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**ANNEX I**

**Agriculture Sector Assessment**

**1985**

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DRAFT AGRICULTURE SECTOR ASSESSMENT

1985

REPUBLIC OF TUNISIA

USAID/TUNISIA

AGENCY FOR INTERNATIONAL DEVELOPMENT

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## TABLE OF CONTENTS

	<u>Page</u>
LIST OF ACRONYMS	iv
PREFACE	vi
I. Executive Summary	1
II. Current Macro-economic Context	3
A. Overall Economic Growth	3
B. Economic Performance 1984-85	3
C. Economic Prospects	4
D. Recent Agricultural Growth	4
III. Characteristics of the Agriculture Sector	6
A. Land Utilization	6
B. Agro-Ecological Zones	6
C. Population and Employment	6
D. Land Tenure	7
E. Irrigation	8
IV. Agricultural Plans and Related Performance	8
A. Objectives of the VIth Development Plan	8
B. Performance of the Agricultural Sector in Relation to Plan Targets	9
C. Preliminary Orientations of the VIIth Plan	10
V. Organizational Structure of the Agriculture Sector	11
A. The Organizational Map	11
B. Ministry of Agriculture	11
C. Financial Institutions	13
D. Farmer Organizations	14
E. Private Sector Participation	15

	F. Conclusions	15
VI.	Resource Flows to the Agriculture Sector	16
	A. National Budget Allocations to the Agriculture Sector	16
	B. Bilateral and Multi-lateral Investments	16
	C. Issues in Donor Involvement	17
VII.	Sub-sector Organization and Performance during the VIth Plan	18
	A. Dryland Cereals and Legumes	18
	B. Livestock and Dairy Production	20
	C. Irrigated Agriculture	22
	D. Other Agricultural Products: Vegetables, Fruit, and Fish	23
VIII.	Support System Organization and Performance	25
	A. Agricultural Research	25
	B. Agricultural Extension	27
	C. Agricultural Inputs	28
	D. Agricultural Marketing	34
	E. Prices, Subsidies, and Private Sector Participation	36
	F. Agricultural Credit	40
	G. Major Policy Issues in the Management of the Agriculture Sector	42
IX.	Productivity Constraints in the Agriculture Sector and Implications for the Design of USAID/Tunisia's Agricultural Development Strategy	47
	A. Water as the Limiting Factor	47
	B. Human Resources and Organizational Performance	48
	C. Responsiveness of Agricultural Products to Modern Techniques and Inputs: the Role of Research and Extension	49

D. Role of the Private Sector in the Marketing and Distribution of Agricultural Products and Inputs	49
E. Pricing of Agricultural Products and Inputs	49
F. Availability of Short and Medium Term Agricultural Credit for Small Dryland Farmers	50

•  
NOTES

•  
BIBLIOGRAPHY

TABLES

FIGURES

ACRONYMS

(TO BE COMPLETED BY MISSION)

ACRONYMS (con't.)

## AGRICULTURE SECTOR ASSESSMENT

### PREFACE

#### Introduction

The impetus for this document stems from an intensive review of the USAID program in Tunisia conducted in Tunis in August 1985. The review was especially timely given AID/Washington's recent decision to continue over twenty-five years of developmental support to Tunisia beyond 1985. Due to Tunisia's impressive economic achievements during the 1970's and early 1980's, AID had decided to terminate the development assistance program in 1985. The impact of adverse climatic conditions and a worldwide recession has created over the past three years, however, a strong justification for continuing developmental support, at least through the end of the 1980's.

In order to provide guidance for this developmental assistance in the agricultural sector, AID/Washington requested that the Mission in Tunis prepare an agriculture sector assessment as an input into the 1987 Country Development Strategy Statement (CDSS). The Mission wanted to complement the agriculture sector assessment with an agriculture sector strategy for the years 1987-1991. Both of these documents are intended to provide the basis for the development of the Mission's 1987 CDSS which will be reviewed in Washington in March 1986.

Following the program review in early August, the Mission requested that the Asia/Near East Bureau's Office of Agriculture and Rural Development provide assistance in drafting the Agricultural Assessment. Rather than a detailed analysis of a broad set of agricultural data, the 1985 assessment exercise was conceived of as an update of previous assessment efforts conducted by USAID (1981) and the World Bank (1982). Given the short-time frame available in mobilizing resources for this effort, it was also decided that the assessment effort would make use almost entirely of secondary data available at the Mission and in Tunis.

The assessment was drafted over a four-week period from late October to late November 1985 by an agricultural development officer provided to the Mission by ANE/TR/ARD. A considerable effort has been made to include the most recent agricultural statistics available. In several instances, however, the most recent information dates from the early 1980's and is only now being revised by the Ministry of Agriculture on the basis of on-going studies. Wherever appropriate, the document makes reference to these on-going studies for incorporation in future mission agriculture sector planning efforts.

The assessment does not attempt a comprehensive overview of the entire agriculture sector in Tunisia. It focuses primarily on the dryland agriculture sub-sector, which has been the central target of USAID sector assistance in the past. A majority of the descriptive and analytic material presented in this document, therefore, addresses the issues of transferring modern agricultural technology required to increase cereal, livestock and dairy production. It should also be noted that the timing of both the assessment and the strategy coincides with the GOT's preparation of the VIIth Plan (1987-91).

A second timing issue concerns the preparation by the World Bank, the largest contributor of development assistance to Tunisia, of an agriculture sector adjustment loan. The assessment cum strategy team discussed these issues with Bank agriculture sector specialists in Tunis in November 1985. While the loan will not be presented for bank approval until 1987, the orientations of the loan will be of considerable interest to the implementation of USAID agriculture sector strategy.

#### Acknowledgments

This report, which is drawn largely from a review of secondary sources, has benefitted from a number of analyses conducted by the World Bank and USAID/Tunis during the period 1981 - 1985. While these reports and analyses are cited throughout the assessment document, I believe it is appropriate to make special mention of the key sources here. The primary document is "Tunisia - Agricultural Sector Survey," (Volume I), a detailed analysis of the Tunisian agriculture sector prepared jointly by the World Bank and the GOT's Ministry of Agriculture in 1981 as an input to the Sixth Development Plan. The second key document, rather a set of documents, was prepared under the direction of Dr. Richard Newberg, as the framework for the design and implementation of the AID-financed PL 480 Program of Food Assistance to Tunisia. The first of these documents, "Agriculture Assessment - Tunisia," was written in 1981, followed by Annual Evaluations in 1984 and 1985 and by the proposed design of a new multiyear PL 480 Program in 1985.

A number of individuals in Tunis have made substantial contributions to the development and finalization of this document. Eric Shearer provided a broad review of the performance of the Tunisian agricultural sector over the past three years, much of which was incorporated into Chapter VII on sub-sector performance. Richard Newberg drafted the sections on recent agricultural growth (Chapter II), agricultural inputs (Chapter VIII), and prices/subsidies (Chapter VIII) and helped substantially in editing the entire document. Jerry Edwards, who authored the companion piece to this document, "USAID Strategy for Agricultural Development in Tunisia 1987 -1991," drafted Chapter X on implications for strategy. Both Edwards and Newberg, ex-USAID Agricultural Development Officers with

over forty years combined experience in Asian and Near East country development settings, served as a constant source of direction during this project. Sheila Larbi worked tirelessly in gathering source documents for the assessment and in preparing the statistical tables and bibliography.

All of the above, joined by Jim Phippard, Paul Novick, Salah Mahjoub, John Schamper and Lou Macary reviewed this document and made valuable comments on its content and its presentation. Both Paul and Salah were extremely supportive in facilitating the range of procedural, logistical, and contact arrangements required in the production of this document. Finally, I would like to recognize the unending patience of Jim Vermillion and Jeff Willis who, from the first day to the last, resolved difficulties associated in combining microcomputer technology with the nitty-gritty of report production.

Jim Lowenthal, ANE/TR/ARD  
Tunis, January 1986

## AGRICULTURE SECTOR ASSESSMENT

### I. Executive Summary

Two years ago, in 1984, the AID program of economic development assistance to Tunisia was scheduled to phase out based on the impressive growth which had been achieved over the past twenty-five years. The early 1980's, however, presaged an increasingly difficult period of adjustment for the Tunisian economy, during which most indicators of economic strength and vitality, particularly balance of payments and debt service ratios, either stagnated or worsened. The capability of the country to achieve a net positive balance in the agricultural sector weakened dramatically. As a response to these circumstances, the Government of Tunisia has committed itself to an ambitious program of long-term agricultural development. In order to provide support for this effort, the Agency for International Development has decided to extend its economic assistance program at least through 1991.

As part of the planning for supplementary assistance, the USAID Mission in Tunis is up-dating its most recent assessment of the agriculture sector drafted in 1981. This document reviews the performance of the agriculture sector since 1981 and identifies constraints to more efficient functioning. Because of the participation of other major donors in the irrigated sub-sector and because of USAID's concerns about the cost-effectiveness of on-going irrigation activities, this assessment emphasizes opportunities for more productive performance in the rainfed sub-sector. While this document discusses implications for an agriculture sector strategy, a complete description of this strategy is provided in "USAID/Tunis Agriculture Sector Strategy, 1987-1991," prepared in conjunction with this assessment.

Despite a record cereals harvest of approximately 2 million MT in the 1984/85 campaign, it is clear that the GOT will have to rely heavily on grain imports during the next five years in order to keep pace with the burgeoning demand of its population for grain, meat, and dairy products. Grain consumption for the early 1990's (human and animal) is projected at approximately 2.5 million MT, while average production for the past five years, including the banner crop of 1985, is 1.25 million MT. Based on the findings of this assessment, the potential exists in the Tunisian agriculture sector to slow or eliminate continuing increases in the food deficit over the period of the upcoming VIIth Plan.

With the current technology available for adaptation to Tunisian circumstances for the rainfed production of cereals and livestock in semi-arid and arid zones, Tunisian farmers can substantially increase yields and livestock off-take. This technology includes the use of high-yielding cereal varieties, low-cost phosphates and nitrogen fertilizer, integrated weed control practices,

soil-analysis/fertilizer response research and testing, and farm-level integration of livestock and cereal production strategies. Throughout much of the 1970's and into the early 1980's, however, performance in the agriculture sector was hampered by unfavorable climatic conditions, a lack of adaptive and focused agricultural research, a highly dispersed, fragmented and ineffective extension system for communicating relevant information to farmers, a set of administrative regulations and pricing policies which have limited farmers' access to agricultural inputs and depressed the development of responsive marketing structures, and an inefficient system for providing agricultural credit. The GOT was aware of these constraints and, with USAID support, has undertaken substantial changes in many of these policy areas.

The current situation provides an important opportunity for AID to expand and focus better its support to the GOT in implementing changes which would reduce the adverse impact of these constraints on the efficiency of cereal and livestock production systems. Partly as a result of USAID bilateral project assistance, much of 44e required technology for improving rainfed agricultural performance in Tunisia is already known. The major issue facing the GOT is the management of the process in which this technology is adapted and applied in the agriculture sector.

In the next five years, USAID will attempt to build on the contributions of the bilateral program in addressing a wide range of micro-level implementation and macro-level policy constraints by shifting development resources into a program-support modality. Discrete project assistance, which has been the mainstay of the USAID/Tunis program to date, will be reduced in order to provide the GOT with a flexible instrument for addressing the sector management issue.

An innovative sector support program, combining resource transfer (local currency) and policy dialogue/implementation, is recommended which would allow the GOT to focus resources in areas most supportive to the implementation of technical changes already identified. The predominant theme of this program is the improvement of farm-level productivity through integrated farming systems management. One of the major obstacles identified in this assessment is the communication of a body of technical information to farmers which corresponds to a set of production and marketing constraints faced by those farmers. Because farmers in Tunisia typically deal either simultaneously or sequentially with dryland cereals cropping, livestock, and some form of irrigated agriculture, they require integrated sets of technical advice and support. Based on this sector approach, USAID/Tunis will attempt, over the next five years, to strengthen the capacity of a range of GOT institutions for managing integrated technical change at the farm-level.

## II. The Current Macro-Economic Context of Agricultural Development in Tunisia

### A. Overall Economic Growth

Over the past three decades since independence, Tunisia has enjoyed a relatively high rate of economic growth, averaging around 7% per year throughout the 1970's, and a favorable balance of payments. This generally strong economic situation derived largely from the impact of a dynamic petroleum sector, development of phosphate fertilizer exports, tourism, and worker remittances. Beginning in the early 1980's, however, stagnating output in the oil sector and two years of adverse climatic conditions (1982-83) contributed to a progressive deterioration in the terms of trade and a worsening economic setting. The joint effect of inflation, 13.7% in 1982 and almost 10% in 1983, and a steadily appreciating dollar, resulted in a decline in estimated per capita GDP from over \$1,400 in 1981 to approximately \$1150 (IMF, 1985). The state of external accounts paralleled the deterioration of the economy, reflected in a rapid increase in foreign indebtedness. This situation was further exacerbated by the impact of strong demand pressures developed in the early 1980's as a result of expansionary fiscal, monetary, and income policies in pursuit of high economic growth rates. Overall, economic growth declined to 1% in 1982 and about 4.5% for 1983 and 1984.

### B. Economic Performance 1984-1985 (1)

In 1984/85, economic prospects brightened marginally, at least on the domestic side. Real GDP growth accelerated to 5.4%, based largely on a 6.2% increase of nonhydrocarbon GDP, an 11.6% increase in agricultural output (the highest in a decade), and related increases in the agro-processing industries. Value added in the tourism sector remained depressed, however, while that of the hydrocarbon sector declined by over 2%. A limited 2.9% increase in employment in 1984 was overshadowed by a 3.9% increase in the labor force, causing overall unemployment to reach 13.7%, up from 12.9% in 1983 (taking under-employment into consideration pushes the total unemployment figures to over 20%). Total consumption grew at a rate faster than GNP, forcing the ratio of national savings to GNP down to 20.9% from 21.6% a year earlier (IMF estimates are 20.4% for 1985). Following the failure of the government to decrease subsidies substantially in January 1984, the consumer subsidy bill rose to 4% of GNP.

The operational subsidy of nonfinancial parastatal organizations rose to 4.1% of GNP, up from 3.7% a year earlier. Despite the increases in agricultural, mechanical and electrical products, overall exports stagnated, with textiles, phosphates, and phosphate derivatives performing poorly. In two years, external debt rose almost 25% to just over 50% of GNP in 1984. Over the same period,

the overall deficit in the balance of payments shifted from a net positive balance of 25 million SDR's to a negative 146 million SDR's.

### C. Economic Prospects (2)

The economic prospects for the remainder of 1985 and throughout the decade are not encouraging, despite a cereal harvest in 1985 which exceeded the previous (1974) record by over 60% (approximately 2.0 million MT). Factors which have been important in past economic growth cannot be counted on to provide the same contribution in the near future. Tunisia is likely to be a net petroleum importer by 1990. Worker remittances from European and oil-producing countries have leveled off, resulting in a net decline when inflation is taken into account. Political and economic pressures in these countries (the expulsion of 20,000 Tunisian workers from Libya, for example) are likely to exacerbate this trend. Tourism has yet to rebound to its pre-1982 level.

Phosphate production and fertilizer exports have decreased as a result of the worldwide economic recession; traditional agricultural export markets are less certain following the entry of Spain and Portugal into the EEC. Real GDP growth for this year is expected to be about 4%, with an overall balance of payments deficit of 1.5 - 2% of GNP for the second consecutive year.

Faced with these prospects, the GOT has taken a number of measures to deal with its unsustainable external position and weakened economic growth performance. In the middle of 1985, the government announced moderate increases in the prices of subsidized goods, petroleum products, electricity and transportation. The GOT has adopted a policy of differentiating among food commodities in its price policy. Price controls and subsidies have been elements in all except a few commodities, particularly those commodities consumed in urban areas and by low-income urban residents. The GOT hopes to eliminate budgetary transfers to its primary subsidy support fund, the Caisse Generale de Compensation, by 1990. Administrative controls over imports of capital equipment and consumer goods have been tightened. The GOT's Investment Promotion Agency (API) has been instructed to focus on and approve only projects which have a net positive effect on the balance of payments. In preparation for the VIIth Plan, the GOT looks to the agricultural sector to play a key role in these economic support measures by reducing cereal import requirements, increasing agricultural exports, and providing employment opportunities for its expanding population (annual growth rate 2.5%).

### D. Recent Agricultural Growth

The latter part of the 1960's were characterized by stagnation and often decline in agricultural output associated with measures unfavorable price relationships, efforts at development of other sectors, and the program of collectivization of agriculture. After

the reversal of farm collectivization policies in 1969, agriculture expanded very rapidly and by 1972, had regained earlier total output levels. The 1969-72 growth momentum continued into 1974/75 when very favorable weather produced a record cereal crop. However, unfavorable price and investment policy and continued preferential treatment of nonfarm sectors resulted in agricultural stagnation through the remainder of the 1970's. Unfortunately, the period produced rapid growth in consumption resulting from low farm and food prices, subsidies and liberal imports.

As the Vth Plan period (1977-81) drew to a close it was generally recognized that greater attention to agriculture was needed to reduce the burgeoning import dependence and to provide balance in economic growth. Further, the principal engines of the earlier growth - petroleum and phosphate exports, tourism, import substitution, worker remittances - all appear unlikely to continue to provide a comparable level of stimulus beyond the middle 1980's and debt-servicing levels were beginning to mount. Liberalization of farm and consumer price controls and other measures to improve price incentives and increase supplies of end-use, production-increasing inputs were undertaken.

Two good crop years, 1980/81 and 1981/82, provided optimism that stagnation was behind. These campaigns were followed by two years of unfavorable weather and reduced production of cereals, but for the first time in recent years, farmers did not cut back sharply on use of production-increasing inputs in the face of poor weather. Use of fertilizer, improved seed, and pesticides continued upward, albeit at a slower pace. Earlier investment in irrigation along with ample supplies of inputs, permitted some growth in output in 1983/84 over earlier years despite the poor weather. The cycle of olives produced a bumper 1984 crop and most other tree crops also were up. With freeing of most prices and sharp increases for these prices still controlled, livestock production increased somewhat from the shock of reduction in feed ingredients and a 100 to 200% increase in commercial feed prices between November 1981 and November 1982. Fish production also increased sharply, apparently reflecting higher prices of directly competing animal products.

Following the favorable growth rate for 1983/84, the next year (1984/85) appeared likely to show a decline in output; but the coincidence of good weather, improved price incentives, greater attention to supplies and distribution of inputs, and technical information resulted in unprecedented increase in nitrogen fertilizer offtake and a cereal crop exceeding the previous 1974 record by 60%. Livestock has continued its recovery despite feed imports much below 1981/82 and earlier years. Despite an expected sharp downward shift in the olive cycle (-33%), total value of output in 1984/85 is up almost 13%. Overall agriculture, including fisheries, showed an increase in value of output of 15% in 1983/84 and a two-year total of 30% increase in value of output in constant 1980 prices. Value of output for 1985 is 36% above the last two

years of the Vth Plan period, but growth still has far to go to overcome the slow growth rates of much of the previous two decades. In 1984/85, nitrogen fertilizer consumption, the principal indicator of increase in production inputs, was about 60% above the end of the Vth Plan period. Agriculture is largely responsible for turning what would normally have been a decline in GNP into a modest gain for 1985 over the prior year.

#### IV. Characteristics of the Agricultural Sector

##### A. Land Utilization

Tunisia has a total land area of 16.4 million ha. of which 8.4 million ha. are suitable for agriculture and grazing (Table 6). Of this 8.4 million ha., forests and esparto grass cover 1.2 million ha. and 2.2 million ha. are used for grazing. Of the five million ha. of cultivable area, 34% is planted in cereals, 35% in tree crops (mainly olives), 5% in cultivated forage crops, 2% in grain legumes, 3% in vegetables and 1% in industrial crops; 21% is normally left fallow. Tunisia's ratio of irrigated to arable land is very low (3.3% in 1977-80). Tunisia has an irrigable potential of about 250,000 ha. of which 205,000 ha. are presently irrigated and about 160,000 ha. effectively irrigated. Underutilization of irrigation water is a major issue in the irrigation subsector (World Bank, 1985b).

##### B. Agro-ecological Zones (3)

Tunisia can be divided into three distinct agro-ecological zones (see Figure 2). The Northern part (25% of Tunisia's land area) is the most fertile, receiving considerable rainfall (400-1,000 mm). The Central zone (15% of the land area) receives between 200-400 mm. of rainfall. Rainfed area in the central zone is limited to fruit tree plantations (mostly olives), low yield cereals (wheat and barley), and rangelands. The Southern zone (60% of the land area) is a pre-desert zone receiving less than 200 mm. of rainfall with extensive grazing, some irrigated agriculture, and a very small amount of low-producing cereal cropping and some olives. Soil characteristics generally follow the pattern of climatic zones with the most fertile soils located in the Northern zone, particularly in the areas of Fernana, Beja, Mateur, Bizerte, and part of Jendouba. Farther south, soils are characterized by increasing calcium and salt content and are much less suitable for dryland cereal cropping. Throughout the country, valleys contain alluvial deposits in which soils are characterized by clay-like texture excellent for cereal production.

