

11/17/75

**I. PROJECT IDENTIFICATION**

<b>1. PROJECT TITLE</b> Accelerated Livestock Production		<b>APPENDIX ATTACHED</b> <input type="checkbox"/> YES <input type="checkbox"/> NO	
<b>3. RECIPIENT (specify)</b> <input checked="" type="checkbox"/> COUNTRY <u>Tunisia</u> <input type="checkbox"/> REGIONAL <input type="checkbox"/> INTERREGIONAL		<b>4. LIFE OF PROJECT</b> BEGINS FY <u>1971</u> ENDS FY <u>1980</u>	
		<b>5. SUBMISSION</b> <u>9/16/70</u> <input type="checkbox"/> ORIGINAL <u>11/15/1975</u> <input type="checkbox"/> REV. NO. <u>APR(AS)04-</u> CONTR./PASA NO. <u>72</u>	

**II. FUNDING (\$000) AND MAN MONTHS (MM) REQUIREMENTS**

TD 0.400

A. FUNDING BY FISCAL YEAR	B. TOTAL \$	C. PERSONNEL		D. PARTICIPANTS		E. COMMODITIES \$	F. OTHER COSTS \$	G. PASA/CONTR.		H. LOCAL EXCHANGE CURRENCY RATE: \$ US <u>1.00</u> (U.S. OWNED)		
		(1) \$	(2) MM	(1) \$	(2) MM			(1) \$	(2) MM	(1) U.S. GRANT LOAN	(2) POP COUNTRY	
											(A) JOINT	(B) BUDGET
1. PRIOR THRU ACTUAL FY	1,117	709	188	195	243	201	12	709	188		565	1,645
2. OPRN FY <u>76</u>	269	146	34	56	70	65	-	123	34		124	992
3. BUDGET FY <u>I.Q.</u>	129	129	16	-	-	-	-	84	16		-	-
4. BUDGET +1 FY <u>77</u>	466	297	64	91	98	100	-	237	64		124	1,100
5. BUDGET +2 FY <u>78</u>	418	306	61	32	92	20	-	245	61		124	1,368
6. BUDGET +3 FY <u>79</u>	327	253	52	69	56	5	-	217	52		120	1,564
7. ALL SUBQ. FY <u>80</u>	854	234	39	20	10	-	-	180	39		120	1,600
8. GRAND TOTAL	3,002	2,086	454	325	569	391	12	1,795	454		1,177	8,269

**9. OTHER DONOR CONTRIBUTIONS**

(A) NAME OF DONOR	(B) KIND OF GOODS/SERVICES	(C) AMOUNT
Germany, Austria, Belgium, Holland, Sweden/FAO, Canada	Improved Animal Husbandry Practices	\$10,016

**III. ORIGINATING OFFICE CLEARANCE**

1. DRAFTER <u>Douglas W. Butchart</u> <u>Dennis H. Morrissey</u>	TITLE: <u>Project Officer</u> <u>Program Economist</u>	DATE <u>11/21/75</u> <u>11/21/75</u>
2. CLEARANCE OFFICER <u>Ullmont L. James</u>	TITLE: <u>Director</u>	DATE <u>11/26/75</u>

**IV. PROJECT AUTHORIZATION**

**1. CONDITIONS OF APPROVAL**

AGR:CE Ferguson  
 PPS:RD Carlson  
 FMS:AD Hulliang  
 TRG:LM Mogannam

1/ Calendar Year basis (OPRN FY 75 = CY 75)

2/ GOT contribution to U.S. assistance projects/Trust Fund.

3/ GOT direct support budget. Reference Center Room 1656 NS

**2. CLEARANCES**

BUR/OFF.	SIGNATURE	DATE	BUR/OFF	SIGNATURE	DATE

**3. APPROVAL AA: OR OFFICE DIRECTORS**

SIGNATURE	DATE
TITLE	

**4. APPROVAL A/AID (See M.O. 1025.I VI C)**

SIGNATURE	DATE
ADMINISTRATOR, AGENCY FOR INTERNATIONAL DEVELOPMENT	

I. PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project:  
From FY 1976 to FY 1980  
Total U. S. Funding US\$1,629  
Date Prepared: 11/17/1975

Project Title & Number: Accelerated Livestock Production Project No. 664-11-130-276

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Program or Sector Goal:</b> The broader objective to which this project contributes:</p> <p>To increase the production and income of the small farmer.</p>	<p><b>Measures of Goal Achievement:</b></p> <ol style="list-style-type: none"> <li>1) Increase in small farmer production.</li> <li>2) Increase in small farmer income.</li> </ol>	<ul style="list-style-type: none"> <li>- Periodic agricultural surveys conducted by the GOT Ministry of Agriculture, Bureau of Planning.</li> <li>- GOT Household Surveys</li> <li>- Project Records.</li> </ul>	<p><b>Assumptions for achieving goal targets:</b></p> <ul style="list-style-type: none"> <li>- Tunisian Government policy will continue according high priority to agricultural development.</li> <li>- There will be continued GOT emphasis on the small private farmer in the country's agricultural development.</li> </ul>
<p><b>Project Purpose:</b></p> <p>To develop GOT capability to reach the small livestock farmer with modern technology in forage production, feed utilization, and livestock management.</p>	<p><b>Conditions that will indicate purpose has been achieved: End of project status.</b></p> <ol style="list-style-type: none"> <li>1) Thirteen Governorats staffed with the requisite production technicians and technical backstop capabilities in place.</li> <li>2) Continued availability of updated technology.</li> <li>3) In-country production forage seed to meet requirements.</li> <li>4) Capability for in-service training.</li> </ol>	<ul style="list-style-type: none"> <li>- GOT organization chart and staffing records.</li> <li>- Technology guidance manuals.</li> <li>- Project records and Ministry of Agriculture periodic surveys.</li> <li>- Training records.</li> </ul>	<p><b>Assumptions for achieving purpose:</b></p> <ul style="list-style-type: none"> <li>- Adequate personnel available and assigned.</li> <li>- GOT will supply required logistical support, i.e. transportation and support equipment.</li> <li>- Adequate supplies of essential recommended inputs available to target group.</li> <li>- Other GOT livestock programs and donor projects continue to meet goals, i.e. imported breed distribution, crossbreeding, bovine A.I., disease control, etc.</li> </ul>
<p><b>Outputs:</b></p> <p>Cadre of trained specialists responsible for providing technical backstopping and training personnel for future requirements. Trained production technicians needed for minimum staffing of 13 Governorats. Farm feeding and forage demonstrations. Cattle feeding and forage production handbook. Forage seed production. Livestock extension service reporting and analysis system.</p>	<p><b>Magnitude of Outputs:</b></p> <ol style="list-style-type: none"> <li>1) Five subject matter specialists and thirteen Governorat production chiefs trained on the job.</li> <li>2) 100 production technicians trained.</li> <li>3) An average of 1000 farm demonstrations per year.</li> <li>4) One handbook.</li> <li>5) 8,000 metric tons/year.</li> <li>6) 13 regional agents reporting data and headquarters subject specialist using analysis system.</li> </ol>	<ul style="list-style-type: none"> <li>- Project records and reports.</li> </ul>	<p><b>Assumptions for achieving outputs:</b></p> <ul style="list-style-type: none"> <li>- USAID and GOT will provide the inputs in a timely manner.</li> </ul>
<p><b>Inputs:</b></p> <p><b>USAID</b></p> <ol style="list-style-type: none"> <li>1) Advisors</li> <li>2) Training</li> <li>3) Commodities</li> </ol> <p><b>GOT</b></p> <ol style="list-style-type: none"> <li>1) Personnel and salaries</li> <li>2) Participants for training in the USA.</li> <li>3) Commodities</li> <li>4) Trust Fund project contributions.</li> </ol>	<p><b>Implementation Target (Type and Quantity)</b></p> <ol style="list-style-type: none"> <li>1) Dryland forage agronomist 60 mm, irrigation engineer (on-board) 12mm, replaced by irrigated land agronomist 24mm, livestock advisor 60mm, seed production expert 48mm, farm management economist 48mm, plus short-term consultants 4mm/year.</li> <li>2) Nine participants long-term academic training and 40 participants for two months short-term training in USA.</li> <li>3) Farming equipment, seed and demonstration supplies.</li> </ol>	<ul style="list-style-type: none"> <li>- Project records and reports.</li> </ul>	<p><b>Assumptions for achieving inputs:</b></p> <p><b>GOT-Type and Quantity of Inputs</b></p> <ol style="list-style-type: none"> <li>1) 118 technicians plus facilities and support staff.</li> <li>2) 49 of above for participant training in USA.</li> <li>3) Project vehicles, farming equipment, seeds, fertilizer, herbicides, insecticides, etc.</li> <li>4) American technician support fund.</li> </ol>

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## II. BACKGROUND AND PROGRESS TO DATE

This project was initiated in 1971 as a planned two-phased effort aimed at increasing meat production. In the course of the first phase just completed, it became apparent that forage production and its proper utilization were the constraints most critical to improved livestock production which were not already being addressed by other foreign assistance donors. At the same time, coinciding policy priorities of both the GOT and AID determined that these problems be addressed in the context of the needs of small farmers.

The shift from the broader scope of the first phase to the narrower focus of the second has not, of course, been abrupt. It has been gradual and based upon both a sharper perception of needs and the step-by-step completion of a series of essential preliminary actions. Thus, neither forage production nor attention to the requirements of small farmers will commence with the second phase. It is the zeroing in on these two aspects of livestock production which constitutes the distinguishing characteristic of the future role of the project.

