection assuming a decline in growth according to the exponential function that describes the development of population size during the period 1986 to 1993 gives a projected growth rate starts by 2.13 percent in 1993 and ending by 1.54 growth rate in the year 2000 and estimate:

Size of population in 2000 = 67648 thousand persons.

Table A–25: Population and Labor Force in Egypt, Population Size and Growth, 1902–1986

Years of Census	Pop. Mill.*	Total Mill.	Rural Total	% of Mill.	% of Total Population
1907	11.190	9.260	82.7	1.930	17.2
1917	12.718	----	----	----	----
1928	14.178	10.368	73.1	3.810	26.9
1937	15.921	11.429	71.8	4.492	28.2
1947	18.967	12.604	66.5	6.363	33.5
1960	26.085	16.120	61.5	9.965	38.2
1966	30.376	17.692	58.8	12.033	40.6
1976	36.627	20.590	56.2	16.037	43.8
1986	48.254	27.038	56.0	21.216	44.0
Growth Rates					
1907-1917	1.3				
1917-1927	1.1				
1927-1937	1.2				
1937-1947	1.8				
1947-1960	2.5				
1960-1966	2.6				
1966-1976	2.0				
1976-1986	2.8				

* Egyptians Living abroad are not included.
Source: CAPMAS, Population Censuses.

Table A–26: Estimation of Population of 1987-1993, Using Birth & Death Rates

Mid-Year	Pop. Estimated	Birth Rate		Death Rate		Natural Increase	
	000	000	%	000	%	000	%
1986	49,863	1,928	3.87	458	0.92	1,470	2.95
1987	51,349	1,923	3.74	468	0.91	1,455	2.83
1988	52,827	1,933	3.66	429	0.81	1,504	2.85
1989	54,210	1,743	3.22	417	0.77	1,326	2.45
1990	55,586	1,717	3.09	395	0.71	1,322	2.38
1991	56,898	1,761	3.10	430	0.76	1,331	2.34
1992	58,311	1,680	2.88	427	0.73	1,253	2.15
1993	59,563	1,682	2.82	409	6.90	1,273	2.13

* Egyptian living abroad are included.
* Figures of 1986 is from population census.
Source: CAPMAS.

ANNEX IV: THE LIVESTOCK SECTOR

R. El-Saadany

LIVESTOCK ON SMALL FARMS IN EGYPT

Livestock and milk production are of great importance for small farmers in Egypt. The major proportion of cattle in Egypt is kept in small holdings under traditional farming system and produces about 85% of total milk production. Egypt's livestock is maintained primarily for dairy production, with meat production of secondary importance. Buffaloes are the main dairy animal on conventional farms in Egypt. On an average, dairy buffaloes represent about 60% of the total dairy animals. Egyptian conventional small farmers hold buffaloes or native dairy cows for many objectives:

1. To increases the farm's income, Table A-27 gives the structure of farmer's house income by farm size and shows that dairy income is relatively important for small farmers.
2. To provides opportunities for the family labor especially women. Table A-28 gives the total requirement of crop and livestock production in Egypt, which indicates that livestock takes 39.9% of men's working days, 71.0% of women's working days and 17.8% of children's working days. This shows that livestock production depends mainly on the labor of women.
3. To provides food products mainly milk and milk products for home consumption. Soliman[15] found that about 40% of all milk and milk products are consumed on the farm, and this percentage increases to more than 60% in small farms less than 3 Feddans.
4. To provides animal power for farm operation esp. in small farms.
5. To provide manure for crop production on the farm. Egyptian livestock produces about 200 million cubic meter manure .

Small farmers prefer to hold buffaloes because of its preferred milk and milk products, which has higher sale prices as a result of consumer taste, while it produces milk at minimum costs, also because of its resistance to animal diseases.

Buffalo on Egyptian farms, is the lowest cost producer of milk, followed by cows kept in commercial herds, then milk from state farm frisian, while the most expensive source of milk is the native cow due to its low productivity per animal and low price of its milk for its low fat contents and consumer taste.

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[15] I. Soliman, Milk Market Surplus of the Egyptian Farm—The 20th Annual Conference of Statistics and Computer Sciences, Cairo, December 1985, p. 10.

Studies[16] using field data showed that milk yield per animal in small farms is relatively higher compared with that in larger farm size, as small farms use less green fodder and much more grain, legumes, beams and concentrated feeds if compared with larger farm sizes. Another reason is that cattle on small farms is the most valuable asset and it takes the highest care of the farmer.