##### C. Population, and Employment

Almost half of Tunisia's seven million population is rural. About 35% of Tunisia's population works in agriculture. Although population density is not high statistically, population pressure

for access to cultivable land is high. According to the most recent figures, there are about 2 ha. of arable land per rural inhabitant (MOA, 1980).

According to an analysis conducted by the MOA's DPSAE (1984), the agriculture sector furnished 138 million days of work in all categories of labor (Table 8). The greatest proportion of this effort (57 million days) was contributed by 355,000 full-time farmer-owners. Full-time wage laborers contributed 11.6 million days; temporary wage labor, 6.4 million days; and permanent and temporary labor from farm family members combined for an additional 63.1 million days (4). At key harvest times, shortage of available labor is a common occurrence.

#### D. Land Tenure

Land distribution in Tunisia is highly skewed. Sixty-eight percent of the farms have less than 10 ha., covering 21% of available arable land (Table 7). One percent of the farms have more than 100 ha., covering twenty per cent of the available land. In addition, farm land is highly fragmented, with 47% of the farms having two or more separate parcels. According to the most recent unofficial estimates from the MOA's, Department of Agricultural statistics, the average farm in Tunisia has 4.2 parcels. Under financing made available through the World Bank Technical Assistance project, the MOA is conducting a detailed survey of land use and land ownership. These data should be available for analysis in March 1986.

Farm land is divided among private holdings and government control in the form of: a) agro-combinats (collective farms organized by the GOT in the late 1960's, a model abandoned shortly thereafter), model farms, cooperatives, and government corporations, with government and public cooperative land totaling around 447,000 ha., b) private farm land amounting to approximately 4.7 million ha., and c) a remaining 2.1 million ha. of collectively owned (non-government controlled) rangeland which is used collectively by tribal groups (MOA, 1981).

In addition to unequal distribution and fragmentation, the issues related to land tenure include slow and very inefficient efforts by the government to title private land (approximately one-third of existing privately held farms) and the lack of security for small farmers who rent land. According to the FAO, this factor may be over-emphasized since 95% of the land is exploited directly by the owner (FAO, 1985).

Government efforts are being pursued to regroup land wherever possible and to accelerate the titling process. Legislation exists which would permit a more rational exploitation of available land, but government agencies have not generally been very effective in

implementing the new policies (largely due to the resistance of current land-owners, see Lemel 1985). The best efforts to date to deal with land tenure problems have been in both public and private irrigated perimeters, where land distribution within the perimeter attempts to take into account minimum land holdings required for profitable exploitation.

#### E. Irrigation (5)

Since the 1960's, a major preoccupation of the GOT has been to increase the efficient use of scarce water resources through irrigation. From 1977 to 1981, 44% of public and private investments in agriculture were for irrigation. Currently 205,000 ha. (60% of which is privately held) are equipped for irrigation, almost 100% more than existed in 1972. Government-controlled perimeters "Perimetres Publiques Irriguees" (PPI), are large irrigation schemes financed by the government and managed by public entities, "Offices de Mise en Valeur" (OMV).

In 1984, only about 160,000 ha. (79%) of the land equipped for irrigation was actually irrigated. The intensity of utilization varied from 66% in the PPI's to 86% for private perimeters. The main reasons for low intensity in the PPI's have been inadequate operation and maintenance of irrigation systems, water shortages in the eastern and southern zones, and farmer resistance to invest their own resources in irrigation development where titling is unclear or where strong preferences exist for farming with low labor requirements. These factors have frequently resulted in investments which have not been cost-effective.

The next chapter reviews the VIth Development Plan, its achievements to date, and the preliminary orientations of the VIIth Plan.

### IV. Agricultural Plans and Related Performance

#### A. The Sixth Plan, 1982-1986 (6)

Economic development planning in Tunisia is carried out within the framework of medium-term Economic and Social Development Plans. The Government of Tunisia is in the preliminary stages of preparing its VIIth development plan, which covers the period 1987-1991. In order to appreciate the framework for the VIIth plan, as well as for the USAID agriculture development strategy, a brief description of the VIth plan is presented and, to the extent available, the performance of the agriculture sector during the first four years of the plan period.

The VIth Plan was built around three fundamental issues: employment, income distribution (regional development), and medium and long-term balance of payments equilibrium. In its review of the Plan, the World Bank described its objective as easing "as much as possible

the growing unemployment problem, to reduce inter-regional disparities, but to maintain the country's long-term social stability and creditworthiness at a time of growing financial and balance of payments constraints caused by the unexpected decline in hydrocarbon exports (World Bank, 1983)."

Faced with a slowing down of export earnings generated by hydrocarbons and a worsening of terms of trade, GOT planners stressed the importance of slowing consumption, reducing imports, and more selective investments. Increased emphasis was given to investments that are directly productive (in order to stimulate overall growth), labor intensive (to create employment), and export-oriented (combined with some import-substitution) to ease the projected trade gap. Agriculture is one of five priority sectors in which these investment criteria were to be maximized (the others include electrical and mechanical industries, tourism, textiles, and miscellaneous manufacturing industries).

In the agriculture sector, VIth Plan investments were expected to climb to 19% of the overall investment budget, up from the almost 13% realized in the Vth Plan. Quantitative targets included an average annual 5% increase in the volume of agricultural production, a 4.4% annual increase in the value of agricultural production (Tables 2 and 3), a decrease in the food deficit to 67 million TD in 1986 from the 93 million TD deficit registered in 1981, the creation of 30,000 new jobs in the irrigated sector and 13 million days of labor in the livestock and fruit tree sub-sectors. Cereal production was expected to increase to an annual average of 1.3 million MT.

The quantitative targets were accompanied by a series of policy directives oriented towards increasing the availability of inputs, accelerating the titling of agricultural lands, improving the capacity of the research and extension establishments, increasing access to medium and long-term credit, and inducements to encourage greater participation of the private sector in marketing and distributing agricultural products (GOT, 1982). The following section summarizes the overall progress achieved by the agriculture sector in meeting these VIth Plan targets.

#### B. Performance of the Agriculture Sector in relation to VIth Plan Targets

Despite the fact that the period covered by the VIth Plan, 1982-1986, has not been fully completed, the DPSAE has estimated the percentage of plan completion based on four full years of data (five years in the case of olives and tree crops) plus conservative hypotheses concerning the impact of weather on the fifth year of dryland cereals output (1.2 million MT) and livestock production (MOA, 1985a).

Using this approach, the MOA has projected an overall 3.8% decline in 1986 from 1985's record year of output, based largely on a 38% reduction in cereal production. The other sub-sectors should experience slight but moderate growth: tree crops, 1.9%; vegetables, 4.8%; livestock, 5.8%; and fishing, 4.7%. The projection model, if accurate, would translate into a five-year growth in valued added of 2.7% compared with a VIth Plan target of 4.4%. This outcome is the result of a strong performance in the agriculture sector in 1984 and 1985 but an poor rainfall and growing conditions of 1982 and 1983 (DPSAE, 1985). In order to smooth the effects of climatic variability, DPSAE has calculated five-year averages in value-added. For the VIth Plan, the five-year average in value added (constant 1980 prices) would be 555 million TD compared with a target of 602 million TD, or 92% of the target. The comparable averages for the IVth and Vth Plans are 456 million TD and 486 million TD respectively (constant 1980 prices). Growth would be much higher if the end of the Vth Plan and the 1985 year were compared.

### C. Preliminary Orientations of the VIIth Plan, 1987-1991

Preparations for the VIIth Plan have just begun in the Ministry of Agriculture. For each sub-sector area of concentration, the MOA has established work groups assigned the responsibility of evaluating progress achieved under the VIth Plan and making recommendations for the next plan period. Although the specific conclusions have not been formulated, the MOA has begun to sketch preliminary orientations for the next plan. Earlier this year, Minister Ben Osman communicated to USAID/Tunis a general framework for the development of the VIIth plan (Leonard, 1985).

According to the Minister, primary emphasis will be placed on three major areas:

1. increasing production of cereals, meat and milk to satisfy growing consumer needs and move Tunisia towards self-sufficiency in these "strategic" products;
2. increasing exportation of high value crops (dates, citrus, etc.) in order to relieve external balance of payments pressures;
3. expanding development of rangeland areas in the central and southern sections of the country.

With respect to the first priority, the Minister indicated that production increases will be achieved by expanding the distribution of fertilizers, especially to small farmers, improving efforts in weed control, setting incentive prices at the beginning of the season, and extending the technology of cereal crop/forage rotations. In an earlier document, the MOA also indicated that agro-industry would be called on to play a greater role in support

of agriculture, with emphasis on increased capacity for stocking, transforming, and conserving agricultural products. Agricultural credit will be given special attention as a "driving force in the development process" (MOA, 1985c) Based on current programming in the DPSAE, the agricultural component of the VIIth Plan will be available about March 1986.

## V. Organizational Structure of the Agriculture Sector

### A. The Organizational Environment

Activities which support development in the agriculture sector are implemented through a wide range of organizational actors, primarily the Ministry of Agriculture and its associated line agencies, semi-autonomous parastatal offices, and research and training institutes. In addition to these entities, additional organizations, some of which have primary mandates in the agriculture sector and some of which intersect with the agriculture sector at a secondary level of activity, influence the degree and rate of development in the agriculture sector. Examples of these latter categories include the producers of agriculture inputs, banks and other institutions which provide credit to farmers, pricing and subsidy administrative structures, and cooperatives. The following brief review of these organizations is designed to provide a map of the key organizations which, in one way or another, are involved in efforts to promote more rapid technological change in this sector.

### B. The Ministry of Agriculture

#### 1. Central Level Line Agencies or "Directions"

The MOA at the central level is divided into line agencies or departments which are responsible for planning, implementing, and supporting agriculture development (see Figure 1). For the purposes of this analysis, the key line agencies include:

a. Department of Planning, Statistics, and Economic Analysis (DPSAE - Direction de Planification, Statistiques et Analyses Economiques) - responsible for overall planning, budget preparation, project monitoring and analysis for all MOA activities;

b. Department of Crop Production (DPV - Direction de Production Vegetale) - responsible for crop protection, extending information related to more effective tillage methods, and improving cropping at regional and sub-regional levels;

c. Department of Animal Production (DPA - Direction de Production Animale) - responsible for extending information related to inputs related to improving animal production at the regional and sub-regional level (see Office d'Elevage et Parcours below);

d. Department of Support for Small and Medium-sized Farmers (DAPME - Direction d'Assistance aux Petits et Moyens Exploitants) - responsible for extending information and providing inputs, particularly agricultural credit related to improving production on small farms and on cooperatives;

e. Department of Training, Research and Extension (DERV - Direction d'Enseignement, Recherche, et Vulgarisation) - responsible for defining objectives for agricultural education, training, and research; organizing in-service professional development programs; coordinating and overseeing GOT agricultural research and training institutions; and disseminating technical information and research results to relevant users

agricultural training institutes:

(1) National Institute of Agronomy (INAT - Institut National d'Agronomie de Tunisie) - the principal Tunisian institution which provides Bachelor and Master's level training in agronomy and agricultural economics; there are additional institutions which provide specialized training in horticulture, forestry, engineering, etc.

(2) Mid-level technical training school and secondary vocational training schools.

and agricultural research institutes:

(1) National Institute of Agricultural Research (INRAT - Institut National de Recherche Agronomique de Tunisie) - senior-level research institute, staffed and managed by technicians with graduate degrees,

(2) Specialized Research Institutes - National Forestry Research Institute (INRF), Research Center for Rural Engineering (CNGR), and the Arid Regions Institute (IRA),

(3) Soil-testing laboratories at Le Kef and Beni Khalled, and a part of INRAT.

## 2. Regional and Sub-regional Line Agencies

The MOA is represented at the regional or governorate level by the CRDA (Commissaire Regionale de Developpement Agricole). The CRDA coordinates the activities of all MOA line agencies represented at

the regional and sub-regional level. Organization of the line agencies at the regional and sub-regional level reflects MOA organization at the central level.

### 3. Semi-autonomous Parastatal Agencies

Semi-autonomous agencies have been established outside of the formal line agency structure to improve performance in a given functional area. In Tunisia, five types of semi-autonomous parastatal agencies established under the general direction of the MOA are 1) offices for managing irrigated perimeters (Offices de Mise en Valeur), of which there are ten, 2) regional development authorities such as the Central Tunisian Development Authority, 3) marketing/input supply offices, for example the National Cereals Office (Office Nationale des Cereales), 4) sub-sector specialty offices, for example the National Range and Livestock Office (Office d'Elevage et Parcours). Both the ONC and the OEP supervise large cooperatives which are vertically integrated within their commercial sectors. These organizations include the Central Wheat Cooperative (COCEBLE), the Central Cooperative for Major Crops (CCGC), the Central Cooperative for Seeds and Improved Varieties (CCSPS), and the Central Meat and Herders Cooperative (CCVE).

The fifth type includes commercially managed enterprises, wholly or partly owned by the GOT, which operate upstream or downstream of agricultural producers in the manufacturing and distribution of agricultural inputs or the processing of agricultural output. Among the key state-owned enterprises in the agriculture sector are:

- a. STEC (Societe Tunisienne d'Engrais Chimiques) - responsible for wholesale distribution of chemical fertilizer,
- b. SONAPROV (Societe Nationale pour la Protection des Vegetaux) - responsible for pesticide and herbicide applications,
- c. SONAM (Societe Nationale de Motoculture) - responsible for the rental and distribution of mechanized traction units

### C. Financial Institutions

Three key types of financial institutions impact on the pace of change in the agriculture sector: institutions which provide agricultural credit, the institution which sets prices and subsidy levels for agricultural products and inputs, and the institution which administers the mechanics of the subsidy program.

#### 1. Agricultural Credit (see fuller description in Chapter VII)

Other than funds controlled by the MOA, a range of institutions provides credit to farmers:

- a. Banque Nationale de Tunisie
- b. Banque Nationale de Developpement Agricole
- c. Private Commercial Banks, such as Credit Foncier or Credit Commercial de Tunisie

## 2. Prices and Subsidies

Official prices are set at the ministerial level by the Conseil de Ministres largely on the recommendations made by the "Comite National des Prix." The Committee is made up of representatives from all relevant government, professional, political, and social organizations. The meetings are chaired by the Minister of National Economy. Although the MOA is a participant, its voice in setting price policy is not decisive (World, Bank 1982).

## 3. National Subsidy Fund (Caisse Nationale de Compensation)

The National Subsidy Fund administers the distribution of funds made available by the national budget in order to maintain subsidized price levels for specified agricultural products and inputs such as farmgate wheat prices and bread subsidies (Tables 15 and 16).

### D. Dryland Farmer Organizations

#### 1. Farm Cooperatives

There are two main types of cooperatives operating in the agriculture sector, Unites Cooperatives de Production Agricoles (UCP) and Cooperatives de Service de Base (CSB).

a. UCP - In 1985, the number of UCP's was 221, with 211 in the North, covering 233,000 ha. of land of which 127,000 ha. was devoted to cereal farming or mixed dairy/livestock/cereal farming. The UCP's included 7,360 cooperators, and the average area per active cooperator was 27.6 ha. During the VIth Plan, thirty-five UCP's were transformed into commercially-run parastatal organizations or privatized.

b. CSB - The CSB's are a relatively new form of farmer organization in Tunisia. As of September 1985, there were CSB's, most of them located in the North. These entities are associations of small and medium-sized farmers whose primary functions are to obtain inputs and market outputs. The CSB program is administered by the MOA's DAPME. The CSB's were created to help farmers perform for themselves many of the input and marketing services now performed by parastatals such as the ONC or by private dealers. These services could include treatment of standard seed, distribution of seed and fertilizer, and post-harvest cereal storage, marketing, and processing of cereals, vegetables and other crops.

## 2. Rural Savings Organizations

One of the major types of farmer organization concerned with mobilizing rural credit resources in Tunisia is the Societes de Caution Mutuelle Agricole (SCM). SCM's are legal entities with variable capital empowered to issue guarantees to a qualified institution (such as the BNT) giving loans to SCM members. At the end of 1981 there were 213 SCM's with 54,000 members and a subscribed capital of 360,000 TD. Today, however, there are only 87 SCM's in operation and it is generally believed that these organizations have not effectively performed their mutual credit guarantee function.

### E. Private Sector Participation

Increasing private sector participation in the agriculture sector is a specific objective of the VIth Plan, particularly in the areas of input distribution. In conformity with policy under the PL 480 Program, the GOT agreed to carry out studies and increase margins sufficiently to encourage private dealers to market fertilizer. Margins were increased by four-fold in 1982. By November 1983, 38 new dealers were reported in five governorates surveyed and by December 1984 a total of 167 dealers was reported. This figure has continued to grow and, in addition, service cooperatives have entered the trade in fertilizer, seeds, and pesticides (there are about 150 such cooperatives). The total number of dealers and cooperatives handling inputs as of November 1985 is not known nor is there a specific target for the end of the VIth Plan. At the moment, there is some concern that both the level of margins and the manner of treating public versus private distribution has begun to erode the stimulus for private trade in fertilizer.

### F. Conclusions

As can be seen from the previous descriptions, the organization environment of agriculture development in Tunisia is complex and highly segmented. In one respect, segmentation and specialization are highly desirable characteristics in the development of a functional system. Specialization allows organizations to develop increased competency and expanded capacity at minimum cost (assuming the operation of relatively free market forces) in areas of activity which are required by other organizations operating in the same environment. For example, it is anticipated that private dealers will be able to distribute fertilizer to small farmers more efficiently than parastatals and, therefore, limit or reduce costly state involvement in this area.

On the other hand, segmentation of activities requires some mechanisms of coordination in order to avoid wasteful duplication of resources. Two primary examples of weak coordination with inappropriate duplication of resources in the agriculture sector are the agriculture credit and extension sub-sectors. At the regional

level, there may be as many as ten different agencies responsible for extending agriculture-related information to the same small and medium-sized farmer population. Beyond the obviously high cost of such an arrangement, the multiplicity of sources of advice confuses farmers.

In Chapter VIII, the extent to which organizations of the key actors in the agriculture sector constitute a constraint in promoting the transfer of modern technology will be addressed.

## VI. Resource Flows to the Agriculture Sector

### A. National Budget Allocations to the Agriculture Sector

During the past fifteen years, investments allocated in the national plan to agriculture have grown steadily (Table 10). In 1971, approximately two percent of total investment was attributed to the agriculture sector. In 1981 the last year of the Vth Plan, this share had increased to 13.2 percent. During the Vth Plan as a whole, 12.9% of total investment was allocated to the agriculture sector. The VIth Plan projected an 18.9% share of investments for the agriculture sector. While full data has not yet been tabulated for VIth Plan accomplishments, it is anticipated that agriculture investments for the period will amount to 14% of the total investments (World Bank, 1983). Preliminary indications are that this percentage share for the agriculture sector will continue to grow in the VIIth Plan.

In terms of sub-sector shares of the investment budget, the irrigation sector has increasingly dominated over the past four plans, growing from a 17.1% share in the First Plan to a 42.3% share in the IVth Plan (World Bank, 1983).

### B. Bilateral and Multi-lateral Investments

Accurate data on the volume of external donor investments in the Tunisian agriculture sector are difficult to obtain. The source documents for this section are the 1983 and 1984 annual reports issued by the UNDP Office in Tunis, supplemented by data obtained directly from the World Bank and USAID.

In 1983, The GOT obtained financial support for agriculture sector investments from thirteen bilateral donors, from five United Nations agencies, and the European Economic Community. Total investments in the agriculture sector were US\$37.4 million, 48% of all external assistance. The largest donors to the agriculture sector were the World Bank, the World Food Program, the FAO, USAID, the Federal Republic of Germany, Italy, and the EEC. In order to obtain an idea on donor financing trends, a brief overview of two of the most active donors in the agriculture sector, the World Bank and USAID is presented below.

World Bank support for the agriculture sector began in 1967. Since that time, fifteen projects have been approved for a total of US\$ 358 million. The portfolio includes two fishery projects, three agricultural credit projects, one large integrated rural development project (Northwest), a grain storage project, a planning assistance project (for preparation of the VIIth Plan), and six irrigation projects, five large perimeter infrastructure and one focused on management improvement. Nine of the projects are on-going. Of the on-going projects, irrigation projects constitute a large majority of the funding. In the next eighteen months, the World Bank is anticipating funding for a substantial agriculture sector adjustment loan and the fourth phase of the agriculture credit project.

USAID has been involved in the agriculture sector in Tunisia since 1957 with total funding exceeding US\$ 995 million (Checci 1985). Support for agriculture represented approximately 50% of total aid funding for Tunisia in the period 1983 - 1985. The current generation of USAID projects dates from 1978, including projects in rainfed agriculture research and extension, regional development (Central Tunisia), potable water, agriculture credit, range and livestock development, long-term university training in the U.S., and local currency support for agriculture via the PL 480 food aid program (see Figure Two for life of project funding levels and duration). In the next eighteen months, USAID is anticipating funding a second phase of the agriculture credit and potable water projects and a combined resource conservation/range management project.