The specific major accomplishments of Phase I which have led up to Phase II are as follows:

(1) Established The Basic Framework of a Livestock Production Education Delivery System

The Tunisian Government has established the National Office of Livestock Production (OEP)\*, which has been assigned responsibility for planning and implementation of livestock development activity, including forage and forage seed production. OEP is responsible for performing two main series of actions at the regional level; (1) activities of a purely technical character aimed at improving livestock production systems; and (2) activities of a technical-commercial character consisting of organizing an effort to provide livestock farmers with the services they need, such as forage seeds and inputs related to livestock breeding and marketing.

Regional project offices have been established in thirteen of the eighteen Governorats in Tunisia. Each of the thirteen Governorat Offices has the responsibility of conducting production education demonstrations of forage production and feed utilization on the farmer's own farm throughout a defined region. The technical backstopping and coordination of the overall effort is provided by the headquarters staff located in Tunis. The area for establishment of each regional office was selected on the basis of technical judgement, the need for forage production and feeding technology and number of small livestock farmers available to respond to and use the technology presented through the demonstration effort.

There are at present 49 professional OEP employees assigned to the Livestock Project. They consist of five with Masters degrees, four in the USA studying toward the Masters degree in various specialities of livestock production, six with Bachelor of Science degrees or their equivalent, ten who have had a three-year training program in agriculture after High School and twenty-four who have had a two-year training program in agriculture after High School.

\*Office de l'Elevage et des Paturages

They are assigned to the following offices:

Nine professional staff consisting of a Director and two assistants in the Project Administrative Office, and two each in headquarters supervisory positions in the Animal Husbandry Section, the Forage Production Section and the Irrigation Section. This headquarter's staff is responsible for overall planning programming, budgeting, evaluation, training and reporting to the Ministry of Agriculture. Each of the regional offices has from two to five professional staff according to how important livestock production is in that particular Governorat.

(2) Established The Small Livestock Farmer's Receptivity to Improved Technology

Since 1971, when 94 hectares of forage were planted under the auspices of the project, the number of forage demonstrations has multiplied rapidly. During the Autumn of 1974 a total of 1305 farmers established demonstration forage plantings. Of these, 934 were new participating farmers and 371 were doing a second demonstration planting. Approximately 80% of the farmers that took part in the 1974 forage campaigns owned less than 5 hectares of land. Extensive follow-up with farmers who participated in forage demonstrations during prior years has shown that almost 100% of them have continued to grow forage after project support was withdrawn.

(3) Identified Forage Production as a Solution To The Principle Constraint To Livestock Production

The 1974 acreage and livestock enumerative survey conducted under the auspices of Phase I project activity confirmed what was suspected regarding the importance of forage as the principle constraint to livestock production in Tunisia. Over 95 percent of livestock feeding is carried out without using any feed grains and those farmers that did report the use of feed grains in feeding their animals tended to be the larger farmers who are not the target group of this project. Project demonstration results have shown that by using high quality forages properly the small farmer, without using feed grain, can increase milk production an average of 6 to 7 liters per cow per day as well as having his calves gain an average of 1 kilo of weight per day in contrast to a normal rate of less than half that without improved forage. The demand for improved forage for cattle feeding alone is estimated to be 800 thousand metric tons of hay equivalent while only 280 thousand metric tons are available at present. The critical shortage of forage and forage seed in Tunisia at present is shown in tables 1 and 2 along with the estimated requirements, GOT production targets and shortfalls through 1980. Table 3 shows the forage production agronomic potentials in Tunisia by giving the average yields obtained in 1974 at the INRAT experiment station, on the OEP farm demonstration fields and farmer commercial production.

(4) Developed a Package of Technology Addressing Forage Production and Feed Utilization That is Adapted to the Needs of the Small Farmer

The technology developed in forage production consists of a package of practices including proper soil or seedbed preparation, shaping of the field for uniform irrigation, the proper seeding date, species and variety for the type of climatic conditions and soil present, how much seed to use, irrigation procedures, amount of water needed and at what time, weed control, insect control, fertilizer application - what kind, how much and when according to soil type and moisture found in different regions of the country - harvesting, preservation and storage methods. Throughout the project life,

the forage demonstration fields have been prepared using as much as possible of the participating farmer's own equipment, methods and financing as is consistent with producing good forage yields. The forage demonstrations are conducted on selected but scattered fields to maximize their visibility and impact on non-project farmers.

The technology developed in feed utilization demonstrates the different feeding requirements for growth, reproduction, production of milk and fattening. Feeding standards and various balanced rations take into account not only the age, production goal, etc. of the animal but also the availability and price of nutrients being recommended, what the farmer can best grow on his land to balance out the different rations needed, and the feeding methods that best fit the ration and production goals.

### III. RATIONALE

A. While contributing less than 20 percent of gross domestic product, agriculture plays a key role in the Tunisian economy. Not only does it account for 40 percent of employment, it also is a major determinant, through its impact on the balance payments, on the supply of inputs for industry, and on the demand for goods and services, of what happens in other sectors (cf. Tunisia DAP).

Within this key sector, livestock is the second most important sub-sector, following very closely after cereals. About one quarter of the value of agricultural production is derived from livestock. Over one sixth of the total man-hours of agricultural labor is devoted to livestock; in the northern governorats it is more than one fourth. Moreover, the income generating effects of livestock production are widespread among the farm population. In the 7 northern governorats covered by the 1974 livestock survey\*, 57 percent of all farms raised cattle and nearly three-fourth had cattle and/or sheep.

Despite the importance of the livestock industry, it is unable to meet domestic demand for meat and dairy products. Net imports of these items amounted to \$28 million in 1974. While not presently a serious burden, such imports, which grew by 20 percent in 1973 and 53 percent in 1974, threaten to become one, as demand increases continue to outstrip production growth. The situation is particularly striking in the case of dairy products, for which an estimated 40 percent of consumption is covered by imports.

#### B. Priority in National Planning

The characteristics of the livestock sub-sector just described have merited it a key role in the current GOT Four-Year Development Plan. The Plan gives general emphasis to increased production and to increased participation of the majority of the rural population in development. Under the first goal, priority was assigned to livestock and forage (as well as irrigated vegetables) because short-term results could be expected from presently available infrastructure and because these sub-sectors are less susceptible to variations due to weather.

\*At the time the Survey was taken it covered 5 governorats. They have since been reorganized into 7.

These same sub-sectors likewise received priority attention in terms of the social/equity goal of the Plan because they offered the greatest potential for agricultural employment creation. In fact, increased livestock employment is to serve to offset, at least partially, reduced employment in the cereals sub-sector resulting from mechanization necessitated by modern cultivation methods.

Assistance to the livestock sub-sector is an especially suitable means of reaching lower income groups because livestock farmers in Tunisia typically are small operators. In the area covered by the Livestock Survey, 80 percent of farms with cattle and sheep had less than 20 hectares and 40 percent had less than 5 hectares. Similarly, 83 percent of farms with cattle had less than 10 head and 82 percent of farms with sheep had less than 50 head.

Tunisia has a substantial acreage of land which is unsuited for the production of cultivated crops but adequate for grazing or forage production. Forage and livestock production, is, therefore, a means of improving utilization of marginal land resources and thus reducing the negative impact of the major basic constraint on Tunisian agriculture - the shortage of arable land. Inasmuch as poorer land tends to be in the hands of poorer farmers, whatever is done to improve the productivity of this land will tend to benefit the poor majority.

Soil erosion is also a serious problem in Tunisia, and overgrazing is a major contributor to this problem. To the extent that increased forage production and improved management practices resulting from the project make it possible to alleviate this problem, there will be a positive impact on the environment. No negative impact is apparent.

Another justification for more emphasis on irrigated forage production has also become obvious. In the past, the GOT has invested heavily in irrigation infrastructure construction and has made water available on nearly 400 irrigation perimeters covering approximately 100,000 hectares. Productivity has remained low, and relatively few farmers have been trained to utilize the water made available to them. A major cause of the underuse and low productivity is difficult soil conditions, among which are heavy clay soils with drainage problems, naturally occurring saline conditions aggravated by applications of irrigation water containing salt, and uneven soil surfaces. Planting salt tolerant forage such as varieties of alfalfa, berseem, ryegrass, fescue and strawberry clover, can be expected to produce significantly higher returns than the extremely low ones presently being received from the high capital investment costs of such projects. Phase II will capitalize on this underutilized water availability to expand both irrigated forage and forage seed production.

### C. Role of Women

Women play a major role in Tunisian agriculture. In the seven northern Governorats covered by the 1975 Agricultural Survey (that region encompassing most of project activities and the only one for which such data is available), 31.8 percent of farm workers were women. Of the family workers on farms, 35.5 percent were women, of temporary hired farm laborers working at the time of the survey (April) 37.4 percent were women, and of the permanent hired farm labor, 13.4 percent was female. As can be seen from these statistics, the woman's role tends to be more important on small farms - where family labor predominates - than on large farms which employ permanent laborers.

Within this general pattern, however, traditional livestock production practices have not involved women to a significant degree. Itinerant herding of cattle is considered largely a man's job, as is most of the labor connected with production of vetch/oats, the only widespread forage crop.

The Livestock Project should contribute to increasing women's participation in the livestock sub-sector, and, in fact, it has begun to do so. Improved breeds of cattle being fed improved forage and concentrates are kept in one place, generally near the farm house. Hence they can be cared for by women in conjunction with their household duties. While milking of low producing local cows does not require a significant amount of labor, labor does become an important factor when milk production is increased by as much as 1,000 percent. Moreover, women can also engage in butter, yogurt and cheese production with the increased availability of milk. Improved forage generally requires much more intensive production practices than does oats/vetch and thus creates an additional labor demand that can be filled by women.