Table A-27: Structure of Farmers House Income By Farm Size, 1989

	Farm Size (Feddans)				
	0 – 1	1 – 3	3 – 5	5 – 10	> 10
Crop income	23.2	40.0	39.3	49.6	59.8
Dairy income	15.6	7.6	7.5	7.7	17.9
Sales of livestock	4.3	3.0	1.4	1.9	5.0
Wages from Agric.	14.5	13.9	3.4	---	---
Wages from Non. Agric.	31.9	27.4	29.3	12.2	12.0
Rent	4.8	3.8	12.5	22.5	5.3
Trade	2.3	0.8	1.5	5.1	---
Remittances	2.2	1.6	---	---	---
Other income	1.2	1.9	5.1	1.0	---
Total %	100.0	100.0	100.0	100.0	100.0

Source: Calculated from A. Sarris, Structural Adjustment and Agricultural Development in Egypt, Agricultural Policy Analysis in Egypt, Conference, MALR, FAO, CAIRO 1992.

Table A-28: Total Demand for Agriculture Labor During 1991

	Men		Women		Children	
	mill. days	%	mill.days	%	mill.days	%
Crop requirements	420.8	60.1	94.4	29.0	133.6	82.2
Livestock Requirements	279.9	39.9	231.8	71.0	28.9	17.8
Total	700.7	100.0	326.7	100.0	162.9	100.0

Source: USAID, Agronomic and Economic Factors Effecting Cotton Production in Egypt, APCP, CAIRO, DEZ 1994.

[16] I. Soliman, An Analysis of the Buffalo Milk Response Under the Conventional Farming System, Tenth international conference for statistics and social research, Cairo, 1985.

Table A-29 shows that small farms (less than 3 feddans) produces buffalo milk at the least cost per animal, while achieving the relatively highest yield per head. Table A-30 shows that income generated from a head of milking buffalo increases as the farm size decreases.

Table A–29: Costs Per Milk Buffalo on a Traditional farm According to Farm Size Class (value in LE) and Yield (Kg/head)

Farm Size Class	Feed Costs						Labor Costs				Other Costs	Total Costs	Ave. Milk Yield per Buffalo (Kg)
	Green	Straws	Grains, Fodder & Brans Mix[1]	Concent. Legumes	Total Feed	Hired Rate	Family Labor	Total Labor Costs	Veter. Service	Interest for Fixed Capital			
0< to 1	82	35	21	34	172	3.0	37.5	40.5	1.75	65	11.0	280	1357
1< to 3	99	55	21	26	201	3.7	45.5	49.2	2.30	75	3.0	330	1077
3< to 5	114	50	19	20	203	4.5	38.0	42.0	4.00	82	6.5	338	1048
> 5	127	77	15	20	239	5.5	44.5	50.0	4.80	92	6.0	392	1001

[1] It is a mixed processed concentrate feed composes of cotton seed cake, yellow corn, brans, molasses and minerals.

Source: I. Soliman, An Analysis of the Buffalo Milk Response Under the Conventional Farming System, Tenth international conference for statistics. and social research, Cairo, 1985.

Table A–30: Gross Output per milk buffalo on a traditional farm according to farm size class (value in LE)

Farm size Class (Feddans)	Milk Output Value	%	Farm Work Output Value	%	Calf	Net Crop	Total Inventory Change	Meat Output % Value	Value	Manure % Value	Total
0< to 1	288.23	56.9	42.13	8.3	77.26	94.85	172.11	33.9	5.09	0.9	507.56
0< to 3	260.63	51.0	64.76	12.7	83.81	95.32	179.13	35.1	6.39	1.2	510.91
3< to 5	267.58	49.2	95.00	17.5	93.05	81.06	174.11	32.0	7.43	2.3	544.12
> 5	199.29	42.0	118.22	24.9	81.18	69.58	150.76	31.8	6.36	1.3	474.63

Source: I. Soliman, An Analysis of the Buffalo Milk Response Under the Conventional Farming System, Tenth international conference for statistics and social research, Cairo, 1985.

BORDER PRICES OF LIVESTOCK PRODUCTS AND ITS COMPARATIVE ADVANTAGE

Soliman[17] analyzed the border prices of livestock products and found the following:

Border Price for Red Meat

Egyptian beef production costs ($3.34/kg = LE11.68/kg) are above, comparable border prices for beef. It is 19% higher than that of U.S. boxed beef cutout choice 1–3 grades/which currently priced at $ 2500/ton Midwest Market of United States and would cost $ 2.80/Kg (= LE 9.38/kg) deliver Cairo.

Local border price of red meat is also higher by 38% than the CIF cost of Australian boneless beef. Also local border price is 2.7 times the landed costs of the heavily subsidized EEC beef exports ($1.2/kg).

[17] I. Soliman, Impacts of GATT Implication and Animal Protein Food System in Egypt, Egyptian Journal of Agricultural Economy, Vol. 4, Nr. 2, September 1994, pp. 172–192.