### C. Issues in Donor Support to the Agriculture Sector

As in many developing countries during the last decade, donor support in Tunisia has proliferated substantially. While issues of coordination among similar projects are evident, broader issues of coherence within an agriculture sector policy framework are even more critical. For example, at least eight different sets of procedural modalities are being employed to provide small and medium sized farmers with agriculture credit, and the number of separate credit funds, mostly from foreign donors, is several times this level. More important, in this confusing array of modalities, procedures, and funds, the really critical issues of how to maintain acceptable levels of repayment and to promote interest rate and savings mobilization policies for a more rational management of limited budgetary resources have received inadequate attention.

A second issue relates to the capability of the Tunisians for managing the development process. Because of a sustained commitment to post-graduate training for its technicians, the GOT does not face the type of manpower quality situation found in many areas of Africa. In the agriculture sector, the MOA can depend on a wide range of Masters-level and PhD-level technicians to implement donor assisted projects with limited recourse to expatriate technical assistance (Table 19). Because of this abundance of capably trained

individuals, the role of technical assistance need focus less on operational support and more on the tasks of elaborating policy, coordinating strategy implementation, and managing the process of technical change.

## VII. Sub-sector Organization and Performance during the VIth Plan

Although the agriculture sector in Tunisia has demonstrated continued growth during the VIth Plan, production increases have been uneven and have varied across sub-sectors. In this chapter, the performance of each of the production sub-sectors is reviewed for the previous five-year period. Since a full description of the organization of these sub-sectors is available elsewhere (World Bank 1982, Newberg 1981), only summary data are presented on the organization of these sub-sectors. An attempt has also been made to identify the key constraints to increasing production in these sub-sectors. As in previous chapters, this material focuses primarily on rainfed agriculture production. The following chapter reviews the key support systems which complement the efforts of farmers to grow and market agriculture products.

### A. Dryland Cereals and Legumes

#### 1. Overview

Tunisians are large consumers of cereal and cereal-derived products (livestock and dairy). From 1966 to 1980, the relative role of cereal, livestock, and dairy products in the diet of the average Tunisian increased from 52.1% to 57.7% for cereal and from 8.2% to 10.4% for meat and dairy while all other dietary components experienced declines (FAO 1985). Bread has become a central focus of the daily caloric intake and its importance is demonstrated by the "Bread riots" of January 1984 which occurred following a more than 100% increase in the price of this highly subsidized product. Cereal imports have also steadily increased over the past decade, averaging 760,000 tons for the six years ending in 1983, and as high as a million tons for the period 1980-83 (Tables 4 and 5). The average annual rate of increase in cereal importation from 1972 to 1983 was approximately 16%. Food self-sufficiency, particularly in the cereal sub-sector, has become a key component of GOT planning in the agriculture sector in order to reduce the political costs of dependence on external markets for feeding its population and to address the adverse impact of this scale of imports on the balance of payments.

The key cereal products grown in Tunisia are durum wheat, bread wheat (ble tendre), barley, and a small but increasingly important proportion of Triticale (a rye-wheat crop now used mainly in animal feed). An additional consideration in a review of the rainfed cereal sub-sector is land devoted to the production of forage and legumes. This aspect will be treated more fully in the livestock sub-sector review.

Cereal production is concentrated in the eight northern governorates of Tunisia, in which rainfall averages between 400 and 600 mm. The area devoted to cereal production in these provinces covers approximately 800,000 hectares (755,000 ha. annual average from 1977-83; 833,000 ha. average for 1984-85). Over the past eight years, there has been a progressive increase in the amount of land devoted to bread wheat and barley cultivation in the north at the expense of durum wheat. The 1985 campaign represented the first substantial production of Triticale, which occupied 5,000 ha. The combined Central and Southern zones, where rainfall averages between 150 and 400 mm., planted approximately 643,000 ha. in cereals in 1984. As a response to the ideal growing conditions, favorable government policies, and increased prices of the 1985 season, farmers in these zones augmented the area devoted to cereals production by 70%. For bread wheat and barley, areas almost doubled in comparison with the previous year.

While rainfall is a key causal component in cereal production (Table 18), it is clear that the increasing use of improved inputs, such as treated and certified seed, new high yielding-grain varieties, phosphate and nitrogen fertilizer, improved weeding-control practices, including the use of chemical herbicides, have contributed to increasing cereal production during years of normal or better than normal rainfall. According to projections by the MOA (DPSAE 1984) and the FAO (1985), cereal production by the year 2001 could attain a potential average annual level of between 1.8 million and 1.9 million tons, assuming production constraints can be gradually alleviated. The official cereal production statistics for 1985, 2.08 million tons achieved under near ideal growing conditions, demonstrate that this potential is realizable. Even if one assumes the crop estimate erred to the maximum on the high side, the actual crop still probably would be around 1.9 million MT which would appear to make a year 2001 plateau of 1.8-1.9 million MT achievable if progress on improvement in technology and incentives continues at levels of the 1980's to date.

## 2. Issues and Constraints

Price policy is not a constraint in achieving substantial increases in rainfed cereal production. Prices now equal or surpass world market prices for most cereals, do not seem to be a constraint in achieving substantial increases in rainfed cereals production. The key constraints are the ability of the research establishment to continue to refine its research on high yielding cereal varieties suitable to the agroclimatic conditions which prevail in the cereal producing zones in Tunisia, better linkages between research and extension services in communicating improved practices to farmers, a more effective and responsive system for distributing inputs to farmers, other measures to improve efficiency such as reliable soil testing, a better managed agriculture credit system, and resolution

of the land tenure issues, with absentee ownership, fragmentation, and lack of clear titles being major problems. Most of these issues are addressed in the support system chapter.

A different kind of issue concerns the mix of grain, forage, and legumes which the farmer cultivates in a given rotation year (the production strategy question). Tunisian farmers, like farmers everywhere, seek a compromise between profit maximization and risk aversion. In the Tunisian environment, they prefer to pursue diversified production strategies in response to precarious climatic conditions. The integration of livestock and grain production, both in the higher and lower rainfall zones, is now a predominant production concern. Research and extension must increasingly address the issue of these strategic land-use options and preferences at the farm level. One of the major problems is that areas previously left to grow nitrogen-fixing legumes during the fallow, now are over-grazed, destroying the legumes and removing moisture-preserving crop residue. In the short run, these choices may increase livestock production and food self-sufficiency, but lack of appropriate technology incorporating livestock into cropping systems in the long run results in higher per unit costs, lower output, and probable environmental degradation. A farm-level, integrated "production systems" approach, therefore, must be taken into account by Tunisian research and extension systems.

## B. Livestock and Dairy Production

### 2. Overview

The increases in red meat, poultry, and dairy production initiated in the 1970's have continued into the 1980's although not at the pace projected in the VIth Plan (Table 1). Levels of investment in livestock have increased considerably over the past three plans and are expected to continue into the VIIth Plan, reflecting the importance of this subsector both to food self-sufficiency and to reductions in imported meat, dairy, and livestock feed (one of the consequences of 1970's policies was rapid increase in feed imports). For 1985, production of meat is estimated to reach a record 209,800 tons compared with 190,000 tons last year. The strongest efforts have been in beef and poultry production which registered 14.1% and 11.1% increases, respectively in 1985 relative to 1984 levels. Milk production increased 8.6% to 315,000 tons. The major factor in the increase in livestock production since 1981 has been the freeing of livestock prices. Despite these advances, import levels remain high, demonstrating the expanding appetites of Tunisians for livestock and dairy products. This year's projections for livestock and dairy imports total 21,000 tons (carcass) and 290,000 tons fresh milk equivalent, respectively (MOA 1985a).

Two specific objectives of the VIth Plan were to increase the amount of fallow converted to forage production and to improve and expand land given over to pasture. Between 1984 and 1985, a five percent

increase was achieved in the area of fallow given over to forage production (representing approximately 15,000 additional ha.). Given that there are approximately 400,000 ha. of land usually left fallow in the North, further increases can be expected. Efforts by the World Bank in the Northwest and by USAID in Central Tunisia have led to the upgrading or restoration of 11,000 ha. of pasture.

The production and consumption of animal feed concentrates decreased substantially during the VIth Plan following the suspension in 1982 of the heavy subsidy on imports of feed concentrates resulting in increased feed prices. In addition to a substantial reduction in feed imports between 1981/82 and the present (see Table 17), the principal effect of these price policy changes was to encourage livestock producers to seek cheaper feed substitutes wherever available. Emphasis on Triticale and a shift of some of the local barley production to feed use were responses to these price factors. Triticale production for 1985 amounted to 12,500 tons, with an additional 20,000 tons of barley diverted to feed.

From 1981 to 1985, the number of cattle increased 9.3%, sheep 29%, and goats 36.3% (measured in livestock equivalent units, see Table 9). Development of improved dairy cattle did not proceed as rapidly as planned; only 10,500 head of improved dairy cattle were imported compared with the 25,000 anticipated during the VIth Plan. Progress has been made in development of veterinary services and milk collection infrastructure. Access to reliable and inexpensive feed required to make dairy production profitable is a major problem, especially with the decision to eliminate feed subsidies. The production of eggs increased despite the reduction in feed subsidy (from 777 million in 1981 to 1 billion in 1985), but the production of poultry meat (broilers) decreased substantially after 1981 but is now showing some signs of recovery.

## 2. Constraints and Issues

The major related constraints to improving livestock production in Tunisia are increased integration of rainfed cereals farming with forage production and increased access to reliable supplies of reasonably priced feed. The increased use of traditionally fallow land for forage production can have a significant impact on livestock production levels provided proper technology and necessary inputs are made available. Farms which have access to irrigation (shallow wells, springs, stocking ponds, etc.) could also serve as a source of forage production during the dry season. In Central and Southern Tunisia, the availability of water from such sources represents the only reliable means of production of forage for livestock to supplement the highly rain-dependent and often unreliable rangeland. Seeding pastures with improved varieties of forage crops, the expansion and protection of pastures, and better management of the rangeland in most cases can be highly cost-effective approaches to improving access to feed within the limits of available arid and semi-arid technology.

## C. The Irrigated Subsector

### 1. Overview

The irrigated subsector has contributed substantially to the growth of the agriculture sector in Tunisia. In 1980, it accounted for about 25% of the country's total agricultural GDP. For 1985, the contribution of the irrigation subsector is slightly below 25%, largely because of the large increase in the value of that year's cereal production. About 50% of total irrigated area is used to produce vegetables, 35% for fruit trees, 8% for fodder and the balance (7%) for cereals and industrial crops (mostly sugar beet). By the end of the VIth Plan, it is anticipated that 245,000 ha. of the 250,000 ha. total irrigation potential theoretically will be equipped for irrigation. In practice, the amount of land irrigated is likely to be considerably less, largely because of the substantial discrepancy between total area theoretically equipped for irrigation on government-controlled perimeters and the amount actually irrigated. Approximately 125,000 ha. organized as Public Irrigation Perimeters (perimetres publiques irriguees) will be managed by publicly-owned entities, "Offices de Mise en Valeur." Irrigation in private systems comes from about 23,000 shallow wells equipped with pumps plus some pumping from rivers and small impoundments. Irrigated land represented approximately 5% of the total land actually cropped in 1984, though it represents less than 3.5% of the total arable area.

The development of water resources for agricultural purposes is guided by three "Plans Directeurs," one for each of the major geographic regions in Tunisia. The plans project water use through 2000 and 2025. As of September 1985, fifteen major dam projects have been completed with a total volume of 767 million cubic meters of water (a 9.36% increase over 1984). Two dams now underway and expected to be completed in 1987 and 1988 (Lebna and Siliana) will contribute an additional 30 million cubic meters, enough to irrigate about 4,000-5,000 additional hectares. Since most of the irrigated areas receive 200 mm or more of rainfall, the systems perform more of a supplemental role to rainfed conditions, at least during the rainy season.

After having contributed substantially to the creation of large irrigation infrastructure in Tunisia, the World Bank determined that PPI's were operating at far less than full capacity and efficiency. A complete description of the problems associated with the operations of the PPI's can be found in the World Bank Appraisal report for the Irrigation Management Improvement Project (World Bank 1985b). The objective of this project, approved in May 1985, is to increase and insure the sustainability of agricultural production within 105,000 ha. of irrigation land in the PPI's (i.e., consolidate the benefits of considerable past investments).

## 2. Issues and Constraints

The key issues for the irrigated sub-sector are broader than questions of operations and management, however, deriving in some cases from source of ownership and control. For example, private systems are typically better managed than public perimeters, have lower investment costs per unit of additional production, and have much better cost recovery ratios. Other than subsidized credit rates, private farmers pay for the entire cost of the irrigation investment. Private farmers are more susceptible to being provided basic input and marketing services by the private sector than those in the public perimeters whose structure already includes provisions for those services. Issues of improved water management probably are more difficult to deal with in public perimeters than in privately operated irrigation systems.

A second broad set of issues has to do with the relative importance of the irrigated sector in the future. The equipping of land for irrigation will have reached its full potential early in the VIIth Plan. At that point, issues of maintenance and operating efficiency will be the primary concern. Rainfed agriculture covers approximately thirty times as much arable land area as does irrigated land (about 20-25 times as much cropped...) and employs many more people. In the future, the major benefits to the agriculture sector in the areas of employment, efficiency and output will have more to do with improved management of rainfed agricultural areas than with the performance of irrigated areas. Given the existing large sunk investments in public irrigation systems and prevailing low levels of water use efficiency, however, measures designed to increase water use efficiency may prove to have very high benefits to cost ratios. The problem is that techniques for bringing about quantum increases in efficiency have not been developed and proven.

### D. Other Agricultural Products: Vegetables, Fruit, and Fish

#### 1. Overview

As mentioned in the section on irrigated agriculture above, about half of irrigated lands are devoted to the production of vegetables, covering 119,000 ha. for the 1985 season. Altogether, land devoted to vegetable production has increased marginally over the course of the VIth Plan, with the largest increase coming in land devoted to tomato production (up 62% from 1982 to 1986). While yields reached record highs for most of the vegetable crops, low prices in Europe and marketing problems for many of the vegetables reduced the impact which production increases may otherwise have had on the balance of payments. Along with modest increases in land devoted to vegetable production, there has been a parallel increase in the use of greenhouses. Greenhouses will account for 1,072 ha. of vegetable production in 1986 against 861 ha. in 1982 (a 25% increase), the major part of these is devoted to peppers. The GOT is encouraging

the use of greenhouses by subsidizing pesticide treatments up to 50% (nematodes) and increasing the amount of credit for greenhouse use (3,200 TD per hectare vs. 3,000 TD per hectare previously).

Despite an 11% decrease in the volume of the 1985 citrus fruit crop, exports rose 28% in 1985 to 41,000 tons from 32,000 tons a year earlier. Most of this increase was due to the freeze in Spain during the winter of 1984/85. Total production of citrus fruit declined slightly from 1981 to 1984. Olive production in 1985 was down slightly from 1984 due largely to the cyclical nature of olive production (after a very good year, olives tend to produce at a lower level the following year). In addition, there has been some downward trend in production especially in the Central and Southern regions due to increased costs relative to prices and to aging of plantations. While rains were ideal for grain production in 1984/85, they were disastrous for date palm production. The heavy October and November rains translated into a 23% decrease in 1985 date palm production. One of the bright spots in production was the grape harvest which experienced a 7.7% increase over the preceding year and a 34.6% increase over 1981 output (50,000 tons v. 35,000 tons). This large increase from 1981 resulted in an accumulation of wine stocks and an almost 300% increase in the export of table wine during the first seven months of 1985. These increased exports were achieved at a reduction in per liter earnings of approximately 50% between the current and the previous year. The GOT expects continued increase in competition in export wine markets in 1986. The almond and apricot harvests for 1985 were also up over 1984 figures, totalling 52,000 tons and 22,000 tons respectively. Finally, summer fruits were expected to amount to approximately 147,000 tons in 1985, a marginal increase from the previous year. The GOT has made a special effort to encourage production of summer fruit which has resulted in important increases in the planting of trees (particularly apples).

Based on heavy investments made in the fishing subsector at the beginning of the VIth Plan, plus the effects of livestock price decontrol, production results have exhibited important increases, from 57,500 tons in 1981 to 74,900 tons in 1984. The first half of 1985 has already posted an 11% increase over the comparable period from 1984.

## 2. Conclusions

In all three areas of production, vegetables, fruit trees, and fish, continuing, modest increases have been achieved, as a result of increased investments and favorable price policy. In the future, increased production of fruits and vegetables will depend on improvements in the upstream marketing and transformation infrastructure. Without these improvements, it will be difficult for farmers to move additional quantities either into local market consumption or into export arenas.

## VIII. Support System Organization and Performance

The performance of each of the sub-sectors reviewed in the preceding chapter depends, in varying degrees, on the performance of complementary support systems which create knowledge of improved practices and varieties, which communicate that knowledge to farmers in a timely and usable manner, which provide the farmer with access to required inputs in a timely and economic manner, and which assist the farmer in marketing produce not required for personal consumption. This chapter reviews the performance of these agriculture sector support systems and identifies the key constraints which must be addressed to improve the performance of those systems.

### A. Agricultural Research

#### 1. Overview

The two main institutes involved in agricultural research are the National Agronomic Institute of Tunisia (INAT) and the National Institute of Agricultural Research of Tunisia (INRAT). As the main Tunisian institutions charged respectively with training of upper-level agricultural professionals (Masters and "Doctorat") and agricultural research, both INAT and INRAT are well-established organizations with a total of roughly 150 professionals, almost all Tunisians. INRAT has a fairly broad range of research activities with nine separate departments, but a relatively small senior staff. INAT mainly emphasizes research in cereal variety improvement, legumes, and agricultural economics. Water, farm machinery, and rural engineering teaching and research are addressed in separate institutes located in Medjezelbab.

Livestock research is conducted at the Animal Husbandry School in Mateur; the only significant range management research, however, is being carried on in Kairouan under sponsorship of the USAID-financed livestock project. The Farm Management School at Mograine offers a B.S. degree and does some research. The Superior School of Agriculture at Le Kef (ESAK) combines teaching and research oriented largely to field crops (ESAK was upgraded to a four-year institute in 1982). The Horticultural School at Chott Meriam does research on horticultural crops, including fruits and vegetables, but olive research is conducted at the Olive Institute in Sfax. Finally, some research in agro-processing is carried out at the Higher School of Food Industries.

#### 2. Research Progress during the Vith Plan

A key focus of USAID-financed PL 480 support since 1982 has been the improvement in the capability of the Tunisian research establishment to provide farmers with more efficient production-increasing technologies in rainfed areas. This support has included assistance to expand the capability of INRAT, ESAK, and the Department of Plant

Production (DPV) to perform soil analyses and to make fertilizer application recommendations to farmers desiring such services. In the future, it is expected that soil test services will be devoted to farmers willing to pay at least part of the costs. Three soil-testing labs have been equipped and are scheduled to begin an expanded program of testing in calendar year 1986. A second domain of research centers on integrated weed control research designed to evaluate and extend information on alternative weed management programs - particularly for cereals - that require less use of costly herbicides. Herbicide use has been steadily increasing in Tunisia (see Section C on Inputs), but available herbicides remain heavily subsidized.

Finally, PL 480 support has attempted to encourage applied research activities to develop, test, and disseminate on a widespread basis, new, higher yielding cereal and legume varieties uniquely adapted to various micro-climes of the country. Some higher yielding varieties are now available and widely used, especially for soft wheat where almost 100% of the area is seeded in high yielding varieties. Percentages are lower in durum and barley. Very recently, Triticale, a cross of wheat and rye has been introduced, and last year 12,500 MT was harvested.

A second activity of support for agricultural research, also commencing in the first year of the VIth Plan, was USAID's agricultural research project designed to focus attention of Tunisian researchers on priority problems, improve communication and interaction among researchers involved in dealing with these problems, and to adapt, wherever possible, inter-disciplinary, integrated farming systems approaches to these problems.

### 3. Constraints and Issues

Although research has improved significantly in recent years, both in terms of relevance to key problems facing farmers and in terms of productivity, it still continues to impose a major constraint on rates of agricultural growth and innovation in agricultural and agribusiness efficiency. Major weaknesses in the GOT's agricultural research system include:

- fragmentation, particularly among commodity groups and production resources which make effective integration of results into meaningful farming systems advice for farmers difficult;
- a tendency to emphasize esoteric outputs and neglect the practical problems confronting farmers;
- fertilizer response research is at best very weak and soil testing/fertilizer response research almost non-existent and soil and foliar analysis services practically unavailable to farmers;

- in general, research on agricultural economics, marketing, and agricultural policy is weak;
- Research tends to be concentrated on stations and in offices with relatively little research done on farmers;
- budgets tend to overemphasize facilities and permanent personnel with little funds allocated to operating costs, including supplies, transport, travel, and casual field and clerical workers.