The occupational opportunities afforded to women by modern livestock production are far from being simply adjunct in nature. The project has worked with a number of female livestock entrepreneurs. One of the most successful has been reported to AID/W previously as a Mission success story. In addition, the 1974 Livestock Survey showed that 5 1/2 percent of hired farm workers devoting full time to livestock were women, indicating that women have begun to gain acceptance within the commercial livestock sub-sector, as well.

#### D. Sub-Sector Analysis

An assessment of the livestock sub-sector in Tunisia was completed in September 1974 by a U.S. Department of Agriculture agricultural economist who concluded:

"Tunisia has made significant progress in its efforts to increase livestock products output in recent years. The course that has been followed, with major emphasis on improving livestock quality and increasing feed supplies, has been consistent with conditions in Tunisia. Continued efforts in the same direction, together with some changes in government policy and the adoption of improved production and marketing techniques would further improve the climate for accelerated livestock production."

Proposed Phase II project activities are consistent with these general recommendations and, together with other actions being taken by the GOT alone or with help from other donors, are responsive to virtually all of the specific recommendations contained in the assessment. (See Annex F)

#### E. Other Donors

There were some 20 different foreign assistance projects addressing problems of the livestock sub-sector in 1974. These projects were sponsored by 8 bilateral donors other than AID and by several international organizations. About half of the projects were devoted specifically and exclusively to livestock. The others incorporated a livestock-related element, often a major one, within a project concerned with a broader subject, such as cooperative development, agricultural extension, agricultural research or rural development. The live-of-project contribution of the foreign donors to the projects with an exclusively livestock focus alone totals over \$10 million. The zone of activity of these projects is limited, almost without exception, to the 7 northern

governorats, and in a number of cases it is a single location, such as a particular pilot farm. With only a single major exception - Canada - these projects are carried out in collaboration with OEP, which has coordinating responsibility for foreign donor activities in the livestock field.

A number of the projects either ended in 1974 or are planned for phase-out in 1975 or 1976. However, two large-scale projects - an FAO implemented Swedish (SIDA) project for beef cattle production and a Canadian heifer program for the dairy industry - have only recently gotten underway.

The major emphasis of other donor assistance has been on breed improvement, with animal health in second place.

Annex E contains a detailed description of these activities.

F. Economic Analysis

Forage and livestock production can be profitable enterprises in Tunisia under present price conditions. This should continue to be true for the foreseeable future, since the most likely potential for negative price movement, a future decline in the real price for forage, would affect the most profitable sub-sector, while the least profitable sub-sector, milk production, will benefit from the same price change. In addition, pressure building on milk prices, a free market price in some cases double the official price, seems certain eventually to bring an increase which would improve the profitability of the dairy industry. Returns to land and management from forage production are shown in Table 4. On the basis of average yields, these returns range from \$281 per hectare for oats and vetch, the traditional Tunisian forage crop, through \$598 for sulla (Hedysarum coronarium) and \$857 for berseem up to \$1729 for irrigated alfalfa. In comparison, durum wheat produces a return of only \$170. Comparative analyses have not been done on other crops at present prices. However, despite great annual, seasonal and geographical variations in vegetable prices, various studies indicate that irrigated vegetables seldom yield a return in excess of \$750 per hectare.

Irrigated tree crops may in some cases produce a higher return than forage, but soil types and capital investment requirements dictate that they are seldom real alternatives.

The price used in calculating the profitability of forage production, \$75 per metric ton of hay, is at the lower end of the present price range, which rises to as much as \$163 per MT in some areas at certain times of the year. However, forage is in chronically short supply, with consequent price inflation, and analysts have concluded that the long-range equilibrium price may be in the neighborhood of \$50 (in constant price terms). Even at this price, one third less than that utilized in our calculations, the return per hectare would amount to \$115 for oats and vetch, \$348 for sulla, \$523 for berseem, and \$970 for irrigated alfalfa.

In addition, it should be noted that production costs have been computed on the basis of hiring all work done by mechanical means where possible and charging labor at the minimum legal agricultural wage. Hence the farmer's actual cash income would be augmented to the extent that inputs other than the physical ones of seed, fertilizer, water, etc., were supplied through the use of family labor. This is likely to be a substantial amount in the case of small to medium-sized farms.

Moreover, the costs on medium to large-sized farms are also likely to be less than indicated in our calculations. This comes about because the actual costs of owning and operating farm machinery appear to be only a fraction of the charges made by contract operators which were utilized in our computations.

Revenues per cow from pure and crossbred dairy animals are shown in Table 4. The returns are \$319 for purebred cows and \$170 for crosses between purebreds and local breeds.

The returns for dairy cattle shown in Table 4 are calculated on the basis of the official milk price of 16¢ per liter. Independent distributors are currently paying from 22-53¢. If one were to assume a price of 19¢, either as a result of an increase in the official price or as a result of the producer selling independently a portion of his production sufficient to raise his average price to this level, returns per cow would be as follows: \$430 for purebred; \$245 for mixed breeds.

The returns in the table are also calculated by charging all forage consumed at a market price of \$75 per MT, the same as that utilized in calculating the returns for forage production cited above.

Utilizing the \$50 price set forth therein as a theoretical, long-run equilibrium price for forage increases the return per dairy cow to \$380 for purebred, and \$218 for mixed breeds.

A probably more meaningful alternative assumption for the short-term would be to assume all forage is grown by the owner of the cows and charged at cost of production. These production costs range from \$10.75 per metric ton for berseem to \$32.75 for oats/vetch and average \$19.25 for the four types of forage studied. Charging forage at this average cost increases the return per cow to \$435 for pure and \$278 for mixed breeds.

If we assume a production of 40 metric tons of green forage per hectare (approximately the average of the 3 types of non-irrigated forage analyzed), the return per hectare of dryland forage fed to a dairy cow amounts to \$1995 in the case of a purebred animal and \$1525 in the case of a mixed breed. With irrigated alfalfa, which produces 100 metric tons of green forage per hectare, the respective returns become \$4985 and \$3815.

Local cows have not been included in these dairy cattle computations, because the insignificant amount of milk they produce (200-500 liters per year) does not qualify them as true dairy animals. There is, of course, a return to the farmer in the form of the calf produced and the eventual sale of the old cow for meat. If it is assumed (as is actually the case) that the owner of local cows normally buys no hay or straw but instead raises it himself, the return amounts to \$57 per cow. Where the owner of local cows does not raise his own forage, the animals are grazed on communal lands, along roadsides, in stubble fields and on fallow land. In this case, costs are lower, but this saving may be largely offset by lower production.

Table 4 also shows the return from raising and fattening young bull calves, i.e. from 3 weeks to 12 months of age, the value of the calf at 3 weeks having been included as a product of the dairy cow. The return indicated is \$137 on an annual basis for

purebred and crossbred calves, and \$52 for local calves.\*

If the production cost of forage is substituted for the market price, as was done above in the case of dairy cows, the following returns result: \$200 for purebred and crossbred and \$118 for local calves. Converting this into a return per hectare of non-irrigated forage fed produces a return of \$1208 per hectare with pure and crossbred calves and \$435 with local calves. Irrigated alfalfa produces a return of \$3658 per hectare when fed to pure and crossbred calves and \$1323 with local calves.

#### IV. IMPLEMENTATION

##### A. Narrative Description

Phase I of the project developed a package of forage production and feed utilization technology suitable for the Tunisian farmer and established the framework of a system to deliver it to him. Phase II builds on this experience to develop the GOT capability to reach the small livestock farmer with the package of modern technology. Project activity will cover both the dryland (rainfed) areas in the northern half of the country and the irrigation perimeters throughout the country.

Forage production education consists of the whole cultural package of soil selection and preparation, seed selection, amount of seed to use, when to plant, how much fertilizer to use, what kind and when, herbicide use for weed control, insecticide use, when to harvest, the preservation and storage methods recommended. The forages being worked with include many different types, both dryland and irrigated, the choice of crop depending on the particular soil-water-plant relationships involved in the different livestock producing regions of Tunisia.

There will be 5 subject specialists for technical backstopping assigned to the headquarters office and one chief production technician assigned to each of the 13 regional offices. This will require 18 technicians trained to the Masters Degree level, 9 of which were sent to the USA during Phase I of the project. The additional 9 required will depart for academic training during Phase II (see the Academic Training Schedule in Table 6).

There will be 40 production technicians sent to the USA for short-term training for two months in groups of 5 to study American forage production and feed utilization methods. One group of five received this short-term training during Phase I of the project.

On-the-job training, both on the farm and through in-country seminars, will be carried out by the team of American technicians. During Phase I a total of 49 Tunisian technicians have been partially trained on-the-job. The staff of 49 technicians now assigned to the project will complete their training during FY 1977 and an additional 69 will be fully trained when the project terminates.

\*The return for local calves is actually higher than this minimum figure. Because of insufficient data on actual consumption by local calves of hay and concentrates, given on a free choice basis under the recommended creep feeding program during the first 6 months, the amounts for pure/mixed calves were utilized. But these are certainly higher than would be the case for local calves which show a smaller weight gain.

Training of Tunisian technicians in forage production will be carried out for the most part on the farms of participating farmers. Major emphasis will be placed on soil-water-plant relationships thereby providing a foundation for Tunisian personnel to evaluate these relationships in providing each farmer with alternative solutions to the soil and moisture problems found on his farm. Recognition of differing soil conditions, including depth, texture, structure, pH, fertility and erosion potential is required. Effects of climate and rainfall will be stressed. Adaptation of various forage species both for irrigated and dryland plantings must be taught. Selection of alternative treatments also requires knowledge of economic feasibilities.

On-site training with on-farm demonstrations will be supplemented by field days and seminars to provide theory and practice. Informal discussions of the demonstration plots, the training, farmer motivation, etc. will take place during each visit of an American technician to a regional Governorat Livestock Office.