Border Prices of Diary Products

Commercial milk production costs in Egypt were between LE0.55 and LE0.63/kg. For smallholder cattle, it is LE0.47/kg, and for smallholder buffalo, it is LE0.3/kg. adjusted to cow milk equivalents. Direct revenues from milk sales almost cover production costs.

For skim milk powder (SMP), prices of milk products are volatile, current import price of SMP is $1,525/ton CIF Alexandria. Subsidies are a feature of the international market for dairy products—about $1,000/ton in the U.S. and greater than that in the EEC ($1,330/ton).

As Egypt does not have a milk powder industry, the cost of locally recombined milk using powder is similar to the price of locally produced milk especially buffalo milk. The cost of milk powder recombined is about $0.58/liter at the retail level.

The local produced milk is fresh and therefore preferable in taste, and gets more comparative advantage for this.

Border Prices of Broilers and Table Eggs

Production costs for eggs in the U.S. in late 1993 were $0.474/dozen (LE1.59) while it is—in Egypt—amounts $0.487/dozen (LE1.71).

Production costs for U.S. broiler chicken is $0.59/kg (LE1.98), while it is in Egypt about $0.86/kg (LE3.00).

Border prices for U.S. frozen broiler CIF Cairo late 1993 was $1.52/kg (LE5.1/kg). Current production costs in Egypt for frozen broiler are $1.64/kg (LE5.50) or slightly above CIF costs.

Comparative advantage analysis of dairy production has a medium to strong comparative advantage based on import parity costs. Frozen broilers meat has a small comparative disadvantage. Red meat production has a disadvantage.

If subsidies on livestock production in the USA and EEC especially on red meat and dairy products are to be phased out according to GATT, this would result on raising a comparative advantages for Egyptian producers.

DEVELOPMENT OF LIVESTOCK PRODUCTION AND CONSUMPTION IN EGYPT

Development and Contribution of Livestock in Egyptian Agriculture

Table A-31 shows that the current value of livestock production increased in 1992 to more than double comparing with 1984 and 1985, while its relative importance decreased from 32 percent to about 26 percent.

The annual growth rate of the value of agricultural production amounted 16.3 percent, while the value of livestock production developed by 12.7 percent annually.

Table A-31: Contribution of Livestock Sector in Agricultural Income in 1991 and 1992 compared to 1985 and 1986

Years	Value of Agriculture Production (mill. LE)	Net Income from Agriculture (mill. LE)	Value of Livestock Production (mill. LE)	Net Income from Livestock (mill. LE)	Relative Importance of Livestock %
1985	10914	7716	3484	886	31.9
1986	12747	9127	4032	1122	31.6
1991	27650	20472	6992	2271	25.3
1992	30963	23009	8377	3098	26.7

Source: MALR.

Statistics in Tables A-32 and A-33 show that the prices of livestock products during 1985–1986 to 1991–1992 increased annually by about 11–13 percent, except for table eggs, which increased by only 6.9 percent, taking into consideration that these prices are not representing the market forces at this period of time, as red meat, poultry products, and feed stuffs was highly subsidized .

Red meat value increased by 18 percent annually mainly due to increase in red meat prices (12.7 percent), as quantities grow only by 4–6 percent.

Milk production increased by only 1.2 percent annually, while poultry production decreased.

Table A-32: Value of Livestock Production in 1991 and 1992 Compared to 1985 and 1986 (million LE)

Year	Value of Livestock (mLE)	Value of Red Meat (MLE)	%	Value of Milk (MLE)	%	Value of Broilers (MLE)	%	Value of T.Eggs (MLE)	%	Value of Manure (MLE)	%	Value of Others (MLE)	%
1985	3614	1160	32.1	1003	28.8	752	20.8	540	14.9	130	3.6	29	0.8
1986	4188	1300	31.0	1171	28.0	812	19.4	713	17.0	156	3.7	36	0.9
1991	6993	3084	44.1	1921	27.5	1035	14.8	482	6.9	388	5.5	83	1.2
1992	8377	3544	42.3	2586	30.9	1159	13.8	455	5.4	507	6.0	126	1.5
Annual growth rate	12.0%	18.0%		12.9%		5.7%		-5%		20.9%		21.5%	

Source: MALR.

Table A-33: Livestock Production and Prices in 1991 and 1992: Compared with 1985 and 1986

Year	Red Meat		Milk		Broilers		Table Eggs	
	000 tons	LE/t	000 tons	LE/t	000 tons	LE/t	000 tons	LE/t
1985	359	3231	2014	498	381	1973	319	1693
1986	366	3552	2081	563	363	2237	381	1871
1991	438	7051	1887	1018	253	4080	170	2834
1992	514	6792	2550	1014	282	4107	183	2483
Annual growth rate	4.6%	12.7%	1.2%	11.4%	5.7%	11.7%	18.5%	6.9%

Source: MALR, Yearbook of Agricultural Economics, 1986-1986.
MALR, Agricultural Income 1991 and 1992.