## B. Extension Support System

### 1. Overview

The most striking aspect of the extension system in Tunisia is the multiplicity of agencies who are responsible for providing advice in one form or another to farmers. At the central level, four different departments address extension issues: the Department of Crop Production (DPA), the Department for Assisting Small and Medium-sized Farmers (DAPME), the Department of Research, Extension, and Education (DERV), and the Animal Production Department (DPA). At the regional level and sometimes at the district level, representatives of each of these departments are responsible for managing extension services to farmers.

In addition, irrigation authorities (OMV's), specialized national agricultural organizations, such as the national Cereals Office or the national Range and Livestock Office, and regional development authorities each have their independent extension staffs. A farmer in Kesserine with parcels divided between the OMMIVAK (irrigated perimeter) and dryland exploitation who was interested in integrating livestock more closely with his crop production, launching a stand of fruit trees, and needing short-term credit to obtain inputs might come into contact with representatives of ten different extension agencies!

The GOT has made an attempt to deal with this multiplicity of agents by establishing a network of local agricultural extension center (CTV - Cellule Territoriale de Vulgarisation) which are to organize direct contact with farmers. Approximately 500 CTV's have been planned for all of Tunisia, 280 of which have been completed with 18 more nearing completion. A notable extension success in the record-setting 1985 campaign was the impact of the mass media strategy implemented by the DPV and the DERV. When the nature of the rainfall pattern had become fairly predictably established, the DERV bombarded both television and radio with fertilizer dosage recommendations (particularly nitrogen). Brief "flash" emissions were aired just prior to the review of the national news and contributed to the record-setting level of ammonium nitrate applied to cereal crops.

## 2. Constraints and Issues

As is apparent from the description above, a key constraint in the extension support system is the low level of coordination among extension agencies. Lack of this coordination prevents the transmission of focused, integrated farming advice to farmers. Weak links to research, which itself is fragmented, also contributes to this inefficiency. In both research and extension, greater effort must be made to view the farmer as the manager of a set of resources who is faced with a broad array of management options in order to maximize output while minimizing risk. In Tunisia, most farmers face these choices on the basis of discontinuous, unrelated, information flows from a range of sources. Integration occurs at the level of the farmer who is least equipped to perform this integration under a system that introduces modern technology. So he tends to cling to traditional low-yield, low-risk methods used by his forebearers. In the future, information directed to integrated production strategies to increase farm-level productivity must be increasingly provided by the research and extension establishment.

### C. Prices and Use of Inputs

#### 1. Overview

Intervention in the market place substantially predates Tunisian independence. The early interventions, especially on cereals, were largely aimed at providing large commercial farmers (mainly colonial) with some price protection and hence greater economic security. After independence, inputs, such as fertilizer, frequently were subject to taxes, sometimes at high levels, rather than being subsidized as at present. The sharp world-wide increase in prices, starting with the oil price increases in 1973, led the GOT to increase its levels of intervention in the marketplace. Many farm and consumer product prices were controlled and substantial subsidies paid, particularly on imported consumer goods, to achieve more general economic stabilization objectives with respect to consumer prices, wage constraints, industrial and other costs. Inputs prices were controlled to compensate for output price contents and limit the impact of the sharp world price increases on the farm sector. For two or three years, very large subsidies were paid. Once launched, the policy of input price control and subsidy and control of output prices to limit consumer prices became common throughout the agricultural economy. Subsidies were (and are) provided on fertilizer, seed, pesticides, machinery, credit, irrigation water, much of the seed used and other inputs. Wage increases were limited and, to a degree, subsidized via cheap food and containment of other prices.

One of the serious problems with managed prices was that adjustments became very political and consequently often were inconsistent with each other, or not timely. Illustratively, annual crop price adjustments were frequently not made despite increases in costs of

production. When price increases were made, they frequently came too late for farmers to respond to the increased incentives (e.g., at harvest rather than planting time). Resistance to price changes often meant partial action as well as delayed price actions. For example, margins (in DT/MT) allowed for private fertilizer dealers remained unchanged for many years while costs escalated. More serious, artificially low consumer prices resulted in growth in consumption well beyond levels that could be supported in the long run.

The increased concern over growing agricultural trade gaps and declining ability to pay for a growing food import bill led to a determination toward the end of the Vth Plan to stimulate greater agricultural growth. One of the principal measures was to be improved price incentives including annual review and, if needed, price adjustment with announcement of new prices sufficiently in advance of farmer decision making to permit an early production response to the improved price incentives.

## 2. Cereal and Fertilizer Prices

In 1981, coincident with the advent of the current PL 480 program approach, the GOT formally adopted the practice of annual review of crop prices and costs of production and the announcement of new prices in advance of planting. It has followed this approach each year since.

During the VIth Plan Period, a major increase was made in fertilizer prices (about 40% in late 1982), as margins for dealers were increased. Another fertilizer price increase was made in 1985, by about 10% for AN and 20% for TSP. The greater increase for phosphate reflects world N/P price relationships. However, the new prices for fertilizer (shown below), still do not reflect fully the world cost ratio of phosphate to nitrogen.

	<u>1984/85</u>			<u>1985/86</u>		
	<u>Factory</u>	<u>STEC</u>	<u>Retail</u>	<u>Factory</u>	<u>STEC</u>	<u>Retail</u>
AN	63.0	66.150	72.750	68.520	71.950	78.550
TSP	45.0	47.250	52.000	66.400	57.650	62.400
SP	25.0	26.650	29.350	31.200	32.520	35.220
DAP	-	-	-	93.000	95.250	100.000

The STEC price is the price at which dealers buy, but it is also the price at which favorably situated farmers can buy from parastatals (e.g., OC). Thus, private dealers are at a competitive disadvantage. Fertilizer prices involve subsidies averaging about 50% of the cost. These levels probably are not sustainable in the long run. Part of the fertilizer subsidy cost appears to be due to above world market costs of some domestic fertilizer.

Illustratively, ammonium nitrate currently is not competitive in international markets. Consequently, the GOT is reluctant to substitute DAP domestically which can be exported for AN and TSP. The table below shows 1972, 1981, 1984, 1985 and recently announced 1986 prices of soft wheat, durum, barley and fertilizer in dinars/MT.

<u>Commodity</u>	<u>1972</u>	<u>1981</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
Durum Wheat	48.00	96.00	140.00	150.00	160.00
Soft Wheat	43.00	87.00	140.00	145.00	160.00
Barley	28.00	70.00	100.00	105.00	110.00
Ammonium Nitrate	30.00	50.00	72.75	72.75	78.55
TSP	36.00	36.00	52.00	52.00	62.40

Grain prices have been adjusted upward more than fertilizer prices during this period. As a result, price relationships now are more favorable than in the early 1970's, when fertilizer consumption was expanding fairly rapidly. Since 1972, prices of soft wheat have been increased over 270%, barley 290% and durum 230%, while TSP fertilizer increased only 73% and AN by about 160%. The price increase for ammonium nitrate at the Office of Cereals is less than this for farmers who can buy at OC since they, in effect, get fertilizer at the same wholesale price paid by dealers and cooperatives.

The current situation would appear to justify a somewhat higher rate of increase in fertilizer than crop prices in the next few years as subsidy costs are being reduced. In contrast with the period following 1973, grain prices now are substantially above world price (CIF). Thus, it would appear that Tunisian farmers would not suffer a competitive disadvantage if inputs were near world levels. At current cereal prices, a retail price of TD 100 for AN and TD 120 for TSP with 1985 crop prices would restore approximately the relationships that existed in 1972. This would very substantially reduce the subsidy costs to the Government.

The official policy beginning in the Sixth Plan Period is to gradually eliminate subsidies. It is recognized that for Tunisian farmers to compete in the absence of subsidies they must have available to them the least expensive and most suitable inputs and crop management systems. Several activities, planned by the Ministry of Agriculture to help meet these needs for increased efficiency of input use, are supported by the PL 480 program and other U.S. development assistance. These include:

- A large scale soil and foliar analysis service based on a large program of on-farm trials to correlate soil analysis results with yields response to fertilizer.
- Evaluation and on-farm testing of weed management systems that depend less on use of costly herbicides.

- Evaluation and dissemination of higher yielding and more fertilizer responsive varieties of cereal crops along with food/forage legumes and information on suitable rotations.

### 3. Fertilizer Consumption

In the pre-independence era, most fertilizer was used on cereals by large farmers commonly in conjunction with medicagos (nitrogen fixing legumes). The primary need then was for phosphate. With the shift in tenure structure, medicagos have declined in importance. The replacement of nitrogen fixation by application of chemical fertilizer, however, took place slowly. By 1967-68 only 6,600 MT of nitrogen was used (about 2 Kg/ha. of land in crops). After the reversal of the land collectivization process in 1969, nitrogen consumption grew rapidly, reaching an estimated 19,800 MT in 1971/72 (Table 13A). Thereafter, however, fertilizer consumption stagnated, through the 1970's and agricultural production grew very slowly and, for many years, actually declined. This stagnation both in nitrogen use and in agricultural production is attributed in large part to policies aimed at stimulating development of other sectors. These efforts often resulted in adverse policies with respect to agricultural prices and price relationships, to constraints on input supply and distribution, and to restricted resource allocations to agriculture. In contrast with agriculture, other sectors achieved a healthy growth rate. Growth in GNP averaged 7% per year during the 1970's.

By the end of the 1970's it was becoming increasingly evident that the factors which had contributed heavily to the very favorable growth rates of the 1970's were not likely to contribute in like manner in the future (industrial development, especially import substitution, tourist trade, remittance from Tunisian workers abroad and petroleum and phosphate exports). The conclusion was reached that agriculture must receive much more attention. Causes of agriculture stagnation came under intense scrutiny. Two of the factors singled out for attention were fertilizer input use and agricultural prices. Quantitative fertilizer targets included 65% growth in nitrogen by 1985/86 over 1980/81 and 7% growth per year for phosphate.

Measures taken beginning in 1981 include generally increased government emphasis on agriculture, improved price incentives and specific steps to insure more timely and adequate supplies of fertilizer and an expanded distribution system. The latter included measures to provide more adequate incentives for private dealers. The established target for 1984/85 was a level of 125,000 MT of AN equivalent. Actual consumption was 124,487 MT (60% above 1980/81). Ammonium nitrate offtake for April 1 to November 5, 1985 was up 20% over the year before (Table 13A). If the current trend continues, the nitrogen target for 1985/86 should be substantially exceeded. Phosphate consumption has grown about 32% during the same period,

which is very close to the established target. The GOT has a target of distributing 5,000 MT of DAP in 1986. Achievement of this target will require early reversal of the current restriction on domestic DAP sales.

#### 4. Use of Improved Seed

In 1971 subsidies on seed distributed by the Office of Cereals averaged about 3D500 for selected seed and about 0D850 for ordinary seed. Not counting public costs of research and development of improved varieties, the subsidy then probably averaged 20% - 30% of the cost (10-20% on ordinary seed and 40-50% on selected seed). Applying the GOT estimate of seed subsidy costs (Figure 4) of one million DT to total seed distributed, 138,000 Qx would give an average subsidy cost of about 7DT/Qx which, with the higher current grain price, would represent a similar percentage.

With the introduction of Project Ble (supported by USAID) in the mid-1970's, the development and distribution of improved cereal seed had been progressing fairly satisfactorily. Improved seed is most concentrated in the higher rainfall regions where most of the wheat now is planted to high yielding varieties. In recent years OC sales of improved soft wheat seed have been sufficient to cover about 50% of the total area each year. Considering farmer retention of his own seed, all the area could be, and likely is, planted with HYV. Annual OC sales of HYV of durum are sufficient to cover about 20% of the high rainfall area and about 10% of the total area planted to durum. This would be sufficient with farmer seed retention to cover the entire northern area and most of the central area. Barley seed sales amount to only 1% of the annual seed needs. Triticale, a newly introduced wheat/rye cross, resulted in 12,500 MT of production in 1984/85. In general, more adequate, improved wheat and barley varieties have been developed for higher rainfall than low rainfall areas.

In contrast with the above, in 1979 only 40% of the soft wheat, 15% of the durum and essentially none of the barley was reported planted with HYV.

#### Distribution of Improved Seed (000 Qx)

<u>Variety</u>	<u>1981/2</u>	<u>1982/3</u>	<u>1983/4</u>	<u>1984/5</u>
Durum Wheat	112	101	84	94.4
Soft Wheat	57	59	51	48.1
Barley	-	6	3	5.1

## 5. Use of Herbicides

Herbicide subsidies are about 50% of total material costs. The herbicide treated area has been fairly constant in recent years as shown below in hectares.

<u>Product</u>	<u>1981/2</u>	<u>1982/3</u>	<u>1983/4</u>	<u>1984/5</u>
2,4-D	166,000	122,000	110,000	130,650
Polyvalents	-	63,000	83,000	153,000
Total	288,000	205,000	263,000	282,260

The most significant development has been the shift from 2-4-D to polyvalents and reduction in use of 2-4-D. Of the total in 1984/5, 17,000 hectares were covered by the SONAPROV (Government) application service. The SONAPROV involved application subsidies in addition to basic ingredient subsidies.

## 6. Use of Commercially Prepared Feed and Import of Feed Ingredients

Most livestock prices have been freed. The remaining price management applies mainly to marketing margins on produce sold in major urban areas. Prices of livestock products have been allowed to increase by amounts similar to increases in price of feeds. Adequate production incentives appear to exist for expansion of beef, poultry, lamb and dairy products. The recent decontrol of prices has tended to depress the excessive growth in consumption of animal products, and, along with greater production incentives, tended to reduce livestock product imports.

The sharp increases in prices of commercially prepared feeds in 1982/3 (between 100% and 300%) resulted in sharp declines in consumption particularly for ruminant livestock. Consumption of commercially prepared feeds in 1982/3 (between 100% and 300%) resulted in sharp declines in consumption particularly for ruminant livestock. Consumption of commercially prepared feed concentrates by ruminant livestock declined by about 70% (Table 13B). Part of this was compensated by a shift to more forage and presumably more feeding of barley. The decline in feed consumption by poultry was smaller, but sufficient to result in reduced poultry production in the first couple of years. The reduced output and government action on poultry prices resulted in a major increase in poultry product prices and feed/poultry price ratios near the pre-1981 levels. Two important objectives of the feed price increases appear to have been achieved - a reduction in subsidy costs and a reduction in rapid growth rate in feed imports. Feed imports increased about 50% from 1978 to 1981, over 15% per year, continuing the trend established in the 1970's. The sharp feed price increase during 1981/82 reversed the trend and brought a decline in imports over the 1981-85 period of about 15% (4%/year).

## D. Agricultural Marketing (7)

### 1. Overview

In most cases in Tunisia, agricultural produce is marketed and processed by government owned or controlled entities. The National Cereals Office (OC) is the best known of these marketing agencies and has a legal monopoly over all cereal imports and marketing. It pays farmers the price fixed by government for cereals and sells wheat for human consumption to flour mills at a lower price which is passed on to consumers (the OC is reimbursed the difference by the Caisse de Compensation). The OC also buys feed barley and imports maize and sorghum meal, but these are currently sold at above costs; subsidies for these products have been gradually eliminated beginning in 1982. The OC markets approximately 35% of domestic cereal production (8), but a much larger share of domestic consumption since it handles all imports (approximately 50% of consumption). While a parallel market for cereals does exist, the volume of OC transactions is such that it exerts a fairly efficient price stabilization and support effect in these markets. The OC also retails selected farm inputs (fertilizer, seed, and herbicides) to farmers directly and supplies these inputs to private dealers.

Wine grapes and olives are marketed by national offices established for this purpose (Office National de l'Huile and Office National du Vin). Since much of this production is exported and the GOT maintains a relatively firm control over exports, nearly all production of these commodities is sold to the marketing agencies. Most of the locally produced milk entering the formal market is processed by three large enterprises (STIL, a public corporation, is the largest). Some dairy product prices are controlled by the government. In the past, GOT price policies favored the import of milk concentrates over local production. Major increases in the price of milk in 1982 have had a substantial impact on this balance so that local milk production now accounts for almost 55% of total milk consumption. Nevertheless, there exists a substantial private market for intermediaries who perform an efficient collection service from farmers and then resell without processing to consumers.

A government-owned meat marketing enterprise (Ellouhoum) buys livestock and meat, sells red meat on the private market, and has a monopoly on meat imports. It also imports live animals for fattening in its facilities. The price of domestic beef is not fixed by the GOT but margins are set. Although an active private market determines prices for meat outside of Tunis, these prices are greatly affected by price-influencing in Tunis where over half of beef consumption occurs. The price of imported beef is fixed at about two-third's the price of local beef for the benefit of consumers in Tunis.

The price of mutton is not controlled by the government, and its price is generally higher than that for beef. Industrial poultry and egg production, though privately owned and managed, also face some government price management which impacts on private markets outside of Tunis in a manner similar to that for beef markets. Most vegetable prices are determined on the free market. Farmers sell to private intermediaries either at the farm or on local farmers markets or on urban wholesale markets through commission agents. Farmer cooperatives also sell on the wholesale markets. The retail trade is in private hands.

## 2. Issues and Constraints

The agricultural marketing constraints identified in the World Bank Sector Survey (1982) are still largely true today. The performance of most of these government-controlled marketing agents was adequate during a period in which the objective of the marketing system was "to provide a simple outlet for farm produce, to allow basic processing, and to transport what was available to consumers (p. 63)." As Tunisia has been transformed into a middle income society, however, the importance of responsive marketing and processing enterprises has increased substantially. Important price increases instituted for a range of agricultural products over the past three years have demonstrated that farmers respond both to changing consumer demand and prices when the marketing system sends the right signals.

The agencies responsible for marketing and processing agricultural products have been deficient in recognizing evolving demand, communicating it to farmers, modifying procurement practices, and providing transport systems capable of handling a changing product-mix. Reasons for this inadequate response on the part of the parastatals stem from the fact that their deficits are financed by the government, which eliminates most if not all incentive to change. Inappropriate price incentives (the OC is the exception here), inability to accumulate surpluses which could be used to reinvest in plant and equipment, and rigid and unwieldy administrative regulation of the development of new business opportunities contributes to institutional stagnation.

Agricultural marketing agencies have been faced with conflicting objectives established by the government, e.g. to subsidize the urban consumption of foodstuffs, to assure an adequate supply of food through the setting of incentive prices, to collect agricultural produce, to provide a range of services to farmers (such as input supply) on a least cost basis to farmers. Simultaneous pursuit of these objectives has led to reductions in the efficiency of these enterprises. In addition, where these enterprises constitute monopolies or monopsonies, their behavior prevents the participation of private and cooperative organizations. The absence of competition leads to higher prices for services, lower quality services, and the lack of objective

indicators of satisfactory performance. A dramatic example of this phenomenon is the Office of Cereals which in 1985 bought fertilizer from the nationally owned fertilizer enterprise and retails it to both individual farmers and private merchants at the same price. The related issues of prices, subsidies, and participation of the private sector are more fully addressed in the next section.

#### E. Prices, Subsidies, and Private Sector

##### Participation

##### 1. Farm-Level Prices and Subsidies

Policies of the Sixth Plan included considerably more attention to price incentives to farmers and reductions in subsidies. The government has taken several positive actions in these directions. Initially much of the price action was offset by the strong dollar and weak dinar which raised costs of imports and intensified inflationary pressures. During the first three years of the Sixth Plan the dinar fell from \$2.50 to under \$1.25, but has recently strengthened slightly and in November 1985 exceeded \$1.25.

Beginning in 1981/82, coincident with the beginning of the Sixth Plan Period, prices were freed or substantially raised on a wide variety of livestock products and in 1982/83 feed ingredient prices were increased and subsidies largely eliminated. Previously heavily subsidized feeds had mainly benefited a small number of well-situated producers (and indirectly, subsidized animal products that were most heavily consumed by middle and higher income groups). Between November 1981 and November 1982, prices of feed ingredients sold to feed manufacturers were increased by about three fold (Table 15A). Prices of finished feed products increased by between 100 percent and 200 percent. Although livestock prices were freed or substantially increased at farm and consumer levels, the actual price increases and consumer market resistance to higher prices were sufficient to discourage production somewhat. Demand for feed substantially declined as initially did production of animal products. There was some recovery in 1984 and 1985 as farmers and consumers adjusted to higher feed prices, but feed imports have continued well below earlier peak levels. Mixed feed concentrate use has particularly been depressed (by 60-70%) in the case of ruminant livestock where forages could be substituted (Table 13B).

Feed ingredient prices were again raised in July-October 1985 and now are generally above world prices (Table 15A). While total cereal subsidies have increased in nominal (dinar) terms, the real cost (in constant) terms has declined (Table 16). This decline is largely attributable to the large increase in prices of feed ingredients to feed manufacturers and the large increase in prices of feed ingredients to feed manufacturers and the large increase in finished feed concentrate prices. While a detailed breakdown on costs was not available, the current ingredient and processed feed prices should result in a subsidy on feed. Since prices of all feed

ingredients to mills now exceed world prices, the subsidy level is very small compared with earlier subsidies . This contrasts sharply with pre-November 1981 when prices charged millers were as low as 40% (corn) to 60% (soybean meal) of world prices (Table 15A).