The forage agronomist specialized in irrigated forage production is programmed for only one two-year tour. That is calculated to be sufficient time for training of an adequate number of Tunisian technicians in the irrigation specialization of forage production which the general forage agronomist (dryland) has neither the time nor knowledge indepth to conduct. The irrigated lands forage agronomist will replace the irrigation engineer now at post when the latter's tour ends in September 1976. He will complete the training of a cadre of Tunisian technicians who are already in the process of being trained in irrigation techniques by the irrigation engineer. The Tunisian technicians are now being taught the engineering considerations that must be evaluated for each type of irrigation system, how to select the system to be installed, the use of surveying instruments and the design of different forage irrigation systems. As well as the many other agronomic considerations, the irrigated lands forage agronomist will teach and demonstrate when to irrigate, how much water to apply, the importance of proper seedbed preparation and the proper shaping of the field for uniform irrigation.

Forage seed production will require special on-the-job training at seed production sites in land preparation, selection of forage species for seed production in relation to the ecology of the area, techniques of seeding, fertilizing, use of insecticides and herbicides and irrigation requirements. Detailed training in harvesting, seed cleaning, grading, quality standards and storage techniques to obtain maximum germination of the seed produced will be taught on the farms of farmers who have contracted to supply forage seed for the project and on the El Grine and Chenchou forage seed production farms.

The Livestock Production Advisor will develop on-farm extension demonstrations concentrating on proper utilization of available feeds and livestock management practices to maximize production and farmer income. His work will also involve the preparation of hay and silage as well as proper feeding of forage and other feeds, improved techniques in raising calves and cattle herd management. As well as problem-solving to accomplish better utilization of feeds to increase the productivity per animal unit, the livestock advisor will teach Tunisian extension agents how to motivate the small livestock farmer to adopt modern techniques to increase his production by demonstrating the different feeding requirements for growth, reproduction, production of milk, and fattening. His feeding standards and various balanced rations must take into account not only the age, production goal, etc. of the animal but the availability and price of nutrients being recommended, what the farmer can best grow on his land to balance out the different rations needed and the feeding methods that best fit the available feed and production goals.

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The analysis of livestock policies, markets and farm economics will be the major focus of the farm management economist. On-the-job training of Tunisian technicians will include farm management records, measuring profits in farming, causes of variation in farm incomes, labor efficiency, use of land, handling farm supplies and marketing of livestock and livestock products, credit and the economics of production and utilization of livestock feed. He also will assist in the establishment of a data collection and evaluation system for the OEP.

Requirements for specialized technical inputs, i.e. sheep production, training specialists, feed grain production, livestock product marketing, utilization of by-products, market news services, institutional development, etc. will be provided through the use of short-term consultants (4 man/months per year programmed).

The U.S. commodity inputs will provide some farming equipment, seed and demonstration supplies required to carry out the project activity. The bulk of the commodities needed, as well as project vehicles, will be provided by the GOT. Maximum use will be made of equipment already in place at various regional stations, as well as encouraging the small participating farmer's resource commitment to complement the demonstration activity. Mechanization options will be considered with the small farmer in mind. Priority attention will be given to animal powered equipment followed by work on adapting available equipment to their needs.

#### B. Implementation Schedule

##### FY 1976

- (1) Implementation documents completed and approved for Phase II of the project. A Forage Agronomist will be brought to Tunisia on TDY for the Spring forage planting campaign from February 1st until June 1st to replace the forage specialist presently at post and scheduled to retire in December 1975. The Irrigation Engineer and the Livestock Advisor now assigned to the project will continue with FY 1976 project implementation. Recruitment will begin for a Forage Seed Production Expert and a Farm Management Economist as well as the Forage Agronomist position open because of retirement of the present incumbent.
  - (2) Four long-term and five short-term participants will return from training in the USA.
  - (3) Twenty production technicians will finish a two-year cycle of on-the-job training and 40 technicians will begin a two-year in-country training program that will include dryland and irrigated forage production, forage seed production, feed utilization and on-farm economics.
  - (4) 2100 participating farmers will plant 2600 hectares of forages with assistance from project personnel. 420 of the plantings will be forage demonstrations which will consist of 170 irrigated and 250 dryland plantings.
  - (5) 85 participating farmers will take part in project sponsored cattle feeding activities and 43 of those will carry out cattle feeding demonstrations. They will demonstrate the different feeding requirements for growth, reproduction, milk production and fattening using ideal utilization of feeds to increase the productivity and profit per animal unit.
-

(6) 450 metric tons of forage seed will be harvested as a result of project activity at the El Grine and Chenchou forage seed farms belonging to OEP and through contracts to private farmers supervised by project personnel.

#### FY 1977

(1) The Forage Seed Production Expert and Farm Management Economist are installed at post.

(2) Baseline data collection system for project evaluation is established and a project evaluation plan is completed and activated.

(3) Three long-term and ten short-term participants return from training in the USA.

(4) On-farm problem solving and demonstration program fully coordinated with on-the-job training of production technicians with inputs by full team of five American experts. The comprehensive forage production and feed utilization demonstration program will be gradually intensified in all selected areas of the livestock raising regions of the country.

(5) 3400 participating farmers will plant 2400 hectares of forages with assistance from project personnel. 680 of the plantings will be forage demonstrations which are divided into 275 irrigated and 405 dryland (rainfed) forage demonstrations.

(6) 100 participating farmers will take part in project sponsored cattle feeding activities and 50 of those will carry out project cattle feeding demonstrations.

(7) 1000 metric tons of forage seed will be produced with direct project assistance. Forage seed quality control, storage and distribution plan developed and activated.

(8) The American Irrigation Engineer ends his tour and is replaced by a Forage Agronomist specialized in irrigated forage production.

(9) Short-term consultants on sheep production and feed grain production will each spend two months in Tunisia studying the possibilities of inputs within those specialties being programmed into the project activity.

(10) Project evaluation plan is completed and activated.

#### FY 1978

(1) Three long-term and ten short-term participants return from training in the USA.

(2) Forty Tunisian Production technicians finish a two-year on-the-job training program and 40 technicians will begin a two-year in-country on-the-job training program.

(3) 4000 participating farmers will plant 2600 hectares of forages with assistance from project personnel. 800 of those plantings will be forage demonstrations of which 308 will be irrigated forages and 492 dryland forage demonstrations.

(4) 130 participating farmers will take part in project sponsored cattle feeding activities of which 65 will carry out cattle feeding demonstrations.

(5) 3000 metric tons of forage seed will be produced with direct project assistance.

(6) Short-term consultants on utilization of byproducts, training and institutional development will provide specialized technical inputs required.

#### FY 1979

(1) Three long-term and ten short-term participants return from training in the USA.

(2) 4250 participating farmers will plant 2800 hectares of forages with assistance from project personnel. 840 of those plantings will be forage demonstrations of which 340 will be irrigated forages and 500 dryland (rainfed) forage demonstrations.

(3) 175 participating farmers will take part in project sponsored cattle feeding activities of which 88 will carry out cattle feeding demonstrations.

(4) 5500 metric tons of forage seed will be harvested as the result of direct project assistance.

(5) The Forage Agronomist position specialized in irrigated forage production will be deleted when the incumbent's tour ends during FY 1979.

(6) Short-term consultants in livestock product marketing and market news services will provide specialized technical inputs required by the project.

#### FY 1980

(1) A gradual phase-out of the U.S. experts will occur during this final year of american assistance to the project activity.

(2) Three long-term and five short-term participants return from training in the USA for a total of 18 long-term and 50 short-term participants trained in the USA during the life of the project.

(3) Forty Tunisian production technicians complete a two-year on-the-job training program for a total of 118 technicians that have received on-the-job training during the life of the project.

(4) 4500 participating farmers will plant 3000 hectares of forages with assistance from project personnel. 875 of those plantings will be forage demonstrations of which 350 will be irrigated and 525 dryland (rainfed) forage demonstrations.

(5) 250 participating farmers will take part in project sponsored cattle feeding activities of which 125 will carry out cattle feeding demonstrations.

(6) 8000 metric tons of forage seed will be produced with direct project assistance. FY 1980 will represent the fourth year of forage seed production with quality control, storage and distribution of project forage seed regulated by the plan activated in FY 1977.

(7) Tunisian Government able to carry out and replicate all project activity including technician training program and on-farm demonstrations without further assistance American assistance phased out.

Note: The project implementation schedule for farmer participation, demonstrations, forage seed production and technician training is presented in tables 9, 10, 11 and 12.

By the end of U.S. assistance to the project in FY 1980 an estimated total of 21,400 farmers will have participated in the project activity. That is the cumulative total number of farmers who participated each year reduced by one-third representing the proportion of farmers who participate for a second year. According to the USDA 1974 Tunisian Acreage and Livestock Survey there are 50,566 cattle farmers in the five Northern Governorats surveyed. The number in the other Governorats in the more southern part of the country is unknown but is considerably less. Although the exact percentage of the target group of farmers which will be directly reached by the project cannot be verified, it is clear from the above data that the percentage will be significant.

### C. Key to Project Network

(1) Headquarters and 13 Regional Offices of OEP established.

(2) Joint OEP/USAID plan prepared for development of OEP capability to reach the small livestock farmer with modern technology in forage production, feed utilization, and livestock management.

(3) Demonstration program as a continuation of Phase I project activity continues with 443 forage production and cattle feeding demonstrations being conducted with project assistance.

(4) Both long-term and short-term participant training in the USA as well as in-country on-the-job training continues as carryover from Phase I activity with four long-term and five short-term participants returning from training and 20 production technicians finishing a two-year program of on-the-job training.