Livestock Production in Old and in New Lands

Table A-34 gives the value and structure of livestock production in 1992 distributed on old and new lands, which shows that 96 percent of livestock output is produced on old lands, while the contribution of new lands amounts only 4 percent. The table shows also that

livestock on new lands is raised mainly for the production of red meat, while livestock on old lands is raised for milk and meat production.

Table A–34: Value of Livestock Production 1992 in Old and New Lands

Items	Old Lands		New Lands		Total	
	Mill LE	%	Mill LE	%	Mill LE	%
Food products						
Red meat	3339	41.4	205	65.3	3544	42.3
Milk	2554	31.7	32	10.2	2586	30.9
Broilers	1111	13.8	48	15.3	1159	13.8
Eggs	443	5.5	12	3.8	455	5.4
Honey & Wax	75	0.9	---	---	75	0.9
Total	7522	93.3	297	94.6	7819	93.3
By Products						
Manure	502	6.2	5	1.6	553	6.1
Hair, Wool	39	0.5	12	3.8	5	0.6
Total	541	6.7	17	5.4	558	6.7
Grand Total	8063	100.0	314	100.0	8377	100.0

Source: MALR.

The Impact of Government Policies on Production and Consumption of Livestock Products

Market indicators show that Government policies of the eighties, which subsidized heavily the livestock production was concentrated mainly on red meat and poultry production. The Government also subsidized imported frozen meat and poultry products.

As more than 80 percent of milk is produced on small traditional farms, dairy subsector was not equally subsidized as meat and poultry subsector.

These policies encouraged the production of red meat and poultry; also encouraged consumers to consume more subsidized animal products. As a result, per capita consumption of red meat increased from 6.6 kg in 1975 to 9.6 kg in 1985, while meat consumption per capita increased also from 3.1 kg to 4.8 kg and egg consumption increased from 1.4 kg to 3.2 kg, while milk consumption decreased from 51.0 kg per capita in 1975 to 45 kg per capita in 1985.

After adopting the reform policy in agriculture starting 1986 and decreasing subsidies or phasing out subsidy policy, milk and dairy subsector could show competitiveness in using resources. The elimination of subsidies on livestock has forced the consumer to re-prioritize his food needs according to his limited income and the relative prices of protein food, which results in a reduction of the demand for meat and poultry for the demand of milk and dairy products as shown in Table A-35. Per capita consumption of milk has increased from 45 kg in 1985 to 50 kg in 1991. The consumption of red meat and poultry products decreased from 9.6 kg to 8 kg for red meat and from 3.2 kg to 2.8 kg for table eggs.

Table A-35: Per capita consumption of livestock products, 1975-1991 (by kilograms)

Items	1975	1985	1991
Red meat	6.6	9.6	8.0
White meat	3.1	4.8	4.6
Table eggs	1.4	3.2	2.8
Milk	51.0	45.0	50.0

Source: CAPMAS.

CONSUMPTION AND INCOME ELASTICITIES OF MILK AND DAIRY PRODUCTS IN EGYPT

Family Budget Surveys show that Individual expenditure on milk and dairy products decreased from LE5.42 in 1974/75 to LE4.10 in 1990/91, which has been reflected in decreasing quantities consumed per capita as indicated in the Tables A-36 and A-37.

Table A-36: Per Capita Consumption of Milk and Dairy Products in Egypt in 1974/75 and 1990/91 (in kg)

	Milk	W. Cheese	Skim Cheese	Butter	Milk Fat
1974/75	15.27	1.58	4.11	1.03	1.48
1990/91	12.31	1.51	3.01	0.88	0.85

Source: CAPMAS. Family budget Surveys 1974/75 and 1990/91.

Table A–37: Income Elasticities for milk and Dairy Products in Rural and Urban Egypt 1974/75 and 1990/91

	Urban		Rural	
	1974/95	1990/91	1974/75	1990/91
Milk	1.217	1.131	1.615	1.520
White Cheese	1.224	1.032	1.811	1.329
Skim Cheese	(-0.293)	(-0.217)	0.031	0.613
Butter	1.334	1.196	1.098	0.988
Milk Fat	1.375	1.077	1.354	0.910

Source: Calculated from Family Budget Surveys 1974/75 and 1990/91 using double-log functions

Income Elasticities for milk and dairy products are decreasing, except for Skim Cheese in rural areas. Skim Cheese is considered an inferior good.

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