Total crop subsidies applicable to agricultural production are shown in Figure 4 prepared by the GOT for 1983/84. Seed subsidies were estimated to cost a total of one million DT, fertilizer eight million DT and herbicides five million DT for 1983. The seed subsidy shown relates mainly to cereals and herbicides, but the fertilizer subsidy is spread over all crops. Overall these subsidies probably are slightly lower in 1985 and 1986 than shown in the chart. Seed subsidy levels per unit increased substantially in dinars/Qx during the 1970's (Table 15B). In the 1980's, however, efforts have been made to reduce costs and total amounts of seed distributed have declined slightly (from 159,000 Qx in 1984/85). The total estimated seed subsidy cost on one million DT in 1983 (Figure 4) spread over total seed distributed (138,000 Qx) would give an average subsidy cost of 7DT/Qx. The latest GOT estimate puts the total 1985 fertilizer subsidy at 6 million DT despite a major increase in consumption (Table 16) and in the domestic cost of ammonium nitrate production which make local production uncompetitive in the current export market.

The Government policy is to reduce subsidy costs on production inputs and consumer products. It is expected that over the next plan period measures will be taken to further reduce input subsidies wherever possible. A key consideration, of course, will be the trade-off among production input and output prices, consumer prices and the minimum level of subsidy costs to achieve particular objectives. Given the implicit leverage of subsidizing inputs rather than output, this well may argue for a continuation of a minimum level of input subsidies. Such a level would permit lower output prices and achieve a much greater reduction in consumer subsidies within politically acceptable levels of consumer price increases.

In general, recently-announced farmer prices for cereals bring them to about 30% over the current very depressed world levels CIF. Other agricultural prices also tend to be near or above world prices.

## 2. Consumer Pricing and Subsidies

Over the years from independence to about 1980, government intervention in agricultural and related food prices increased steadily. By the end of the 1970's, it became increasingly evident that these intervention policies were not only discouraging agricultural investment and constraining production but also stimulating unacceptably rapid growth in domestic consumption. The food deficit and growth in imports of cereals (for food and feed)

and of livestock products were particularly alarming. The increasing budget costs of subsidies required to maintain low consumer and agricultural input prices also were of major concern.

In 1981, the Government began to take significant action aimed at gradually eliminating concessional food prices, treasury costs and, hopefully, reduce imports. The GOT gradually freed prices on virtually all principal foods (lamb, mutton, beef, poultry meat, eggs, dairy products and other animal products) which enter more heavily into food budgets of middle and upper income groups while retaining those on items that impact most heavily on low-income family budgets. Livestock product price management is now restricted to control of marketing margins for a few specialty products (beef, pasteurized and packaged fresh milk, but not raw milk or other dairy products). Vegetable and fruit prices were already fairly free of price restrictions.

Beginning in 1982 subsidies on feed, which had been high and benefitted mainly to larger producers to offset livestock product price controls, were virtually eliminated. Feed ingredient and feed concentrate prices were raised by at least 100% and for some feeds over 200%. Remaining consumer food subsidies and price controls apply mainly to blended oil and to grain products. Some increases have been made in the prices of these items.

Retail prices of bread were raised by 10-20% in July 1984 and for the most popular product, the 300 gram loaf of bread, the price has again been raised for a total of 40% from 50 to 70 millimes. (The cost now is about 32 cents for 1Kg of bread). The larger loaf was raised less and now sells for 140 MM/Kg (18 cents). The supply of this 700 gram loaf is limited. Both flour and baking costs of these two popular products are subsidized. For other products the subsidy is limited to the flour. Wheat flour, spaghetti and couscous sell now for about 250 millimes/Kg. All these cereal product prices are well above the price of feed (the price of the current barley crops is 105 millimes/Kg.).

Thus, while subsidies are costly, there is little question of diversion of such food products to animal feed as is the case in some countries. Reliable estimates of the price elasticity for wheat products are not available, but available information suggests that the demand response to wheat product prices increases of 25 to 50% would be very limited - in part because cheaper substitutes are not readily available. There is no cheap root crop (e.g., cassava) available. The remaining subsidies do not appear to greatly stimulate consumption of high-cost food nor, more than marginally, increase the total food import bill. Despite the bread increases, the subsidy bill for bread probably will be higher for 1985 and 1986 than it was two to three years ago. While existing price policy tends to improve nutritional levels among the poorest segment of the

urban population, the wheat product subsidy goes also to the higher income groups who do not need such assistance. Since there is some preference for pure olive oil over subsidized blended oil, this subsidy probably is targeted more on the poor.

Table 14B shows typical retail prices in Tunis. Except for a few products (mixed oil and cereal products) retail prices are free and most are near or at world levels, (and near U.S. retail prices). Sugar prices are three times the world wholesale price, though much below the highly-managed U.S. price. Beef, lamb, broilers, cheese and some vegetables are well above what U.S. consumers would pay for comparable qualities.

### 3. Effects of Recent Price Changes on Consumer Subsidy Costs

The recent action on consumer prices should reduce somewhat the cost (in constant dinar value) of consumer subsidies. The largest item in the 1985 budget of the Caisse de Compensation (Table 16) was cereal products (60.5%) and the second largest was oils (19%). By contrast, fertilizer subsidies were estimated to account for only 6% of the total Caisse de Compensation budget. The decline in world prices of wheat to as low as \$107/MT CIF Tunisia, combined with an increase in prices of wheat products, particularly flour, pastas and bread other than the 700 gram loaf, should reduce that subsidy cost. This reduction should occur despite the larger share of the wheat coming from the higher costing, locally-produced soft wheat and durum. The meat subsidy, which in 1984 and earlier years was a major item, has disappeared with the new pricing policy beginning in 1984. The butter subsidy also was eliminated beginning in 1983.

Some subsidy is projected to continue on milk, but cheese is basically free and increasingly comes from local production. It is doubtful with the low world price of sugar and large dependence on sugar imports that much if any subsidy will be needed in 1985 or 1986 on sugar. To the extent any is required, it would be largely a reflection of high internal marketing costs, not excessively low retail prices relative to world wholesale prices. Some softening of world vegetable oil prices (which account for about 90% of the mixed oil content) should result in reduced total oil subsidy levels. The the extent Tunisia is heavily dependent on imports for some of its food items, the modest improvement in the dinar relative to the dollar has helped reduce import and subsidy costs.

Figure 4 shows a schematic of the varied levels at which prices are managed and subsidies paid on cereal products. Principal points of subsidization of consumer products are at the milling with principal products; semolina (semoule), pastry flour (farine patissiere), bread flour (farine boulangere) sold at prices that on average probably are near the blended import and domestic wheat prices (but well below the domestic farm price). Essentially, all the handling, milling and product-by product losses must be paid from the Treasury. Beyond this, the principal subsidy is on baking

(panification) of bread (35 million DT total cost which is estimated to be over half of the total cereal subsidy). Although data are not available, the high costs of operation of the Office of Cereals and other intermediaries are believed to be a major factor in the continuing high subsidy costs on food.

## F. Agricultural Credit

### 1. Overview (9)

In spite of the very considerable efforts made by the GOT and the donor community to develop agricultural credit in Tunisia, the importance of the agriculture sector is not reflected in its share of total institutional credit granted. In 1980, agriculture represented 18.8% of GDP, while the proportion of total institutional credit extended to the agriculture sector amounted to only 9% overall, and as little as 5% of total short term credit (World Bank 1982). By the end of 1984, the situation remained roughly similar, with agricultural output representing 15.3% of GDP and agricultural credit amounting to only 7.8% of total credit accorded (Banque Centrale de Tunisia 1985).

Like agricultural extension, agricultural credit in Tunisia is characterized by a multiplicity of programs and projects managed under various funding and institutional arrangements. These include:

- o Credit through the regular banking system. Because of loan size and collateral requirements, banking system credit is generally available only to larger farmers. Banking system loans are subject to regulations established by the Central Bank of Tunisia and can be re-discounted;
- o Credit through national offices. Credit in kind is provided by national offices, such as the Cereals Office, to encourage development of priority activities (cereals, livestock, olives, etc.);
- o Credit through regional development authorities. Regional Offices, such as the Central Tunisia Development Authority, manage credit funds for agricultural development within their specific jurisdictions;
- o Credit through irrigation offices. Most OMV's manage credit funds as a means of encouraging farmers to make maximum use of land within their respective irrigated perimeters;

- o Credit through specific bilateral or multilateral credit projects. These projects, such as the World Bank's Third Agricultural Loan, are generally regional in scope, with loan provisions specific to each project.
- o Credit through national agricultural credit programs (depending on the availability of budgetary resources). The largest of these funds is FOSDA, which has been restricted since 1983 to investment loans for small and medium-sized farmers.

Tunisia recently revised its legislation pertaining to Mutual Guarantee Groups which facilitate loans to farmers. These groups did not function as planned and incurred very high loan losses. The new legislation basically limits membership in these groups to the larger, more solvent farmers. The GOT is in the process of reviewing its credit system. Preliminary findings indicate that more than 100 separate credit funds now exist.

In Tunisia, credit to small farmers is characterized by a high level of subsidization, since it is subject to a 6.75% interest rate ceiling under current government regulations (recently raised from 6%). Nearly all credit loan funds are managed by the BNT, a government-controlled parastatal which, although considered to be a national agricultural bank, has two-third's of its activity outside of agriculture. Fund management by the BNT has been notoriously deficient, with little or no follow-up of borrowers in default, poor reporting, unacceptable accounting, and a high rate of error in individual borrower accounts. Consequently, loan recovery for the individual funds has been generally low.

The BNT is still by far the major conduit of institutional credit to agriculture. BNT was founded in 1953 as a government-owned agricultural bank. It was converted in 1963 into an all-purpose bank providing various types of commercial credit, so that agriculture represents today only around one third of its existing portfolio. BNT's lending to agriculture is largely short-term in the form of seasonal loans. The loan program is financed either through the bank's internal resources or through funds managed on behalf of the GOT. Only in the latter case does the BNT lend to smaller farmers, preferring to lend its own resources to larger farmers with a well-established credit record. The BNT's rate of loan recovery is under 90% for even the "bankable" client group receiving loans from its own resources. Loan recovery for funds it manages is much lower, frequently only about 60% of loans made.

The BNT also manages the FOSDA fund, the oldest and largest agricultural credit program in Tunisia. FOSDA is directed exclusively to small and medium-sized farmers and provides

subsidized loans for infrastructure and equipment: 10-20% of the loan is in the form of a grant, with 70% of the cost financed through the loan and 10-20% financed by the farmer. In the 1984/85 campaign, 10.2 million TD were allocated to FOSDA, representing approximately 44% of the total budgetary allocations to agricultural credit programs. All loans granted under the FOSDA program must also receive approval by the MOA's DAPME. The value of the total DAPME portfolio, which includes FOSDA, APMANE, and seven other funds for small and medium sized farmers, exceeds 100 million dinars.

## 2. Issues and Constraints

One of the major constraints to improved efficiency of the agricultural credit support system is the absence of a national agricultural credit policy. Since the creation of FOSDA in 1963, credit programs and projects, most of which are externally financed, have proliferated in Tunisia. Procedures vary among programs which address similar audiences and there is little, if any, exchange and coordination among programs. In addition, there exists no comprehensive study of the sector and no review of the implications of existing GOT policies has been undertaken. Interest rates to small and medium sized farmers are highly subsidized at a current 6.75% level, and delinquency rates on loans to farmers are high because the BNT has no incentive to improve its collection performance under GOT-funded programs. This situation has resulted in a history of poor repayment discipline among farmers in Tunisia.

A second major constraint has been the deficient performance of the BNT in administering GOT-funded credit programs. The BNT has been slow in making payments to suppliers of agricultural inputs, in disbursing cash to farmers, has performed its collection responsibilities in a casual and ineffective manner, and does not maintain accurate, up-to-date financial records. USAID has proposed a technical assistance project to the GOT which attempts to address the operational issues of managing supervised agricultural credit for small and medium-sized farmers. The policy issues in this area have been identified as a subject for discussion during negotiations for the proposed World Bank agriculture sector adjustment loan.

### G. Major Policy Issues in the Management of the Agriculture Sector

Major policy issues may conveniently be classified into five categories:

- o Consumer prices and subsidies.
- o Producer prices and subsidies including both input and output prices.
- o Allocation of resources for development among sectors and among sub sectors within the agriculture sector.

- o Public and private roles in development and related stimuli to private initiative.
- o Within the public sector, the allocation of responsibilities and authority and of resources to perform defined roles.

Major issues within these categories are discussed below:

### 1. Consumer Prices and Subsidies

Tunisia has a long history of consumer price management and subsidies with benefits directed mainly to urban residents and to some extent other off-farm groups. It is quite clear that in the past, this has often involved a net income transfer from farm to non-farm groups. In recent years considerable effort has been made to offset the burden to farmers of such managed price (control) policies by providing subsidies on inputs such as fertilizer, pesticides, seeds and livestock feed, credit and public irrigation. Unfortunately, for most of the farmers, the offsetting subsidies have generally been unevenly and inequitably distributed.

Beginning in 1981, a process of dismantling controls and subsidies has been underway directed mainly at areas where benefits went disproportionately to higher income groups (meat, poultry and dairy products, olive oil, fruit and vegetables) but retained though somewhat reduced on products (particularly important to low income groups (mainly cereal products and the lower cost vegetable/olive oil blends). Still these consumer subsidies do represent a substantial continuing drain on the national budget.

The evidence indicates that early consumer price controls and subsidies on foods were creating serious distortions in consumption patterns and increasing import dependence. Consumption of livestock products and sugar in particular were growing very rapidly. The remaining price controls and subsidies do not appear to be creating serious distortions of this type. The latest ATO report indicates there may have been some decline in per capita wheat consumption in 1984 (Agriculture Trade Office 1985). The issue of consumer subsidies is a major item on the agenda of multilateral donors, e.g. IMF.

### 2. Producer Level Input and Output Price Interventions

In the 1970's, farmers were subjected to a wide range of price interventions - often output prices were controlled with partially offsetting interventions, such as price subsidies on production inputs. A large part of these have been eliminated or greatly reduced. Most notably, livestock production prices have been freed and feed ingredients prices raised to or above world levels. Livestock grain prices now are all at/or above world prices. Farm level procurement prices, now operating as price supports, are at or

above world price levels (C&F). However, subsidies of up to 50% exist in some key inputs - most notably fertilizer and pesticides, and lesser subsidies exist on seeds and credit. Public irrigation systems are heavily subsidized and generally inefficient. Also costs of a variety of investments are subsidized by 10% to 30% through FOSDA. If one considers the high level of default in farm loans, the true level of subsidy on investments receiving credit may go as high as 90% where the farmer opts to refuse to make payments. Farm credit administration is generally poor, loan collection procedures weak, and overall collection averages about 60%.

AID's primary emphasis in agriculture is on increased production and related income and employment generation. The various farm level price and subsidy interventions are crucial issues in the success of assistance in the agricultural sector. Related to this are the high costs of operation of the many government agencies involved in agriculture.

Major issues to be considered include: price formation and price structure for inputs, mainly fertilizer, seed, pesticides, and credit. When input prices are fixed at unnecessarily low levels these lead to inefficient use, often non monetary forms of rationing and frequently serious inequities. The high costs of operation of the many government agencies involved in agriculture also are important because they siphon off resources that might better be used elsewhere. Though not as bad as earlier, benefits still continue to be inequitably distributed. Feed prices now reflecting world price levels will be sought in conjunction with continuation of basically world price levels for all outputs.

Currently the administration of credit does not provide either accurate or up to date accounting of loan drawdown and repayment. Consequently interest charges often are not based on the current loan balance. Lack of current and accurate accounting of disbursements, interest accumulations and payments and contribute to loan default. Better information will help but other measures also must be taken to ensure more prompt and complete payment. As it is, this element of credit subsidy is unsustainable. Measures will be needed to improve accounting in BNT, the agency directly responsible for most credit disbursement, accounting and collection. Innovative approaches also will be needed in penalizing and censuring non-payment and rewarding prompt and full payment. While some attention also should be given to interest rates, the importance of 2-3% interest subsidy is insignificant in comparison with 30-40% default rates in maintaining the integrity of the various credit funds. AID might examine the possibility of helping BNT establish an improved accounting system in a pilot region along with improved loan collection methods. High operational costs, subsidized by the Government is another problem. Unless these credit subsidy problems can be resolved, Tunisia will be financially unable to maintain a credit system at economically meaningful levels.

Low water charges represent another major farm subsidy. Initiatives to base water charges on total costs or at least to change enough to cover costs of operation and return some part of the capital invested will be required in order to reduce overall subsidy burdens.

### 3. Resource Allocations among Major Sectors and among Subsectors within the Agriculture Sector

During most of the past six planning periods, agriculture has received a share of investment significantly below its share in GNP. Further, within the sector there appear to have been significant disparities and diseconomies in investment levels in different subsectors. Within the sector at least this appears to have resulted from inadequate analysis of the benefit/cost ratios among various alternatives and lack of imagination with respect to investment and encouragement of private investment. A third constraint has been the strong tendency of the Government to opt for public sector operations and interventions (e.g. public irrigation, marketing, storage, etc.) rather than measures to stimulate private investment and concentration of public efforts on activities not easily addressed by private initiative.

For example, public irrigation investment over a long period has pre-empted almost 50% of the public investment with relatively low rates of returns. The low rates of return are partly the result of the choices made in water development which frequently involve high per unit costs but low rates of return also result from very inefficient and wasteful use of the water in the systems after development. Two measures appear appropriate: 1) shift priorities away from new public irrigation projects to private irrigation projects and to investment in other subsectors and 2) within the public irrigation subsector, shift resources from development of new irrigation system measures to improve efficiency of operation of existing public systems. Such a measure might include turning some of the systems over to private water user organizations.

There is need to redress the emphasis which has neglected rainfed agriculture in general - cereal and other rainfed crops, and cropping systems which include field crops, tree crops, forage and livestock and the rainfed agricultural areas such as Central Tunisia. Additional attention will be needed on research and extension, supply and private distribution of production inputs and services and marketing. Parastatals, particularly the inefficient monopolistic ones should be weaned from public funds.

### 4. Public versus Private Development Initiative

If there is any single characteristic of the Government of Tunisia in its approach to development, it is the reversal of traditional roles of the public and private sectors. There is a tendency of the public sector to pre-empt normally private roles and functions.

Thus where a price-making framework and information collection appear needed, the response has been direct assumption of the price-making functions and neglect of price-making framework and information collection and dissemination. Where a light hand was needed in guiding and regulating competition, government agencies were frequently established which pre-empted and monopolized the function. At the same, timely key services to agriculture such as adaptive research, extension, market intelligence, support of private investment were seriously neglected while government agencies were preoccupied with direct interventions in irrigation development, farming operations, and inefficient efforts at provision of production services and marketing. Often unable to compete, parastatals have insisted on total or partial monopolies or at least preferential treatment in access to resources and in buying and selling.

The GOT has indicated its intent to move away from public enterprise approach which is estimated to involve in excess of 500 major public enterprises. Donors can be supportive in identifying opportunities for shifting from public to private roles with primary emphasis on the agribusiness sector. Some functions not susceptible to private operation, particularly research, extension and collection and dissemination of market information, will require a continuing degree of government involvement and more efficient operations. Transfer of some of the public agricultural credit functions and services to private financial institutions could be explored and might be appropriate. One of the important issues to be addressed will be fertilizer pricing which currently privileges cooperative but places other private distributors at a disadvantage.

##### 5. Allocation of Responsibility and Resources within the Public Sector

One of the important issues within the public sector, discussed in paragraph four above, relates to division of roles and functions between private and public sectors and assignment of responsibility and authority within the public sector. The key policy issue of how functions and roles are to be assigned with the public sector is obscured by the overwhelming assumption of direct roles rather than supporting roles (of private initiative) by the public sector. For example, if the public sector were to turn much of the responsibility for input distribution over to the private sector, there would be need for some public oversight especially with respect to quality and weights on fertilizer. In the case of improved cereal seeds, private growers would require sources of foundation seed and there would be need for some public inspection to insure conformity to weight, purity, varietal specification, and germination. Where a public entity or a parastatal produces or arranges production of and distributes inputs and markets outputs, the production, distribution, and marketing function and the regulatory and inspection services are blurred.

The implications of the constraints and the issues identified in the performance of production sub-sectors and supporting sub-systems is the subject of the concluding chapter.