(5) 450 metric tons of forage seed produced as part of continuing Phase I direct project support.

(6) Implementation documents completed and approved for Phase II of project activity.

(7) Baseline data collection and project evaluation system established.

(8) 680 forage production demonstrations conducted.

- (9) 1000 metric tons of forage seed produced and forage seed quality control, storage and distribution system activated.
- (10) 50 cattle feeding demonstrations conducted.
- (11) Ten short-term participants return from USA.
- (12) Three long-term academic participants return from training.
- (13) Consultants on sheep production and feed grain production complete studies.
- (14) 308 irrigated forage production demonstrations conducted.
- (15) 3000 metric tons of forage seed produced.
- (16) 65 cattle feeding demonstrations conducted.
- (17) Consultants on utilization of byproducts training and institutional development submit their recommendations.
- (18) Ten short-term participants return from training in the USA.
- (19) Three long-term academic training participants return to project.
- (20) Forty Tunisian production technicians finish a two-year in-country on-the-job training program.
- (21) Eighty-eight cattle feeding demonstrations carried out.
- (22) 5500 metric tons of forage seed produced.
- (23) 840 forage production demonstrations conducted.
- (24) Three long-term academic participants return from USA.
- (25) Five short-term participants return from the USA.
- (26) 875 forage production demonstrations conducted.
- (27) Forty Tunisian production technicians finish a two-year in-country on-the-job training program.
- (28) 125 cattle feeding demonstrations carried out.
- (29) 8000 metric tons of forage seed produced.
- (30) Three long-term academic participants return from USA (last group).
- (31) All U.S. project assistance terminated.

**PROJECT PERFORMANCE NETWORK**

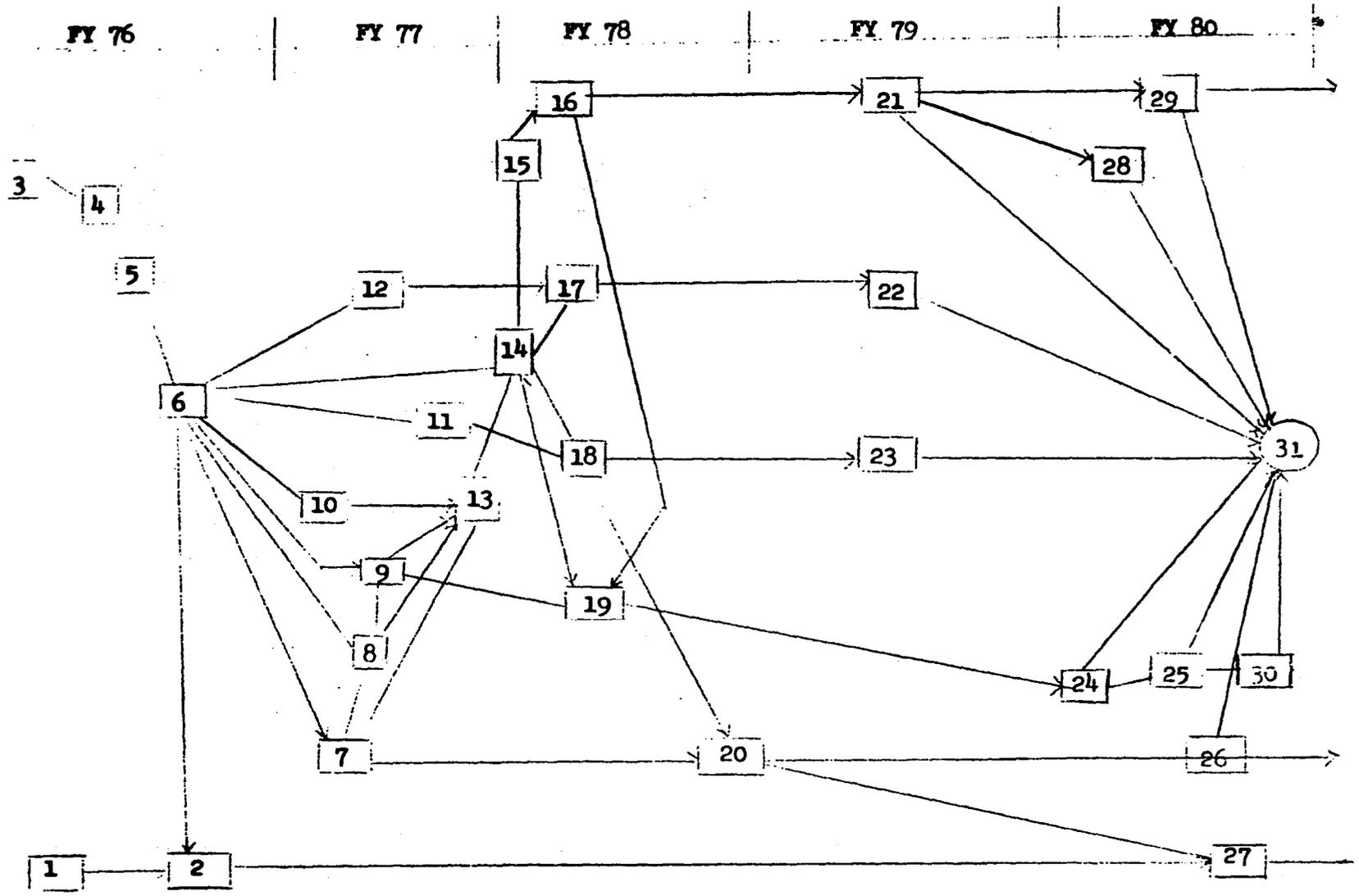


Table 1

ESTIMATED DEMAND FOR IMPROVED HAY OR GREEN CHOP  
 (000 Metric Tons of Hay Equivalent)

<u>Livestock Type</u>	<u>Number</u>	<u>1974</u> <u>Desired Consumption<sup>2/</sup></u>	<u>Availability</u>	<u>Deficit</u>
Sheep <sup>1/</sup>	2,319,000	900	340	560
Cattle	712,000	800	280	520
<u>Livestock Type</u>	<u>Number</u>	<u>1980</u> <u>Desired Consumption<sup>2/</sup></u>	<u>Availability</u>	<u>Deficit</u>
Sheep <sup>1/</sup>	2,000,000	776	600	176
Cattle	1,330,000	1494	1469	25

ESTIMATED PRODUCTION OF IMPROVED HAY OR GREEN CHOP  
 (000 Metric Tons of Hay Equivalent)

	<u>1974</u>				<u>1980</u>			
	<u>Dry Land</u>		<u>Irrigated</u>		<u>Dry Land</u>		<u>Irrigated</u>	
	<u>Hectares</u>	<u>Metric Tons</u>	<u>Hectares</u>	<u>Metric Tons</u>	<u>Hectares</u>	<u>Metric Tons</u>	<u>Hectares</u>	<u>Metric Tons</u>
Oats/Vetch	100,000	350	00	00	280,000	1,050	00	00
Alfalfa	12,000	72	18,000	198	36,000	252	64,000	767
clovers								
sulla								
fescue								

<sup>1/</sup> Sheep in northern part of country where hay supply is projected to develop.

<sup>2/</sup> The estimated hay equivalent that could be economically consumed over and above the present consumption levels.

Table 2

**1974 FORAGE PLANTINGS, PRODUCTION AND FORAGE SEED UTILIZATION IN  
TUNISIA AND ESTIMATES OF DEMAND THROUGH 1980**

	<u>Number of Hectares Planted (000)</u>	<u>Production Expressed in Tons of Hay (000)</u>	<u>Tons of Forage<sup>1/</sup> Seed Utilized (000)</u>	<u>Forage<sup>2/</sup> Units (000,000)</u>
1974	130	620	10.9	186
1975	159	758	13.3	227
1976	194	934	16.4	280
1977	240	1158	20.3	347
1978	300	1459	25.6	437
1979	325	1750	30.7	525
1980	380	2069	36.3	620

1/ Includes oats, vetch, alfalfa, sulla (Hedysarium coronarium), bersim and several varieties of clover seed. 77% of the forage seed requirement is oats and vetch.

2/ One FoRage Unit equals the equivalent feed value of one kilogram of Barley.

Table 3

AGRONOMIC POTENTIALS

Forage Production (m.t./hay equivalent) during 1974

<u>Crop</u>	<u>Exp. Station Averages</u>	<u>Farm Demonstration Averages</u>	<u>Farmers Averages</u>
Oats/Vetch	7.8	6.6	4.2
Alfalfa	36.2	30.3	28.4*
Sulla (Hedysarium coronarium)	12.3	10.0	8.1*
Bersim	15.6	13.3	12.3*

\* A large percentage of Tunisian farmers growing alfalfa, sulla and bersim had at least some technical advice under the auspices of the project during Phase I. Production averages shown are from small plot samplings.

Table 4  
NET ANNUAL RETURN<sup>1/</sup> TO VARIOUS OPERATIONS  
RELATED TO LIVESTOCK FEED PRODUCTION AND UTILIZATION

	<u>Per Hectare<sup>2/</sup></u>	<u>Per Animal</u>	<u>As % of Investment</u>
<b>Forage Production</b>			
Oats/Vetch	\$ 281		648
Sulla ( <i>Hedysarium coronarium</i> )	598		2591
Bersim	857		2461
Alfalfa (irrigated)	1729		1349
Durum Wheat <sup>3/</sup>	170		237
<b>Dairying</b>			
Purebred	(1995)	\$ 319	36
Mixed	(1525)	170	25
<b>Calf Fattening</b>			
Purebred/Mixed	(1208)	137 <sup>4/</sup>	47
Local	( 435)	52 <sup>4/</sup>	22

1/ To land and management

2/ Figures bracketed ( ) represent the return from 1 ha. of dryland forage fed to animals as indicated and charged at production cost, not market value, as in the case in col. 2.