#### IX. Productivity Constraints and Implications for the Design of USAID/Tunisia's Agricultural Development Strategy

The description of the agriculture sector of Tunisia and the constraints inhibiting improvement in agricultural productivity point to several key areas requiring attention. For ease of describing possible responses that might be undertaken with USAID assistance, the constraints have been grouped into six general areas of concern. For some the logical response may be a modification in policies and/or organizational structures, while others imply technical and institutional requirements which need to be addressed, modified, or improved. Numerous actions are underway or planned by the Tunisians, assisted in various ways and through a multitude of projects by a wide range of donor organizations. Keeping all this in mind, the areas where AID assistance would seem to be most effective are indicated in the following sections with brief references to type and kind of appropriate response(s). A more complete description of a recommended strategy for AID assistance to agricultural and rural development is contained in a separate document (USAID 1985).

##### A. Water as the Limiting Factor

Availability of water, both in terms of amount and distribution during the year is the critical variable for agriculture in Tunisia. For most Tunisian farmers water comes strictly in the form of rainfall. Only a small portion, some five percent, of Tunisian arable area benefits from permanent irrigation, currently a potential area of less than 250,000 ha., out of a cultivable area of five million ha. Most of this potential irrigable area will be receiving water within the next few years, but the efficiency of water use, particularly in publicly-managed perimeters, is low.

Since sufficient assistance for irrigation is planned by other donors, notably the World Bank, AID assistance to Tunisian agriculture should continue for the foreseeable future to focus on the rainfed areas comprising 95% of the cultivable area, as well as an additional two million ha. suitable for extensive grazing. The rainfed area is defined as including, particularly in Central and Southern areas, supplemental irrigation obtainable from surface wells and small ponds (but insufficient in volume for permanent irrigation).

In rainfed agriculture, the "production system" approach currently being used in USAID's Agriculture Research project will be the vehicle for expansion under a sector-wide project into additional

areas of Tunisia, focusing on the farmer as a manager of a limited set of resources. The farmer must combine, use and manage these available resources in the most efficient and effective manner to fit his particular circumstances. Throughout Tunisia, this will represent a combination of crops and livestock. Moving from northern toward southern Tunisia, crops will decrease and livestock will increase in relative importance. From Central Tunisia southward, agriculture is largely pastoral with very limited crop production dependent on availability of unreliable rainfall and widely scattered surface wells and springs.

#### B. Human Resources and Organizational Performance

Tunisia has consistently invested in education at one of the highest rates in the developing world, including development of an effective Tunisian educational system. For at least the past twenty years, AID and other donors have assisted in developing and strengthening agriculture schools throughout Tunisia from secondary level up through the National Agronomic Institute. In addition, large numbers of Tunisians have received training in Tunisia, in the U.S., and in other countries in virtually all aspects of agriculture up through the M.S. and Ph.D. levels. As a result, agricultural institutions and organizations in Tunisia responsible for research, education, training, and extension are reasonably well staffed (9).

A continued flow of trained personnel is required for further expansion of operations and for replacement of losses of existing staff to promotion, retirement or opportunities elsewhere in Tunisia. The Tunisian agricultural schools are able to provide most of these requirements, including all B.S.-level training and the majority of the M.S.-level. There remains, therefore, a continuing requirement for M.S.-level training in certain specific disciplines and for Ph.D.-level training in almost all agricultural fields. AID's contribution to this development of "human capital" clearly has been one of, and arguably the most cost-effective element of the AID assistance program to Tunisia.

In agriculture, the Agriculture Technology Transfer project is currently providing a flow of M.S. training (plus very limited Ph.D.-level opportunities). Some M.S.-level training is also provided under other projects. The AID program for 1987-91 should include an expansion in both amount and duration of training opportunities at the post-graduate level beyond that currently provided. This will be one of the core elements, along with "production systems" research, of a new broad-gauged sector project/program.

### C. Capacity to Increase Agricultural Productivity

Increased agricultural productivity under rainfed conditions obviously depends on the amount and distribution of rainfall, the availability of technology appropriate to specific agro-climatic conditions, provision of necessary inputs of seed, fertilizer, chemicals and equipment in a timely fashion and sufficient funds (for credit) to obtain them. Equally obvious, the first factor cannot be controlled - although the effects might be mitigated - but the other factors can be addressed by both public and private sectors.

The development and dissemination of suitable technology is largely the joint responsibility of Tunisia's research and extension systems. Assistance to make these systems more effective can be provided through expansion of the "production systems" approach currently being tested in the Agriculture Research project to other agro-climatic areas of Tunisia by means of a new sector-wide project. The effectiveness of the research/extension system is also dependent on modifications to the current MOA organizational structure, presently under study with World Bank technical assistance. Installation and implementation of organizational changes arising from these studies are items for consideration as integral parts of policy dialogue. Assuring the availability of necessary inputs and the credit needed to purchase them is addressed later in this section.

### D. Marketing and Distribution of Agricultural Products and Inputs: Role of the Private Sector

Some progress has been made during the past several years in reducing the public sector role in marketing and distribution of agricultural products and inputs. However, parastatals still handle by far the greatest proportion and, as a result, establish "market" prices, even where there is no direct establishment of prices or margins by government order. Efforts to effect improvement in enlarging private sector participation initially may have to be confined largely to further discussion and agreements on policy changes and reforms. Directions being taken by various other donors, especially the World Bank, are generally in agreement with actions recommended by AID. Linking common elements for certain aspects of the AID program would appear desirable. In addition, specific assistance to potential private sector investors may also be a possibility.

### E. Pricing of Agricultural Products and Inputs

Here again, progress has been made by the GOT in bringing farmgate prices up to (and in some cases beyond) world prices and in reducing subsidies on a wide range of agricultural inputs. Much more still remains to be done, particularly the subsidization of costs of irrigation water which distorts the terms of trade between the

irrigated and dryland subsectors. Continued dialogue with the government on agricultural and pricing policy is probably the most viable means of obtaining further progress. Use of a sector grant combined with PL 480 resources and linked to improvement in the policy environment is recommended, particularly in conjunction with World Bank discussions undertaken in connection with the planned Agricultural Sector Loan.

#### F. Agricultural Credit for Rainfed Agriculture

Tunisia has a multitude of projects and funds intended to provide short- and medium-term credit to the agriculture sector. All of them are severely constrained by government-mandated low rates of interest and poor recovery rates. The net result is a requirement for continual replenishment of funds from donors and GOT budget sources in order to allow for provision of credit even at current levels, let alone expanded, loan operations. Donors and the GOT alike are increasingly reluctant to continue to replenish funds without some indication of eventual internal viability of credit programs. The question of credit policy in general, and agriculture credit policy in particular, will be a central element in policy discussions over the next several years. In the interim, a short two to three-year interim project to provide continued assistance to the APMANE effort is proposed as a bridging action until necessary changes in credit policy can be explored.

## NOTES

1. See Newberg (1984), IMF (1985), and Harrison, et. al. (1985) for complete descriptions of recent economic performance.
2. See especially IMF (1985), ATO (1985).
3. See Newberg (1981) and World Bank (1982) for complete descriptions of the agro-ecological zones in Tunisia.
4. New methods of calculating full-time equivalent employment data make difficult attempts to compare the latest results with previous studies.
5. World Bank (1985b) provides a thorough description of this subsector.
6. See World Bank (1983) for a complete review of the Sixth Plan.
7. See World Bank (1982) for a detailed description of agricultural marketing practices in Tunisia; statements regarding price management and control, however, no longer present an accurate picture of market dynamics due to continuing GOT efforts to liberalize prices of agricultural products.
8. Over the past five years, the OC and the four large cooperatives buying for the OC processed about:

<u>Year</u>	<u>Amount</u>	<u>Total Est. Crop</u>	<u>Percent Crop</u>
1981	470,000 MT	1,233,000 MT	38%
1982	510,000	1,255,000	40%
1983	295,000	921,000	32%
1984	370,000	1,002,300	36%
1985	750,000	2,078,500	36%

About 65% of the grain, therefore, never leaves private hands. Almost 100% of the soft wheat is processed divided between the OC (40%), COGC (40%), and the COCEBLE (20%). About 35-40% of the durum is processed, divided between the OC (65%), the COGC (25%) and COCOBLE (10%). About 30% of the barley is processed, divided between the OC (40-45%), COGC (30%), and COCEBLE (20-25%). COSEM and CCSPS process about ten thousand tons of grain each per year.

9. Much of the data presented in this section was drawn from the Project Identification Document for the Small Farmer Supervised Credit II project (Deschamps and Shearer, 1985) and from information supplied by John Schamper, USAID's Agriculture Credit Officer.

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## TABLES

1. Value of Agriculture Production, 1972-1985
2. Value of Foreign Trade in Agriculture Products, 1972-1985
3. Volume of Foreign Trade in Agriculture Products, 1972-1985
4. Cereal Production, Yields, Collection, and Net Imports, 1979-1985
5. Cereal Imports, 1972-1985
6. Cultivated Areas, 1984
7. Fragmentation of Farms, 1980
8. Agriculture Sector Employment, 1984
9. Trends in Livestock Population, 1980-1984
10. Evolution of Agriculture Sector Investments in the National Budget
11. Investments within the Agriculture Sector
12. Evolution of USAID Support to the Agriculture Sector, 1957-1985
- 13A. Evolution of Fertilizer Use, 1967-1986
- 13B. Use of Industrial Mixed Feed Products, 1980-1984
- 14A. Prices of Agricultural Products, 1972-1985
- 14B. Prices of Selected Consumer Products, 1985
- 15A. Feed Prices and Subsidies, 1981-1985
16. Agricultural Subsidies in the National Budget
17. Evolution in Animal Feed Imports, 1978-1985
- 18A. Rainfall Data, 1981-1984
- 18B. Rainfall Data, 1985
19. USAID-Financed Post-Graduate Training in the Agriculture Sector

TABLE 1

VALUE OF AGRICULTURAL PRODUCTION  
(in millions: 1980 prices)

PRODUCT	Price in TD 1980	Y E A R S													
		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
1. Hard Wheat	86.00	60.80	36.33	56.33	69.06	60.20	41.28	55.90	51.60	63.64	69.14	64.76	43.77	50.22	91.93
Soft Wheat	77.00	13.86	12.71	10.78	12.47	8.47	6.93	7.70	6.16	9.93	12.24	12.55	8.39	9.78	23.95
Barley	59.00	14.46	16.64	13.45	18.29	14.16	5.90	11.80	15.93	17.46	15.93	20.00	17.88	18.41	40.47
Subtotal		89.12	85.67	80.56	99.82	82.83	54.11	75.40	73.69	91.04	97.32	97.31	70.04	78.41	156.36
2. Artichokes	120.00	1.68	1.20	1.80	2.04	1.56	1.68	1.80	1.68	1.56	2.16	1.80	1.44	1.32	1.92
Tomatoes	50.00	8.65	11.35	11.90	12.80	12.50	16.00	13.00	14.00	14.00	19.00	13.00	18.00	21.50	21.00
Potatoes	88.00	8.71	6.25	8.80	9.68	9.24	7.48	9.24	11.00	10.50	12.32	9.68	13.20	11.88	13.20
Peppers	253.00	21.25	23.28	26.06	21.51	30.36	31.63	32.89	32.89	29.10	31.37	20.77	32.89	30.36	35.42
Melon & Watermelons	100.00	16.20	17.10	20.00	19.50	25.00	21.00	22.00	30.00	28.00	28.00	31.00	32.00	30.00	32.00
Other Vegetables	90.00	23.04	22.68	23.22	24.03	24.30	25.20	27.00	27.00	28.35	27.45	29.25	29.70	30.15	31.50
Subtotal		97.53	81.85	91.78	89.56	103.00	103.00	105.90	116.60	111.60	120.3	107.5	127.2	125.2	135.04
3. Oranges & Citrus	158.00	18.96	11.85	16.91	20.70	25.75	25.28	34.76	28.91	25.28	34.76	26.67	21.80	34.76	31.60
Olives	90.00	81.00	33.75	58.50	42.12	78.30	38.25	56.25	36.00	38.25	65.25	36.00	24.75	67.50	45.00
Dates	400.00	16.80	20.80	23.60	23.60	19.20	23.20	20.80	18.40	21.20	20.00	18.00	24.00	20.00	24.00
Wine grapes	100.00	14.20	13.30	15.50	14.00	8.30	9.40	5.00	8.00	9.40	7.00	6.30	7.00	7.50	7.50
Table grapes	250.00	5.00	6.00	6.25	4.75	3.75	6.25	7.50	8.75	7.00	8.75	7.00	8.75	11.25	12.50
Apricots	129.00	2.84	2.45	2.84	3.23	3.74	3.61	3.35	2.71	3.35	2.71	1.94	2.58	2.45	3.23
Almonds	740.00	11.10	14.80	17.02	18.50	17.76	19.24	25.90	22.20	27.38	25.90	22.20	27.38	31.08	29.60
Other fruits	274.00	16.99	17.81	20.00	19.73	21.37	23.56	26.85	30.14	31.51	34.25	32.06	37.81	41.10	42.47
Subtotal		166.90	120.80	157.80	146.60	180.70	150.00	176.70	152.60	163.90	198.60	149.00	154.10	215.60	195.90
4. Espartograss	13.00	0.98	0.83	0.91	0.85	0.78	0.66	1.21	1.24	1.30	1.30	0.92	0.33	0.78	0.39
Tobacco	400.00	0.68	0.68	0.88	1.32	1.68	1.76	1.84	1.84	1.64	1.72	2.33	1.76	1.44	2.00
Cork	36.00	0.42	0.28	0.48	0.36	0.40	0.28	0.37	0.35	0.25	0.40	0.40	0.40	0.40	0.40
Sugar Beet	15.00	0.53	0.66	0.68	0.78	1.25	1.77	0.78	0.78	1.10	0.93	1.24	1.01	2.10	2.55

TABLE 1 (Con'd)

5. Vegetable and pulses	190.00	7.28	7.12	8.78	11.32	10.10	6.20	8.32	9.50	10.50	9.86	10.20	11.66	7.76	10.10
6. Animal Products															
Cattle	600.00	27.60	31.20	34.20	37.20	40.20	44.40	39.60	33.00	33.60	32.40	32.40	31.50	33.60	34.80
Sheep	950.00	53.20	54.15	59.95	60.80	63.08	58.90	49.40	50.35	59.85	54.06	54.15	59.85	60.80	66.50
Goats	860.00	5.16	5.59	6.36	6.36	8.60	11.18	9.72	7.31	8.43	7.05	7.22	8.17	8.60	9.29
Poultry	440.00	7.48	7.92	9.24	10.50	11.88	14.52	17.03	20.24	24.33	23.45	29.48	22.00	23.76	25.08
Subtotal		93.44	98.86	109.75	114.92	123.76	129.00	115.75	110.09	126.21	116.96	123.25	121.52	126.76	135.67
7. Fish	581.00	22.70	24.30	30.28	29.17	32.24	36.98	35.95	37.16	38.48	35.87	40.59	45.71	56.06	54.76

Source: Budget Economique, MOA 1985

TABLE 2

FOREIGN TRADE IN AGRICULTURAL PRODUCTS  
(in 1000 D 1972-1985)

	Y E A R S													
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985 <sup>1)</sup>
<u>EXPORTS</u>														
Animal products	1187	1365	1174	16991	66708	3132	3080	3596	3439	6121	4584	3068	-	-
Fisheries	1589	2153	2408	3222	4651	4651	7281	9168	11326	8112	14288	24314	24392	-
Cereals	459	876	197	1380	63	937	46	135	194	1055	25	402	-	-
Fruits and Vegetables	7338	9317	6944	7389	9006	11906	10763	17694	15357	27165	15690	-	-	-
Fats, Olive Oils	46057	25778	70335	31031	36275	25893	36493	45997	24894	50118	56652	26326	57338	-
Wines	3136	9371	6629	7031	4831	2775	6346	3829	3182	4379	4243	3233	3159	-
Espartograss & Plants	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Food Industry Products	3737	4779	4879	3749	3148	3297	4366	4260	3502	6254	6009	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL														
<u>IMPORTS</u>														
Animal Products	7245	8669	13281	2098	1399	17661	15303	19071	28087	54937	42846	-	-	-
Fisheries	97	388	637	177	150	320	324	110	163	172	253	871	-	-
Cereals	11052	15823	22533	20124	22173	35196	43925	61840	74110	87265	91113	124076	139518	44840
Fruits & Vegetables	1624	2000	2800	2516	3561	4171	4405	4353	7321	6873	6684	-	-	-
Fats, Oilseeds, Oils	8771	8901	22106	7358	2437	5022	11316	28494	21226	23865	20187	-	-	-
Beverages	204	529	476	939	1221	841	154	1078	1093	1368	1860	-	-	-
Plants	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Food & Industry Products	1135	2692	2790	3473	3302	7198	6980	8786	12591	20038	20038	20469	-	-
Sugar	8780	8389	24670	25300	25971	18186	17022	17942	31151	40636	30456	42619	21431	12603
Spices, etc.	4160	4216	5556	6503	8848	12129	12239	13687	10250	11496	8004	22036	23460	-
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL														

Source: Institut National des Statistiques

Note: 1) 1985 data covers up to July 1st only

TABLE 3  
IMPORTS AND EXPORTS VOLUME  
(1000 tons)

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
<u>IMPORTS</u>						
Cattle & Sheep	10	20	16	24	34	
Milk (powdered/liquid)	19	21	23	21	20	
Butter & Cheese	8	4	2	6	1	
Coffee	2	3	4	4	4	
Tea	-	7	9	12	11	
Barley	18	138	41	3	27	23
Corn	142	263	358	220	261	116
Wheat	647	545	620	899	762	219
Sugar	151	179	187	254	125	95
Tobacco	4	7	5	7	5	
Soybeans, other vegetables	80	68	52	98	97	
Fertilizers manufactured	81	108	119		38	
<u>EXPORTS</u>						
Live animals	1	1	1	3	3	
Fresh fish	7	7	6	7	9	
Vegetables	21	17	13	10	7	
Dates	5	16	8	11	16	
Citrus fruits	28	25	18	15	31	
Olive oil	41	71	58	36	75	
Sugar	12	12	0.1	0.1	0.3	
Wine	23	39	34	23	18	
Canned vegetables	-	-	-	-	4	
Canned fruits	4	5	2	4	2	
Almonds	1	2	-	-	1	

Source: Institut National de Statistiques

TABLE 4

CEREAL PRODUCTION, YIELDS, COLLECTION AND NET IMPORTS IN TUNISIA  
(Crop Years July-June 1979/80 - 1984/85)  
(Quantities in thousands of tons - Yields in Kg per Hectare)

<u>COLLECTION YEAR</u>	<u>1979/80</u>	<u>1980/81</u>	<u>1981/82</u>	<u>1982/83</u>	<u>1983/84</u>	<u>1984/85</u>
<u>Production</u> <sup>1)</sup>						
Durum wheat	740	804	753	509	584	1,070
Bread wheat	129	159	163	109	127	300
Barley	296	270	339	303	312	700
Total	1,165	1,233	1,255	921	1,023	2,070
<u>YIELDS</u> <sup>1)</sup>						
Durum wheat	910	980	1,030	530	750	785
Bread wheat	1,613	1,674	1,852	914	770	1,364
Barley	717	509	767	425	589	600
Total (average)	1,080	1,054	1,216	623	703	916
<u>OFFICIAL COLLECTION</u> (July-June)						
Durum wheat	174	275	300	291	170	2492)
Bread wheat	46	83	113	121	71	972)
Barley	48	77	72	101	63	682)
Total	268	435	485	513	304	4142)
<u>NET IMPORTS</u>						
Durum wheat	349	208	212	203	404	22)
Bread wheat	506	402	413	491	522	2192)
Barley	59	59	126	-	10	2312)
Total	914	669	751	694	936	4622)

Source: Ministry of Agriculture, Office de Céréales, for 1984/85 production, Oct. 1985

Note: 1) For 1984/85 estimates

2) Data covers up to 30/6/85

TABLE 5  
CEREAL IMPORTS  
1972-1985

YEARS	<u>BLE DUR</u>		<u>BLE TENDRE</u>		<u>ORGE</u>		<u>MAIS</u>		<u>TOTAL</u>	
	<u>Q</u>	<u>V</u>	<u>Q</u>	<u>V</u>	<u>Q</u>	<u>V</u>	<u>Q</u>	<u>V</u>	<u>Q</u>	<u>V</u>
1972	76	4,308	176	10,158	34	-	30	-	316	14.466
1973	-	-	216	12,147	32	1,930	30	1,288	278	15.365
1974	-	-	235	17,949	20	1,438	36	2,544	291	21.931
1975	1	15,000	249	14,469	29	1,917	40	3,236	319	?
1976	33	2,049	298	16,466	-	-	60	3,398	391	21.913
1977	42	2,541	498	24,405	61	2,697	114	5,163	715	34.806
1978	270	18,338	283	12,911	95	4,922	134	6,626	782	42.847
1979	261	22,028	446	29,314	38	1,714	146	8,453	891	61.509
1980	280	29,405	367	33,390	18	1,555	142	8,851	807	73.201
1981	185	23,509	360	30,849	138	11,251	263	21,637	946	87.246
1982	119	12,572	501	46,442	41	3,265	358	27,540	1019	89.819
1983	417	53,071	482	50,577	3	387	220	19,933	1122	510.584
1984	247	39,093	515	61,944	27	2,859	261	33,693	1050	137.589
1985 <sup>1)</sup>	12	2,320	207	26,471	23	1,850	116	14,153	358	44.794

Source: Institut National de Statistiques

Note: 1) Q in (000) Metric Tons - V in (000) Tunisian Dinars  
2) 1985 data covers up to July 1st only

TABLE 6

## CULTIVATED AREAS 1984

(000 ha.)