3/ Shown for comparative purposes

4/ see footnote page 11.

Table 5

U.S. INPUTS  
(\$000)

	Actual Thru FY 75	FY 76	I.Q.	FY 77	FY 78	FY 79	FY 80	Total
<b>Technicians</b>								
Forage Production Agronomist		16	8	30	32	35	29	
Livestock Advisor		29	8	30	32	35	29	
Irrigation Engineer*		26	8	30	32	-	-	
Forage Seed Production		-	8	30	32	35	29	
Farm Management Economist		-	8	30	32	35	29	
Short-term Consultants		9	3	10	11	12	10	
<b>Sub-Total</b>		<b>80</b>	<b>43</b>	<b>160</b>	<b>171</b>	<b>152</b>	<b>126</b>	
Personnel Benefits (12%)		10	5	19	21	18	15	
Shipment Effects (to Tunis)		6	18	7	-	-	-	
Storage and Miscellaneous		2	1	4	4	4	3	
<b>Sub-Total</b>		<b>18</b>	<b>24</b>	<b>30</b>	<b>25</b>	<b>22</b>	<b>18</b>	
Overhead (25%)		25	17	47	49	43	36	
<b>TOTAL</b>	<b>709</b>	<b>123</b>	<b>84</b>	<b>237</b>	<b>245</b>	<b>217</b>	<b>180</b>	<b>1,795</b>
<b>Other Direct Costs</b>								
Educational Allowance		5	24	33	28	29	8	
International Travel		9	14	8	21	3	12	
Shipment Effects (from Tunis)		6	6	14	7	-	30	
Contingency		3	1	5	5	4	4	
<b>TOTAL</b>	<b>12</b>	<b>23</b>	<b>45</b>	<b>60</b>	<b>61</b>	<b>36</b>	<b>54</b>	<b>291</b>
<b>Participants</b>								
Academic (M.S.)		40	-	54	53	28	-	
Short-term		15	-	37	39	41	20	
<b>TOTAL</b>	<b>195</b>	<b>55</b>	<b>-</b>	<b>91</b>	<b>92</b>	<b>69</b>	<b>20</b>	<b>525</b>
<b>Commodities</b>	<b>201</b>	<b>-</b>	<b>-</b>	<b>100</b>	<b>20</b>	<b>5</b>	<b>-</b>	<b>391</b>
<b>GRAND TOTAL</b>	<b>1,117</b>	<b>259</b>	<b>129</b>	<b>408</b>	<b>418</b>	<b>327</b>	<b>254</b>	<b>3,002</b>

Table 5

U.S. INPUTS (continued)

\* Position will be deleted at end of present tour in September, 1976 and will be replaced by a second forage production agronomist.

NOTE: The Phase II project proposal begins on July 1, 1975 and ends on June 30, 1980.

Table 6

TECHNICIAN AND PARTICIPANT SCHEDULE

	<u>1971-75</u>	<u>1976</u>	<u>I.Q.</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<b>1. <u>Technicians (Man/Months)</u></b>							
1 Project Manager	48	12	3	12	12	12	9
2 Forage Production Agronomists	48	6	6	24	21	12	9
1 Irrigation Engineer	48	12					
1 Livestock Advisor	48	12	3	12	12	12	9
1 Forage Seed Production Expert			3	12	12	12	9
1 Farm Management Economist			3	12	12	12	9
Short-term experts/consultants	8	4	1	4	4	4	3
	<u>200</u>	<u>46</u>	<u>17</u>	<u>76</u>	<u>73</u>	<u>64</u>	<u>48</u>

A gradual phase-out of the U.S. experts is not shown since we do not yet know the complete schedule of participant training during the remainder of the project. When the schedule is known, we anticipate that technicians' tours will be shortened accordingly. During FY 1980 the GOT will assume all training responsibilities and permit orderly withdrawal of U.S. experts as two-year tours end.

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<b>2. <u>Participant Training (Man/Months)</u></b>					
Academic (M.S. degree)	60	78	72	36	-
Short-term Training	<u>10</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>10</u>
	<u>70</u>	<u>98</u>	<u>92</u>	<u>56</u>	<u>10</u>

The M.S. program requires two years of academic training in an American University. There are at present 800 participants studying in the U.S. towards specialization in forage production, feed utilization or livestock management. On their return they will fill supervisory positions in the project. The first five academic participants to complete their training recently returned. During the next four years of project activity another nine participants will be selected and sent to the USA for academic training. At the termination of USAID assistance to the project in 1980 there will be eighteen key technicians who hold M.S. degrees and have received on-the-job training in Tunisia.

Table 7COMMODITY PROCUREMENT SCHEDULE  
(\$000)

	<u>FY 1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
Forage Seed not available in Tunisia, i.e. Sudan grass, Persian clover, forage corn and certain alfalfa varieties	25	20	5	-	-
Forage Seed Equipment, i.e. Combines and repair parts	16	16	-	-	-
Seed separators	4	4	-	-	-
Seed cleaners	-	12	-	-	-
Forage Demonstration Equipment Seeders	3	12	6	-	-
Miscellaneous items	-	1.5	4	1	-
Irrigation Demonstration Equipment, i.e. Land Planes, corrugators	5	17	0.5	0.5	-
Gated pipe, siphons, misc.	1	-	-	-	-
Cattle Demonstration Equipment and supplies, i.e. squeeze chutes, scales, dehorner, tattoo materials, etc.	6	8	3	3	-
Yearly Totals	60	90.5	18.5	4.5	-
Allowance for Price Escalation	5	9.5	1.5	0.5	-
Total Commodity Input	65	100.0	20.0	5.0	-
			\$173.5		
Total Commodity Input			\$190		

Table 8TUNISIAN INPUTS (\$000)

(Calendar Year Basis)

	<u>1971-75</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>Total</u>
a) GOT contribution to U.S. assistance projects (T.F.)	565	124	124	124	120	120	1,177
b) Direct GOT budget support	1,645	992	1,100	1,368	1,564	1,600	8,269
<b>TOTAL</b>	<b>2,210</b>	<b>1,116</b>	<b>1,224</b>	<b>1,492</b>	<b>1,684</b>	<b>1,720</b>	<b>9,446</b>

**Table 10****FARMS QUALIFYING AS DEMONSTRATIONS\***

	<u>Cumulative Prior Years</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
<b>1. <u>Forage Plantings</u></b>						
(a) Total	540	420	680	800	840	875
(b) Dryland	332	250	405	492	500	525
(c) Irrigated	208	170	275	308	340	350
<b>2. <u>Cattle Feeding</u></b>	205	43	50	65	88	125

\* A farm demonstration requires that the farmer adopt enough of a project technological package to have a measurable increase in his production and income sufficient to demonstrate impact on the stated goal of this project. Project experience to date has shown that about 20% of total farmers planting forages each year and about 50% of the farmers participating in cattle feeding production education meet this criteria.

Table 11EXPANDED FORAGE SEED PRODUCTION\*

	<u>Cumulative</u> <u>Prior Years</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>
Metric Tons of						
Forage Seed Produced	500	450	1000	3000	5500	8000

\* With direct project assistance - includes the GOT forage seed production farms at El Grine and Chenchou plus private contract seed producers.

Table 12

TRAINING COMPLETED (PROJECTED) BY YEAR  
AND CLASS (FISCAL YEAR)

	<u>Cumulative</u> <u>Prior Years</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>Total</u> <u>Trained</u>
1. Long-Term Academic Master Degree Training	5	1	3	3	3	3	18
2. Short-Term Participants	10	5	10	10	-	5	40
3. On-the-job Training	18	20	-	40	-	40	118*

\* The 118 on-the-job trained includes the participants sent to the USA for both long-term and short-term training.