REGION	TOTAL AREA IN 1000 ha.	CEREALS %	VEGETABLES %	FOURRAGE %	CULTURES MARAICHÈRES	ARBORICULTURE %	JACHERES %	AUTRES CULTURES %	BOVINS %	OVINS %	CAPRINS %
Nord-Est	7.16	18.04	47.69	36.16	36.01	9.30	12.09	33.69	40.57	16.17	17.16
Nord-Ouest	10.10	38.31	43.70	27.91	10.35	4.44	31.66	49.87	38.28	21.69	16.02
Centre Est	8.01	12.34	4.17	3.53	26.37	41.02	8.49	6.10	6.15	12.64	3.63
Centre Ouest	14.02	26.10	2.13	24.92	15.18	29.52	26.88	6.63	14.06	27.98	10.29
Sud	60.71	5.27	2.31	7.48	12.09	15.02	20.88	3.71	0.94	21.52	52.90
TOTAL %	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Tunisia	16,179	1,470	108	300	155	1,870	885	37	613	5,561	1,069

Source: MDA, "Enquête de Base, 1984"

TABLE 7  
FRAGMENTATION OF FARMS

<u>FARM SIZE</u> (ha)	<u>NUMBER OF FARMERS</u> <sup>(1)</sup> (in 1000 persons)	<u>%</u>	<u>AREA</u> (000 ha)
0 - 5	158.8	44.8	355.7
5 - 10	78.5	22.1	583.4
10 - 20	63.3	17.9	915.1
20 - 50	40.2	11.3	1,249.3
50 - 100	9.1	2.6	642.5
100 et plus	4.7	7.3	1,285.8
TOTAL	354.6	100.0	5,031.8

Source: Structures des Exploitations Agricoles de Base,  
Dec. 1981

Note: (1) includes coops and private farms.

TABLE 8  
AGRICULTURAL SECTOR - 1984  
EMPLOYMENT

A. <u>Employment</u>		
1. Employed (number)	1,461,000	87.1%
2. Unemployed (number)	216,000	12.9%
3. Work Force (number)	<u>1,677,000</u>	<u>100.0%</u>
B. <u>Work Force by Sector</u>		
1. Agriculture	593,000	35.0%
2. Other	1,084,000	65.0%
3. Total	<u>1,677,000</u>	<u>100.0%</u>
C. <u>Agriculture Labor 1984</u>		
	<u>Equivalent</u>	<u>Total</u>
	<u>Man-Years</u>	<u>Surveyed</u>
1. Permanent salaried labor	31,780	42,000
2. Temporary salaried labor	17,534	69,000
3. Permanent family labor	110,684	201,000
4. Temporary family labor	<u>62,191</u>	<u>336,000</u>
Total	222,189	648,000

Source: MOA, "Enquête Agricole de Base, 1984."

TABLE 9

## UPDATE - TRENDS OF LIVESTOCK POPULATION

Category/Espèce	YEARS / ANNEES					
	1980	1981	1982	1983	1984 <sup>1)</sup>	1985
<u>UNIT:</u>						
Cattle/Bovine	498	586	569	599	613	
Sheep/Ovine	4969	4734	5105	5190	5561	
Goat/Caprine	922	788	917	1002	1069	
Horse/Equine	130	130	130	130	-	
Mulle/Asine	225	225	225	225	-	
Camel/Cameline	78	78	78	78	-	
Swine/Porcine	-	-	-	-	-	
<u>Poultry/Volaille</u> (in million heads)						
Traditional	4.0	4.0	4.0	4.0	4.0	0.4
Broilers	25.0	29.793	34.021	21.968	25.063	24.0 2)
Layers/Pondeuses	2.6	2.9	3.063	3.303	3.609	3.7112)
(in thousand heads)						
Reproducers/Meat	240	264	286	202	252	240*
Egg reprod./						
Reprod. ponte	38	42	42	48	55	53*

Sources: Annuaire des Statistiques Agricoles, 1984  
Direction de la Production Animale, MOA

Note: 1) Enquête de Base for 1984 for Cattle, Sheep and Goat.  
2) Estimated figures

TABLE 10

## EVOLUTION OF AGRICULTURE SECTOR INVESTMENTS IN THE NATIONAL BUDGET

(In millions of dinars)

	1980	1981	1982	1983	1984	Fifth Plan (1977-81)		Sixth Plan
						Planned	Realized	(1982-86)
								Planned
Agriculture and fishing	147.4	178.1	204.7	250.0	290.0	500.0	584.0	1,550.0
Industry	322.8	532.0	692.1	667.3	766.0	1,985.0	1,829.0	3,280.0
Mining	22.0	23.4	21.6	25.0	27.0	130.0	165.0	240.0
Hydrocarbons	98.1	203.2	279.7	145.0	180.0	373.0	490.0	800.0
Electricity and water	71.9	89.4	107.1	137.0	199.0	532.0	358.0	640.0
Manufacturing	130.8	216.0	283.7	360.3	360.0	950.0	816.0	1,600.0
Food processing	(27.5)	(54.2)	(58.1)	(48.4)	(40.0)	(130.0)	(160.0)	(240.0)
Construction materials and glass	(38.2)	(59.0)	(76.9)	(99.0)	(98.0)	(290.0)	(269.0)	(300.0)
Mechanical and electrical industries	(20.6)	(23.4)	(39.6)	(63.7)	(75.0)	(290.0)	(269.0)	(300.0)
Chemical and rubber	(15.6)	(38.8)	(52.6)	(84.1)	(84.0)	(170.0)	(108.0)	(385.0)
Textiles and leather	(15.7)	(25.1)	(27.3)	(34.0)	(35.0)	(100.0)	(73.0)	(165.0)
Woodwork and other	(13.2)	(15.5)	(29.2)	(31.1)	(28.0)	(40.0)	(50.0)	(150.0)
Construction and public infrastructure	270.2	308.0	348.5	924.6	499.0	1,021.0	1,185.0	1,765.0
Housing	174.0	198.0	230.0	278.0	320.0	600.0	760.0	1,000.0
Construction and public works	10.0	12.0	13.0	15.0	16.0	50.0	9.0	10.0
Public infrastructure	86.2	98.0	105.5	131.6	163.0	371.0	416.0	755.0
Services	241.6	271.9	319.7	288.1	345.0	694.0	941.0	1,605.0
Transport and telecommunications	211.0	235.4	268.4	207.0	249.0	575.0	799.0	1,100.0
Tourism	25.5	33.0	44.5	75.0	90.0	95.0	117.0	450.0
Commerce and other	5.1	3.5	6.8	6.1	6.0	24.0	25.0	55.0
<b>Total</b>	<b>982.0</b>	<b>1,290.0</b>	<b>1,565.0</b>	<b>1,630.0</b>	<b>1,900.0</b>	<b>4,200.0</b>	<b>4,539.0</b>	<b>8,200.0</b>
<b>Public sector</b>	<b>510.5</b>	<b>675.7</b>	<b>864.0</b>	<b>945.0</b>	<b>1,141.0</b>	<b>2,786.5</b>	<b>2,543.8</b>	<b>4,600.0</b>
Government	(163.5)	(213.9)	(232.0)	(300.0)	(329.0)	(622.0)	(703.0)	(2,957.0)
Public enterprises	(347.0)	(461.8)	(632.0)	(645.0)	(812.0)	(2,164.5)	(1,840.8)	(1,643.0)
<b>Private sector</b>	<b>471.5</b>	<b>613.4</b>	<b>701.0</b>	<b>685.0</b>	<b>759.0</b>	<b>1,413.5</b>	<b>1,995.2</b>	<b>3,600.0</b>
<b>Financing 1/</b>								
Gross national savings	851.0	1,025.0	1,090.0	1,205.6	1,314.0	3,115.0	3,474.0	6,450.0
(In percent of GNP)	(24.1)	(24.4)	(22.4)	(21.6)	(20.9)	(20.5)	(22.8)	(20.2)
Foreign resources	168.0	320.6	453.3	424.4	673.0	1,210.0	1,093.0	2,100.0
(In percent of GNP)	(4.8)	(7.6)	(9.3)	(7.6)	(10.7)	(8.0)	(7.2)	(6.6)

Sources: Ministry of Planning, Budget Economique, 1985; and data provided by the Tunisian authorities.

1/ Includes changes in stocks.

TABLE 11

AGRICULTURAL SECTOR: INVESTMENTS 1982-1986  
(in millions of dinars)

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u> 1)
Hydraulique Agricole	75.8	99.8	112.8	133.6	144.3
Elevage	19.3	24.6	34.6	36.5	39.5
Pêche	21.6	26.4	26.0	30.7	29.1
Matériel Agricole	37.9	39.4	39.5	37.1	38.4
Arboriculture	7.7	9.9	16.1	19.7	28.0
Stockage de Céréales	0.2	3.4	6.8	17.6	17.3
Etudes, Recherche et Vulgarisation	6.2	8.7	13.0	12.3	9.1
Forêts et CES	22.8	20.5	28.0	24.7	22.6
Equipement en forme	-	-	-	-	-
Autres	4.1	5.0	5.9	2.8	7.8
Programme de Développement Rural Intégré	-	-	6.5	5.0	13.9
TOTAL	195.6	236.8	290.0	320.0	350.0

Source: Ministry of Agriculture, DPSAE

Note: 1) Estimated

TABLE 12

EVOLUTION OF USAID SUPPORT TO THE AGRICULTURAL SECTOR  
1957 - 1984 (\$ millions)

<u>YEAR</u>	<u>AG Sector</u>	<u>TOTAL AID</u> <u>(Development)</u>	<u>PL 480</u> <u>I &amp; II</u>	<u>Grand Total</u> <u>AID</u>
1957	.088	8.489	8.8	17.3
1958	.294	20.637	6.6	27.2
1959	.933	26.229	7.2	33.4
1960	20.402	45.711	11.5	57.2
1961	7.631	37.200	68.4	142.8
1962	5.116	29.670	16.7	46.4
1963	7.147	32.289	32.5	64.8
1964	2.474	21.684	19.3	41.0
1965	.376	19.105	29.9	49.1
1966	1.133	17.485	1.7	19.2
1967	2.115	26.334	27.5	53.8
1968	.614	13.500	34.5	48.0
1969	.582	9.052	36.5	45.5
1970	.640	14.645	28.4	43.1
1971	.726	12.954	31.4	44.4
1972	.861	17.084	23.5	40.6
1973	N/A	2.500	13.5	16.0
1974	N/A	2.318	6.9	9.2
1975	N/A	2.194	10.1	12.3
1976	N/A	2.853	8.1	11.0
1977	3.200	10.900	12.0	22.9
1978	11.275 <sup>1</sup>	20.051	17.5	37.6
1979	9.223 <sup>1</sup>	14.795	16.4	31.2
1980	6.300 <sup>1</sup>	10.900	17.5	28.3
1981	18.250 <sup>1</sup>	25.290	13.7	39.0
1982	3.500	5.000	10.6	15.6
1983	--	5.000	12.5	17.5
1984	--	1.500	16.3	17.8

Source: Lehmann, 1985

Note: Estimate; actual data not available

TABLE 13A

## EVOLUTION OF GLOBAL USE OF FERTILIZERS IN TUNISIA

(in Metric Tons)

<u>Fertilizer Campaign</u>	<u>Super 45</u>	<u>Super 16</u>	<u>Total P205</u>	<u>Ammonium Nitrate</u>	<u>Nitrogen</u>
67-68	21,440	32,200	14,200	20,000	6,000
68-69	30,000	29,900	18,300	24,000	7,900
69-70	25,000	33,800	16,600	30,000	9,900
70-71	33,000	35,000	20,600	40,000	13,200
71-72	25,000	30,000	16,000	60,000	19,800
72-73	28,049	39,459	18,000	40,650	13,400
73-74	28,007	39,324	18,894	46,152	15,230
74-75	37,774	42,280	27,763	48,823	16,112
75-76	35,274	44,313	22,963	66,067	21,802
76-77	43,346	46,302	26,914	56,467	18,834
77-78	30,090	47,607	21,159	53,140	17,536
78-79	39,360	64,643	28,054	65,672	21,672
79-80	43,168	55,687	28,336	75,975	25,072
80-81	52,943	65,974	34,380	79,118	26,109
81-82	61,189	47,654	35,162	94,208	31,089
82-83	68,500	37,500	36,825	97,910	32,310
83-84	80,900	59,900	45,989	102,300	33,759
84-85	82,340	34,265	42,535	124,487	41,081
85-86	90,000	30,000	45,300	130,000	42,900

April 1 - Nov 5, 1985, off take.

1984/5	38,117	15,403	54,794
1985/6	42,541	16,033	68,526
% Change	+ 12%	+ 4%	+ 26%

Sources:

1967-1973	P.A.V.
1973-1983/4	Office of Cereals
1984/5, 1985/6	Direction de la Production Vegetale

TABLE 13B

TUNISIA: Industrial Mixed Feed Products by Kind, 1980-84

<u>KIND OF FEED</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984 (2)</u>
-----1000 Metric Tons-----					
<u>Poultry</u>					
Chick #1	27	27	27	20	22
Broiler #2	122	122	157	91	117
Pullet #3	38	38	32	29	27
Layer #4	133	133	132	114	153
Others	6	6	6	5	5
Subtotal	327 (1)	327(1)	354	259	324
<u>Livestock/Dairy</u>					
Beef					
Fattening #5	209	226	19	14	17
Dairy #7	53	53	28	29	29
Sheep	29	29	145	60	58
Others	7	8	7	3	2
Subtotal	298	316	199	106	106
GRAND TOTAL	<u>625</u>	<u>643</u>	<u>553</u>	<u>365</u>	<u>430</u>

(1) Does not add due to rounding

(2) Source: Animal Feed Division, Office of Cereals

PRICES OF AGRICULTURAL PRODUCTS, 1972-85

EN D/1

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985 (1)
<b>CEREALICULTURE</b>														
-BLE DUR	48.00	48.00	61.00	66.00	66.00	71.35	76.00	76.00	86.00	96.00	110.00	128.00	140.00	150.00
-BLE TENDRE	43.00	43.00	55.00	50.00	50.00	65.35	70.00	70.00	77.00	87.00	100.00	117.00	140.00	145.00
-ORGE	28.00	28.00	40.00	45.00	45.00	50.35	55.00	55.00	59.00	69.00	80.00	95.00	100.00	105.00
<b>ARBORICULTURE</b>														
-OLIVES A HUILE	47.40	71.80	84.50	82.70	63.00	66.00	66.90	83.00	90.00	100.00	150.00	130.00	150.00	170.00
-AGRUMES	53.50	51.70	41.90	53.90	56.30	72.80	73.80	98.00	158.00	134.00	180.00	185.00	175.00	190.00
-RAISIN DE CUVE	41.40	44.20	45.80	42.30	51.70	55.40	93.40	95.00	100.00	90.00	86.00	100.00	110.00	120.00
-RAISIN DE TABLE	67.00	93.00	76.80	112.00	98.00	140.00	153.00	185.00	250.00	210.00	285.00	270.00	270.00	250.00
-AMANDES	284.00	233.00	236.80	257.60	251.00	253.00	276.00	416.00	740.00	800.00	800.00	850.00	850.00	900.00
-ABRICOTS	55.20	70.00	51.80	61.30	64.20	94.60	150.00	170.00	129.00	142.00	180.00	205.00	190.00	200.00
-DATTES	112.00	104.00	111.70	135.20	312.00	378.00	338.00	491.00	400.00	450.00	580.00	550.00	500.00	650.00
-AUTRES FRUITS	91.90	114.00	119.00	132.00	170.00	180.00	197.00	250.00	274.00	220.00	300.00	280.00	300.00	310.00
<b>MARAICHAGE</b>														
-POMME DE TERRE	36.70	71.00	65.00	66.20	75.50	110.00	82.00	89.00	88.00	100.00	139.00	125.00	155.00	150.00
-TOMATES	30.00	22.00	23.40	29.90	32.10	34.90	45.00	38.00	50.00	64.00	85.00	70.00	90.00	90.00
-ARTICHAUTS	53.00	62.00	63.10	59.90	91.90	127.40	88.00	107.00	120.00	134.00	110.00	170.00	170.00	170.00
-PIMENTS	72.00	83.00	67.30	99.40	127.70	145.90	116.00	160.00	253.00	250.00	185.00	200.00	250.00	250.00
-MELONS-PASTèques	38.00	34.00	43.70	52.40	78.70	90.00	89.00	77.00	100.00	105.00	120.00	126.00	160.00	140.00
-AUTRES LEGUMES	49.00	54.00	49.40	64.00	68.00	90.00	82.00	89.00	90.00	115.00	110.00	130.00	125.00	120.00
<b>ELEVAGE</b>														
-BOVINS	479.00	475.00	483.00	499.00	516.00	499.00	506.00	564.00	600.00	670.00	820.00	890.00	940.00	1000.00
-OVINS	532.00	516.00	558.00	611.00	691.00	706.00	724.00	910.00	950.00	1020.00	1310.00	1275.00	1500.00	1600.00
-CAPRINS	452.00	458.00	487.00	569.00	576.00	596.00	657.00	831.00	860.00	980.00	1150.00	1295.00	1400.00	1500.00
-VOLAILLE	483.00	488.00	544.00	595.00	558.00	449.00	474.00	452.00	440.00	470.00	630.00	783.00	820.00	850.00
-AUTRES VIANDES	450.00	522.00	564.00	582.00	582.00	461.00	522.00	463.00	450.00	590.00	750.00	762.00	830.00	850.00
-OEUFs									25.00	25.00	37.00	40.00	47.00	45.00
-LAIT	55.00	61.00	65.00	65.00	90.00	90.00	90.00	90.00	126.00	126.00	180.00	200.00	200.00	200.00
-LAINE ET POILS	540.00	550.00	560.00	570.00	650.00	650.00	750.00	750.00	670.00	300.00	126.00	140.00	145.00	145.00
<b>DIVERS</b>														
-FEVES-FEVEROLES	87.90	92.90	105.40	70.90	90.00	95.00	95.00	95.00	100.00	100.00	250.00	250.00	400.00	450.00
-POIS-POICHICHE	90.50	90.20	90.20	94.50	64.00	120.00	180.00	170.00	180.00	180.00	300.00	400.00	500.00	700.00
-BETTERAVE A SUCRE	9.50	9.50	12.30	12.30	12.00	13.00	13.00	13.00	15.00	18.00	20.00	20.00	20.00	25.00
-TABAC A FUMER	217.90	248.90	310.30	351.30	370.00	370.00	400.00	400.00	420.00	450.00	480.00	520.00	520.00	550.00
-LIEGE	33.00	33.00	36.00	36.00	36.00	36.00	36.00	36.00	17.00	15.00	15.00	20.00	25.00	25.00
-ALFA	6.00	6.00	6.00	8.00	10.00	13.00	13.00	13.00	36.00	36.00	38.00	43.00	43.00	43.00
<b>PÊCHE</b>														
-COTIERE	318.00	336.00	360.00	354.00	477.00	520.00	630.00	740.00	893.00	939.00	1114.00	1250.00	1275.00	1510.00
-AU CHALUT	188.00	211.00	312.00	311.00	414.00	397.00	520.00	566.00	684.00	718.00	914.00	1260.00	1335.00	1524.00
-AU FEU	108.00	84.00	166.00	82.00	109.00	140.00	140.00	195.00	164.00	175.00	230.00	300.00	300.00	360.00
-AU THON	360.00	413.00	513.00	603.00	554.00	637.00	952.00	930.00	725.00	940.00	792.00	1050.00		
-AUX CRUSTACES	1259.00	1288.00	1103.00	1115.00	1470.00	1720.00	1387.00	3295.00	4992.00	5000.00	5364.00	6112.00		
-LAGUNAIRE	420.00	573.00	548.00	714.00	641.00	730.00	802.00	1102.00	1233.00	1475.00	1400.00	1468.00		

Source: MOA, D/PSAE, 1985.