Profile of The Target Group -

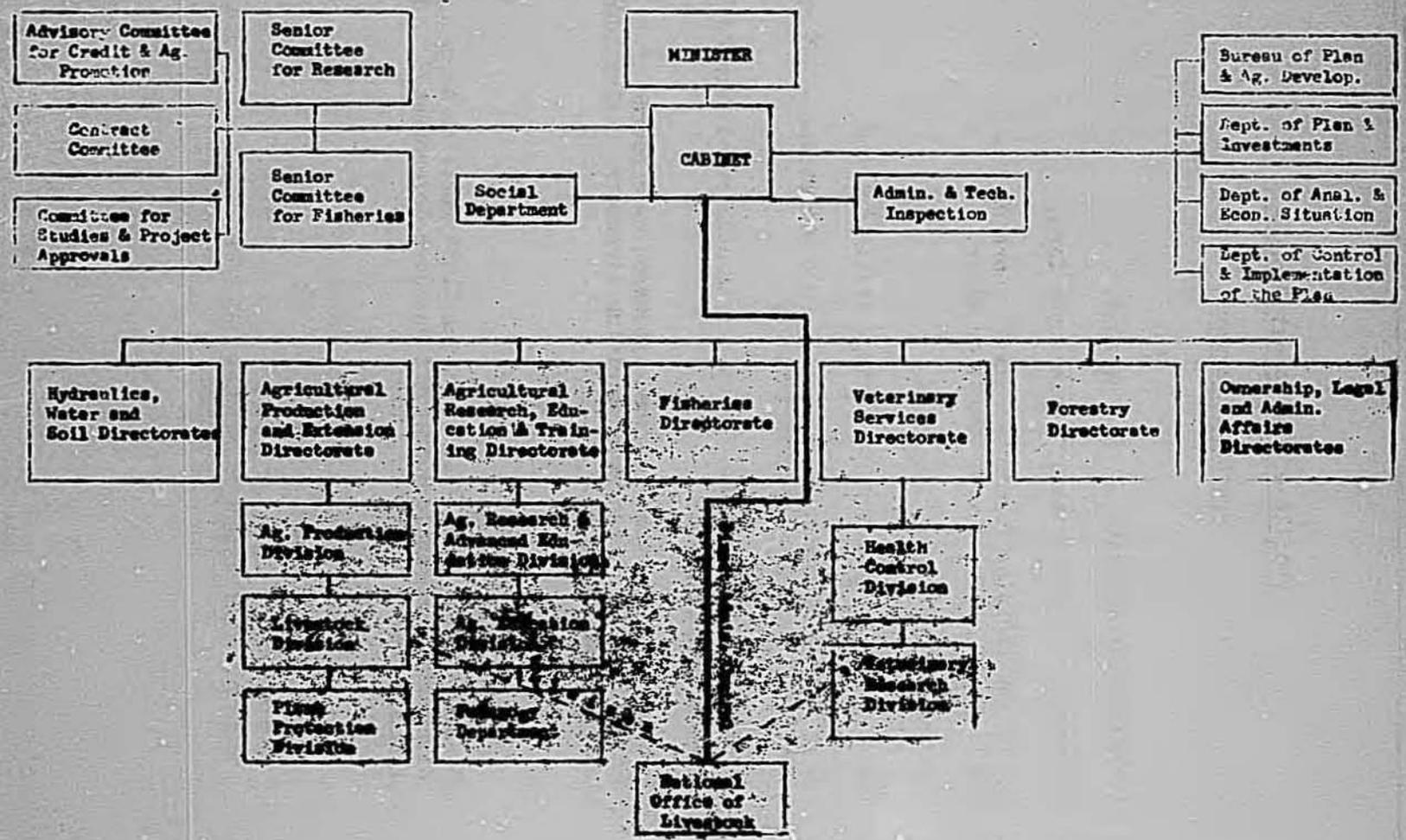
The Small Farmer

1. Average household size - 7.3 persons.
2. Average of 1.6 adult family workers per farm.
3. Age of the Tunisian farmer - 31% 40 years or less, 27% 41 to 50 years of age, 42% 51 or older.
4. 72% have had no formal schooling.
5. 72% of the farm operators own sheep, cattle or both.
6. 49% of all farms operated are less than 5.0 hectares - 34% are between 5.0 and 19.9 hectares in size.
7. Operators with farms under 5 hectares in size owned from 86.4 to 89.2% of their land.
8. 6% of cattle operators mentioned extension as a source of information. Only 8% reported receiving livestock raising information from any source.

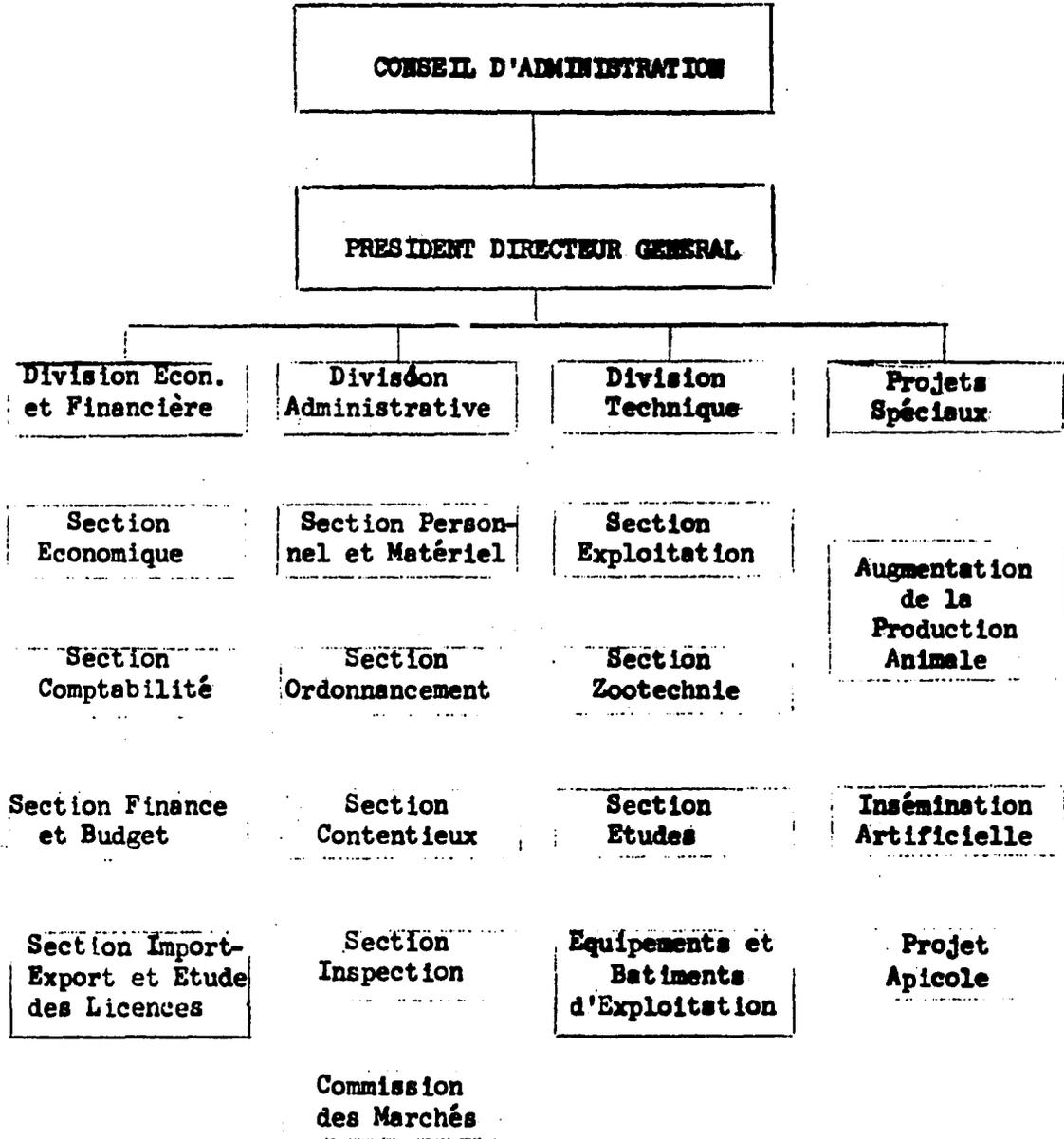
\* Based on data and projection of the "1974 Tunisian Acreage and Livestock Enumerative Survey of 5 Northern Governorats", Volumes 1 and 2.

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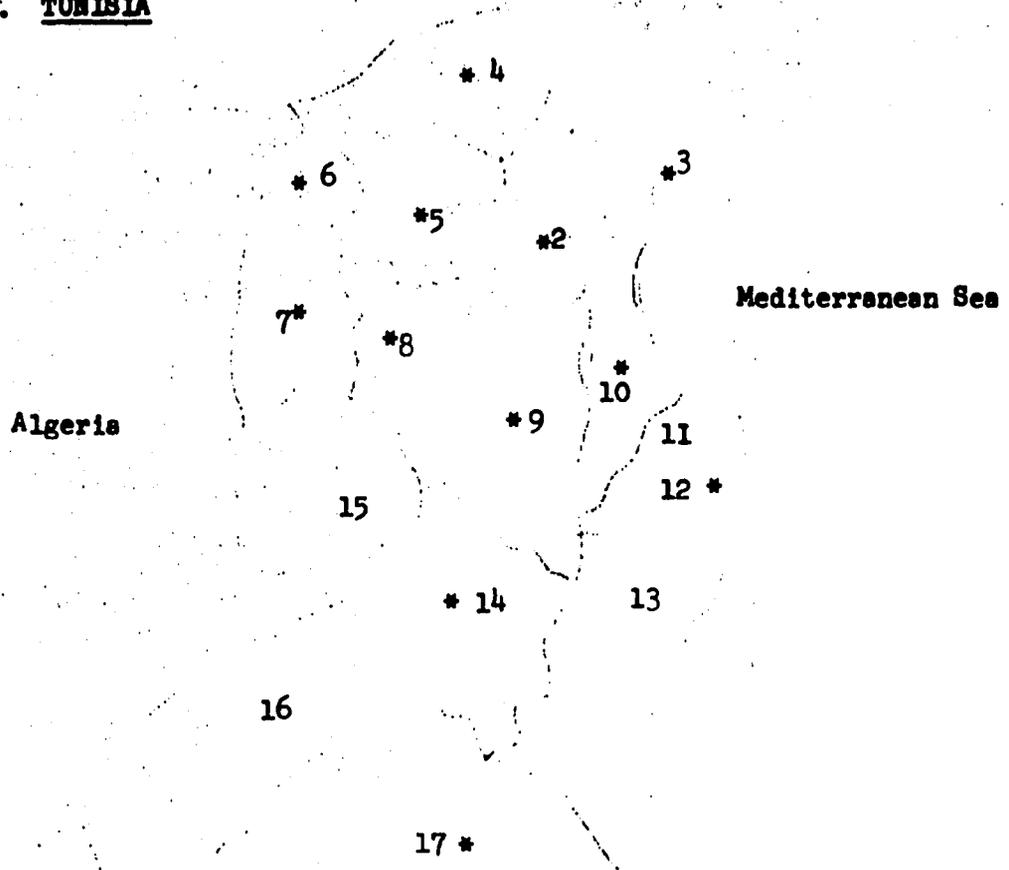
**3. ABBREVIATED ORGANIZATION CHART OF THE MINISTRY OF AGRICULTURES, TUNISIA**



**C. Organizational Chart of the  
Office de l'Élevage et des Pâturages  
(National Livestock Production Office)**



D. TUNISIA



Governorats (Tunisia)

- 1 Tunis
- 2 Tunis Sud
- 3 Nabeul
- 4 Bizerte
- 5 Beja
- 6 Jendouba
- 7 Le Kef
- 8 Siliana
- 9 Kairouan
- 10 Sousse
- 11 Monastir
- 12 Mahdia
- 13 Sfax
- 14 Sidi Bou Zid
- 15 Kasserine
- 16 Gafsa
- 17 Gabes
- 18 Medenine

\* Regional Office de l'Elevage et des Patúrages (OEP) locations.