Note: 1. Estimated

TABLE 14B

## PRICES OF SOME PRINCIPAL CONSUMER PRODUCTS

(In TD/Kg unless otherwise noted)

<u>Product</u>	<u>Price/Unit</u>	<u>Price/Kg</u>	<u>Price in US\$/lb</u>
<u>Oil</u>			
Olive oil (liter)	1,180	1,200	9.69
Mixed oil in bulk (liter)	0,335	0,340	0.19
<u>Bread</u>			
300 gram loaf	0,070	0,233	0.13
700 gram loaf	0,100	0,142	0.08
<u>Wheat</u>			
Flour		0,205	0.12
Couscous		0,230	0.13
Spaghetti		0,225	0.13
Rice	0,240	0,480	0.27
Sugar		0,260	0.15
Fish, low quality		2,500	1.42
Fish, best quality (sole, grouper)		5,00	2.85
Beef, average		3,000-3,500	1.71-2.00
Lamb, average all cuts		4,000-5,000	2.28-2.85
Broilers, live		1,200	0.68
Broilers, dressed with head and feet		1,430	0.82
Eggs (dozen)	0,624 approx.	1,000	0.78/doz
Citrus		0,450	0.26
Tomatoes, small		0,250	0.14
Tomatoes, large		0,450	0.26
Apples and Pears		0,950	0.53
Chickpeas		0,700	0.40
Potatoes		0,350	0.20

TABLE 15A

INDUSTRIAL FEED SUBSIDIES, 1981-85

<u>Commodity</u>	<u>Selling Price to Feedmills</u>	<u>Estimated World Price</u>	<u>Date Effective</u>
-----Dinars per MT (1)-----			
Corn	31.0	75.0	Until Nov. 81
Soybean Meal	65.0	110.0	Until Nov. 81
Barley	30.0	36.0	Until Nov. 81
Wheat Bran	20.0	24.0	Until Nov. 81
Corn	31.0	90.0	From 11/81
Soybean Meal	65.0	130.0	From 11/81
Barley	80.130	96.0	From 11/81
Wheat Bran	40.0	48.0	From 11/81
Corn	55.0	120.0	From 3/82
Soybean Meal	120.0	180.0	From 3/82
Barley	80.130	96.0	From 3/82
Wheat Bran	40.0	48.0	From 3/82
Corn	85.0	150.0	From 11/82
Soybean Meal	180.0	240.0	From 11/82
Barley	95.240	130.0	From 11/82
Wheat Bran	65.0	78.0	From 11/82
Corn	101.28 +2%tax	98.0	From mid 1985
Soybean Meal	185.00	175.0	From mid 1985
Barley	107.40	90.0	From mid 1985
Wheat Bran	65.00	60.0	From mid 1985

(1) Exchange rate:

1982 - One Dinar = U.S. Dollars 1.71 (year average)

1983 - One Dinar = U.S. Dollars 1.63 (year average)

1984 - One Dinar = U.S. Dollars 1.25 (estimate)

1985 - One Dinar = U.S. Dollars 1.25 (estimate)

Source: Office of Cereals, Ministry of Agriculture

TABLE 15B  
CHANGES IN SUBSIDIES ON SEEDS

(Unite: D/Quintal)

<u>Year</u>	<u>Ordinary Seed</u>			<u>Selected Seed</u>	
	<u>Durum Wheat</u>	<u>Soft Wheat</u>	<u>Barley</u>	<u>Durum Wheat</u>	<u>Soft Wheat</u>
1970	-	-	-	1,497	1,442
1971	-	-	-	1,497	1,442
1972	-	-	-	1,497	1,442
1973	-	-	-	1,591	1,536
1974	0,740	0,680	0,645	2,552	2,252
1975	0,740	0,680	0,645	2,667	2,367
1976	0,960	0,850	0,814	-	-
1977	0,900	0,780	0,720	3,225	3,048
1978	0,830	0,910	0,850	3,575	3,474
1979	0,830	0,910	0,850	3,575	3,474

Source: Office of Cereals

Table 16

## EVOLUTION DE L'INTERVENTION DE LA CAISSE GENERALE DE COMPENSATION

Au cours de la période 1981-1986, les besoins de dépenses de la Caisse ont enregistré l'évolution suivante:

PRODUCT	1981		1982		1983		1984		85 probable		86 prévisionnels	
	En Valeur	En %	En Valeur	En %	En Valeur	En %	En Valeur	En %	En Valeur	En %	En Valeur	En %
Céréales	90,000	57	116,800	69,6	112,900	63	164,000	63	160,4	60,5		
Huiles	12,215	7,7	10,200	6	15,200	8,3	38,400	14,7	50,0	18,86		
Engrais	13,835	8,8	15,800	9,4	14,900	8	15,600	6	16,5	6		
Viandes	6,472	4,12	7,200	4,29	12,600	6,9	7,500	--	--	3,2		
Lait	3,000	1,91	3,800	2,26	7,500	4,1	8,800		8,5			
Beurre	3,235	2,05	0,500	0,29								
Autres	28,635	18,23	14,000	8,34	11,500	6,29	13,500	5	14,5	5,4		
SUCRE	--		--		--		12,300	4,7	15,7	6		
TOTAL	157,067		167,800		182,600		260		265		280	
EVOLUTION N/N-I	--		+ 7 %		+ 8,8 %		+ 42,4 %		+ 1,9 %		+ 5,6 %	
N/N-I	--		7 %		16,25%		65,5 %		68,7 %			

Source: MOA/DPSAE

TABLE 17

EVOLUTION OF ANIMAL FEED IMPORTS

1978 - 1985 (in '000 MT)

<u>ANIMAL</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985(1)</u>
Feed	283	332	330	401	400	314	376	340(2)

Source: Newberg (1981) and ATO (1985)

Note: 1) 1985 estimated figure  
2) Includes Barley, Maize and Soybean meal

TABLE 18A

RAINFALL PER STATION (Année Agricole), 1981-84  
Unité le millimètre

<u>North East</u>	<u>81/82</u>	<u>82/83</u>	<u>83/84</u>
Tunis	443	492	482
Bizerte	560	614	647
Béja	627	534	471
Jendouba	460	433	433
Tabarka	917	885	880
<u>Center West</u>			
Thala	976	408	324
Sidi Bou Zid	181	219	214
Gafsa	122	177	107
Tozeur	96	125	48
Medenine	119	208	145
Ramada	41	90	70
Jerba	76	264	151
Gabès	134	206	128
Sfax	143	412	267
Kairouan	305	792	160
Monastir	204	486	128
Teboulba	188	--	206
Nabeul	378	450	377
Kelibia	430	379	525

Source: Institut National de Statistiques

TABLE 18B

RAINFALL BY STATION (1984/85) AND AVERAGE

<u>Stations</u>	<u>1984/85</u> <u>Amount</u>	<u>Annual</u> <u>Average</u>	<u>Change</u>	<u>84/85 as %</u> <u>of Average</u>
<u>North East</u>				
Tunis	566	450	+ 116	126
Bizerte	832	625	+ 207	133
Zaghouan	551	500	+ 51	110
Nabeul	433	385	+ 48	112
<u>North West</u>				
Béja	641	630	+ 11	102
Jendouba	423	460	- 37	92
Siliana	433	420	+ 13	103
Le Kef	458	540	- 82	85
<u>Center East</u>				
Sousse	427	335	+ 92	127
Mahdia	521	400	+ 121	130
Monastir	427	330	+ 97	129
Sfax	211	220	- 9	96
<u>Center West</u>				
Kairouan	313	310	+ 3	101
Kasserine	295	315	- 20	94
Sidi Bou Zid	232	240	- 8	97
<u>South</u>				
Gafsa	247	165	+ 82	150
Gabès	352	185	+ 167	190
Medenine	252	145	+ 107	174
Tataouine	234	140	+ 94	167
Tozeur	117	100	+ 17	<u>117</u>
<u>TOTAL AVERAGE</u>				122

Source: Direction des Ressources en Eau, MOA, 1985

TABLE 19

USAID-Financed Post Graduate Graining  
In The Agriculture Sector  
1957-1980

<u>Field of Training</u>	<u>Degree</u>	<u>Number</u>
Agricultural Economics	Ph.D	2
Agricultural Economics	M.S.	29
Agronomy	Ph.D	2
Agronomy	M.S.	8
Animal Science	Ph.D	1
Animal Science	M.S.	4
Agricultural Education	M.S.	5
Agricultural Extension	M.S.	1
Agricultural Statistics	M.S.	1
Animal Husbandry	M.S.	1
Crop Science	Ph.D	1
Dairy Science	M.S.	1
Poultry Science	M.S.	2
Fruit Production/Plant Physiology	Ph.D	1
Food Technology	Ph.D	1
Livestock Marketing	M.S.	1
Irrigation	M.S.	1
Remote Sensing	M.S.	1
Plant Pathology	M.S.	1

Table 20

INDEXES OF THE VALUE OF THE DINAR AGAINST US\$ AND FF

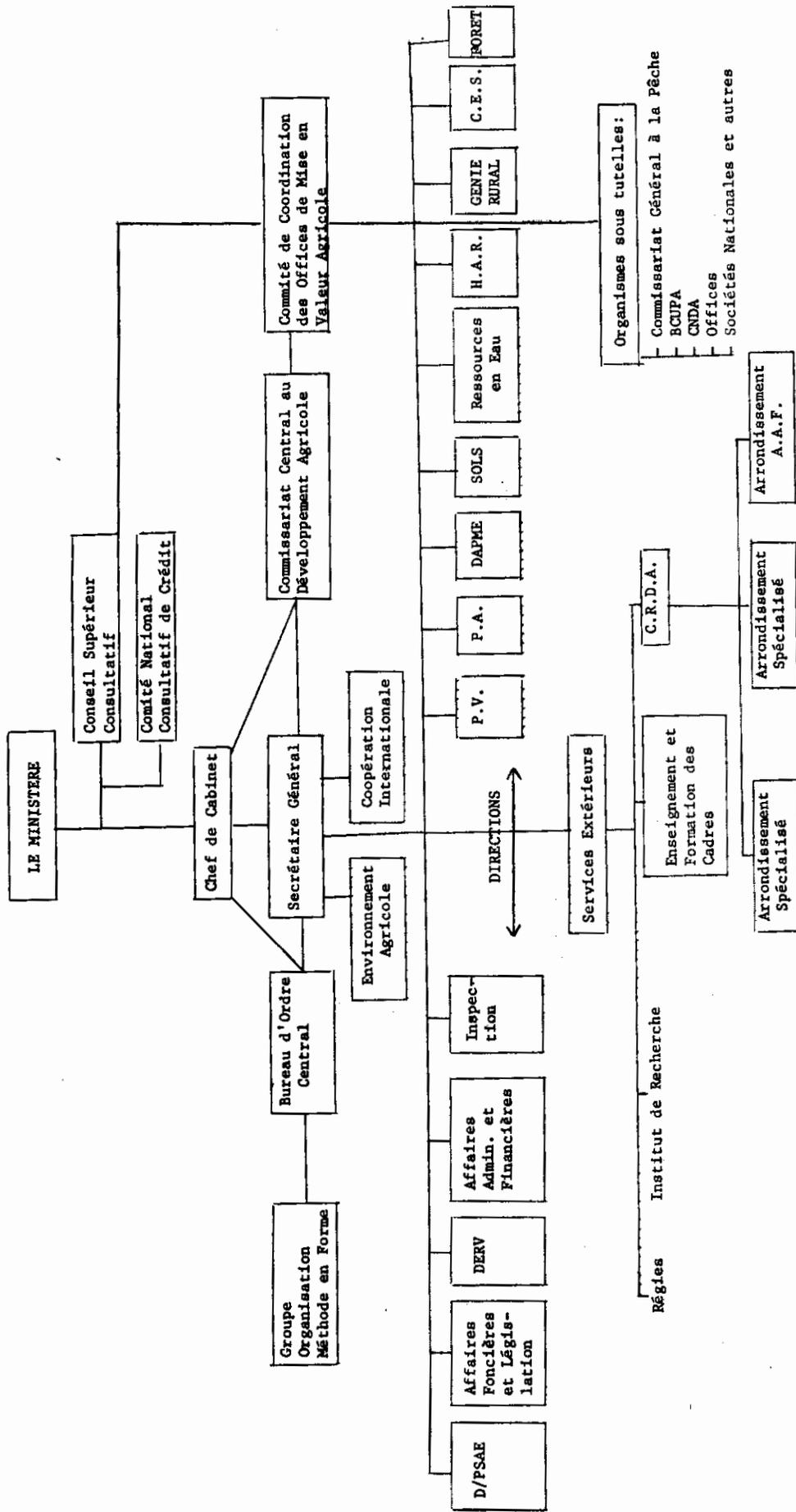
(December 1974 = 100)

<u>DATE</u>	<u>US\$</u>	<u>FF</u>
December 1975	96	95
December 1976	96	105
December 1977	98	103
December 1978	100	95
December 1979	103	93
December 1980	98	98
December 1981	79	100
December 1982	66	101
December 1983	56	104
June 1984	55	102
December 1984	48	101
June 1985	48	99

Source: Calculated from Statistiques Financières, August 1985,  
Table VIII-3.

## FIGURES

1. Organization Chart for the Ministry of Agriculture
2. Map of Rainfall Zones in Tunisia
3. USAID Assistance to the Agriculture Sector, 1978-1985
4. Subsidy Flow Chart in Wheat By-Products



Organisme du Ministère de l'Agriculture  
 Adopted from Décret No. 77 du 5 Août 1977  
 tel que modifié

FIGURE ONE  
 ORGANIZATION CHART OF THE MINISTRY OF AGRICULTURE

FIGURE TWO

IBRD 16403  
APRIL 1962

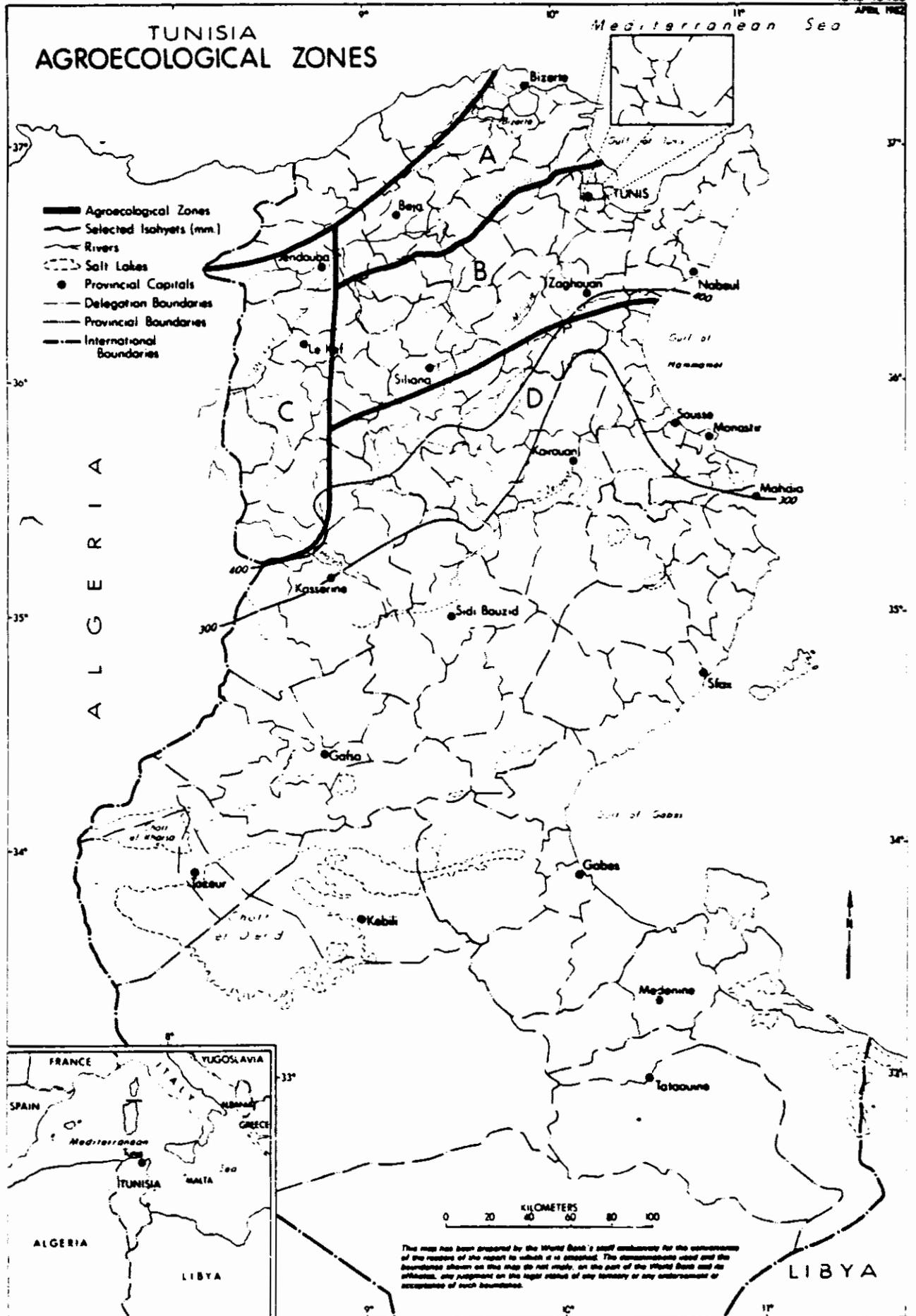
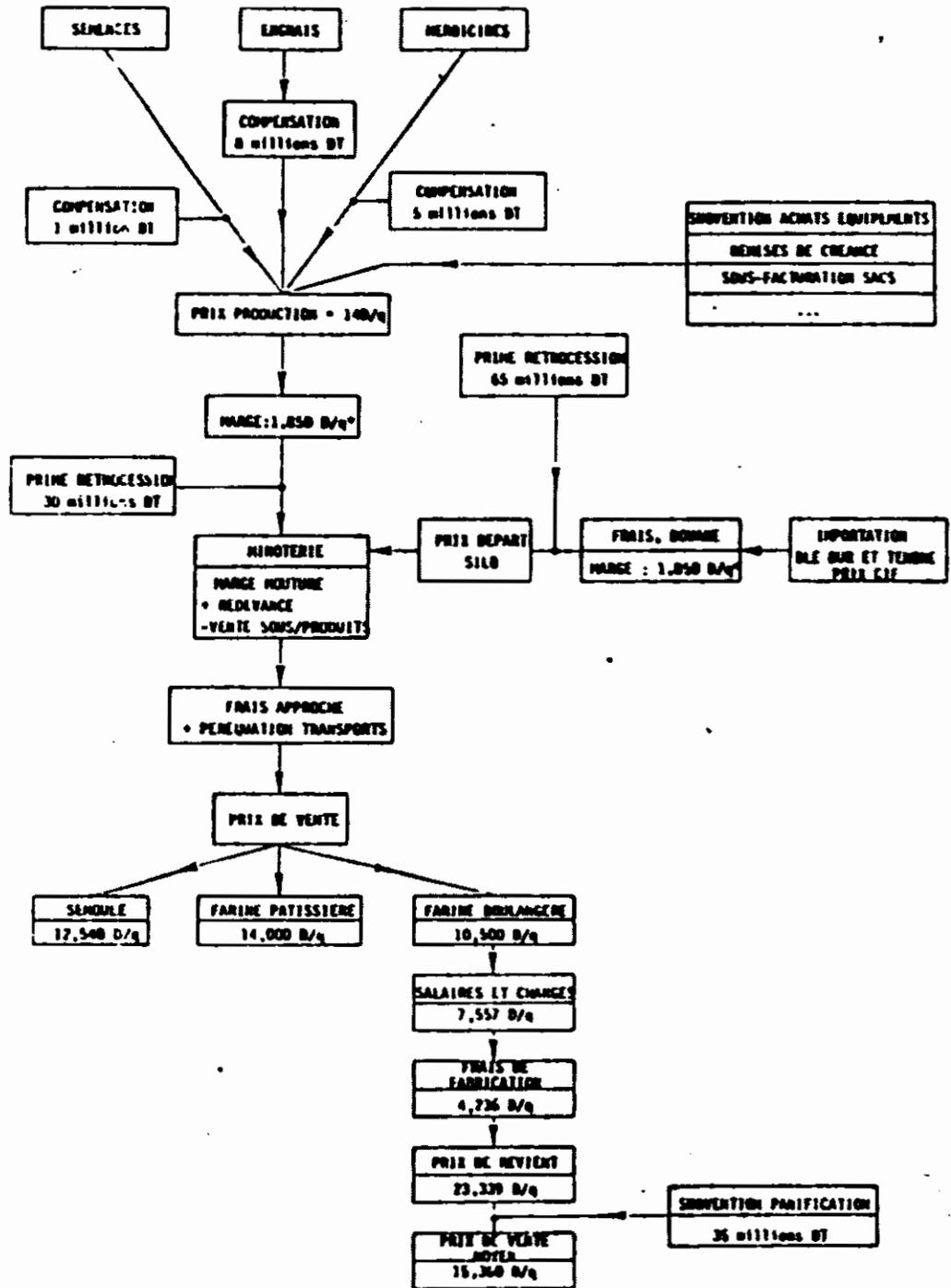




FIGURE FOUR

SUBSIDY FLOW CHART IN WHEAT BY-PRODUCTS



\* Moyenne entre blé dur : 1,870 et blé tendre : 1,826