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### E. Other Donor Activity

Canadian assistance, which is part loan and part grant financed, includes provision of powdered milk, concentrates and vitamins to feed the calves; semen from Canadian bulls; some equipment; short-term training in Canada, and five technicians. When complete, the team of technicians will include, in addition to the team leader already in place, a forage agronomist to assist the OTD center to raise forage for consumption by project animals and three extension agents to work with the farmers who will be receiving the animals. It is envisaged that, over a five-year period, 12,600 improved heifers will have been distributed, thus approximately doubling the number of purebred cows and bred heifers in the northern governorates as shown by the 1974 Livestock Survey.

Two large Austrian projects also address breed improvement. They involve the importation and distribution by OEP of 1200 bred heifers and of 500 bulls over a period of 4 years (1972-1975) in the case of the heifers and of 5 years (1972-1976) in the case of the bulls. The bulls, together with 540 others purchased by OEP, are intended for areas where it has not been possible to extend the artificial insemination program, which was established with Belgian assistance during the period 1969-1974.

Breed improvement is likewise one of the objects of Belgian assistance to OEP's model farm at Fretissa and of German assistance to the pilot farm at Sedjenane. In both cases, the research has included trials of crossbreeding between European and local breeds.

The FAO/SIDA project is concerned with beef fattening through promotion of the use of silage, which is little used in Tunisia at present. The foreign assistance takes the form of the services of 6 experts, vehicles and agricultural equipment, seed and fertilizer and a revolving operating fund.

The project will operate by buying bull calves on the local market, grouping them into lots of 10-15 animals of similar age, weight and breed, and selling the lots to participating farms. In the first year at least, two-thirds of the 6,000 animals involved were destined for large cooperative farms (UCP) and one-third for individual private farms.

Participating farmers are required to plant half a hectare of forage crops suitable for silage (oats, barley, wheat) per animal. The project assures that necessary inputs are available, arranges credit if necessary, and provides technical assistance to the farm operator in all phases of the operation, growing the forage, making silage, feeding and caring for the animals. The project will calculate the selling time/weight which objectively is most advantageous to the farm operator, who must abide by this determination. He is, however, free to sell wherever he chooses and is assured of a guaranteed minimum price by the project.

Improvement of animal health has been incorporated into at least 6 different projects. A veterinarian has been included in the German team at Jendouba, the Austrian team at the Zama pilot farm, the Belgian team working with the Performance Control Project, the Dutch team at Tebourba and the FAO/SIDA team. Canada also provided the services of a veterinarian to the Livestock Center at Ousseltia-Kairouan.

\* Office des Terres Domaniales

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Pasture improvement is a principal objective of a six-year (1970-1976) UNDP/FAO/UNESCO project of arid zone research. It is also an element in 3 other projects - the World Food Program project with Agricultural Cooperatives in the Center and South, Swiss assistance to the Silvo-pastoral Institute; and German-supported agricultural research, which includes pasture species trials.

Except for the Canadian assistance related to the internal requirements of its project described above, the only foreign donor other than AID which has addressed the green forage needs of the livestock industry has been Germany. The German team working on the Lakhmes irrigation perimeter includes an expert in irrigated forage production; one of the members of the agricultural research group at National Institute for Agricultural Research (INRAT) is working on forage plants; and the German team at Sedjenane did a good deal of work with one particular species - Trefolium subterraneum.

#### Resume of other Donor Projects Related to Livestock

<u>Donor</u>		<u>Duration</u>	<u>Total Donor Contribution</u>
UNDP/FAO/ UNESCO	"Research and Dev. of Grazing Land in Center/South" - arid zone research; one of two experts is "pastoraliste"	9/70-8/76	*)
WFP	"Agric. Cooperatives in Center/South" includes coop. working on pasture improvement and cattle raising	5/69-8/75 (extension planned)	*)
Germany	"Ag. Extension - Jendouba" includes experts in herd mgt and vet. med.	9/68-3/75 (extension planned)	*)
Germany	"Lakhmes Irrigation Perimeter" includes experts in irrigated forage production and animal production	6/74-6/76	*)
Germany	"Ag Research" - includes research on forage plants and animal nutrition; pasture species trials	5/67-6/76	*)
Germany	"Livestock and Regional Dev.-Sedjenane" dairy cattle crossbreeding and dev. of <u>Trefolium subterr.</u> as feed	6/65-6/75	\$ 841,000
Austria	"Zama Pilot Farm" - vet. and livestock technician working with beef and dairy cattle	1970-1974	\$ 794,000
Austria	"Breed Improvement I" - 500 bulls	1972-1976	\$ 775,000
Austria	"Breed Improvement II" - 1200 bred heifers; 1 expert	1972-1975	41,575,000

<u>Donor</u>		<u>Duration</u>	<u>Total Donor Contribution</u>
Belgium	"Fretissa Model Farm" - 3 experts in research and extension working on crossbreeding, economic studies and stabling systems	1968-1973	n.a.
Belgium	"Artificial Insemination" - Veterinarian and commodities	6/69-12-74	\$ 630,000
Belgium	"Performance Control" - vet. and 2 technicians introducing system of recording production results	1/72-12/75	n.a.
Canada	"Livestock Center, Ousseltia" Veterinarian and equipment	1972-1974	\$ 110,000
Canada	"Dairy Heifer Production - 200 calves, semen, feed and vitamins, equipment, short-term training, 5 experts	1974-1978	\$ 3,440,000
Spain	"Agricultural Assistance" - veterinarian inspecting slaughterhouses	10/69-10/74	n.a.
Netherlands	"Dairying" - 1 vet. and 2 livestock technicians	1971-1974	\$ 233,000
Sweden/FAO	"Beef Cattle Development in the North" 3 experts in beef and forage production, vehicles, agric. equipment; seeds and fertilizer; cash operating fund	4/74-9/78	\$ 1,618,000
Switzerland	"Silvo-pastorale Institute" - includes one expert on pastures	n.a.	*)
Ecumenical Council of Churches	"Rural Development" - includes one livestock technician	1973-	*)
Peace Corps	"Agricultural Assistance" - includes 5 Livestock technicians	continuing	*)
			\$10,016,000

\*) Cost of livestock-related portion of project not separable.

n.a. not available

## F. Larsen Report Recommendations and Related Project Response

- |  |   |
|--|---|
| A.1 Stabilize cow herd, with decreases in native cow numbers offset by expansion of pure-bred and crossbred stock.   | As level of individual farmer, improved cows do, in fact, nearly always replace, rather than add to, animals in herd. At national level, feed is limiting factor, and improved stock require more feed and have preferential access to available feed so that result should be more or less stabilize national herd size.             |
| A.2 Reduce sheep numbers at least 20% over next 6 years.   | The means to accomplish this do not exist; it is probably not politically feasible; and the 25% decline in per capita consumption of lamb and mutton it implies, represents an unrealistic cultural change.   |
| A.3 Reduce goat numbers.   | Larsen qualified this recommendation in text (p. 45). We agree with qualification.  |
| A.4 Increased cattle feeding.  | Project is supporting, although at small farmer level, rather than large-scale feedlot operations recommended by Larsen. FAO/SIDA program comes closer to latter. 9% "profit" cited by Larsen is 9% of sales price, not 9% return on investment. Latter is about 12% for 6-month period bull is kept. On annual basis it becomes 24%. |
| A.5 Feed lambs on seasonal basis.  | Project proposes short-term technician to investigate feasibility.  |
| A.6 Encouraging more spring lambing.   | Outside scope of Project.   |
| A.7 Expand bred heifer program.  | Being addressed by Austrian and Canadian projects.  |
| A.8 Strong effort to upgrade milk cow rations.   | This is integral part of project.   |
| B.1 Increase forage production by seeding idle hectares with improved temporary pasture or forage crops.   | This is integral part of project.   |
| B.2 Where soil and irrigation water has high saline-alkaline content and limited drainage, test feasibility of planting to crops tolerant of this condition, such as pasture crops, i.e. forage. | This is integral part of project.   |

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- B.3** Convert severely eroded, marginally productive grain land to forage production. This is integral part of project.
- B.4** Develop currently non-productive land in the higher rainfall areas of the north for forage production. The 60,000 hectares in the Sedjenane area cited by Larsen is vastly overstated. An IBRD livestock project planned for the area has been dropped as not feasible, in part because of land tenure problems.
- B.5** Salvage and use as cattle feed several thousand tons of wheat screenings from flour mills which are said to be discarded. Investigation has determined that this report, which originated with KSU Grain Storage Report, was incorrect.
- B.6** Utilize as ingredient in feed rations the 4,000-6,000 tons of molasses Tunisia exports. Depends upon feeding formulas developed by INRAT research staff.
- B.7** Seek out untapped sources of byproducts that would probably yield additional feed supplies (e.g. sugar beet pulp, dried brewers' grain, dried citrus pulp). Project purposes short-term technician to investigate.
- C.1** Install market news reporting system. Proposal is premature. Markets themselves are insufficiently organized, and there are higher priority uses for personnel.
- C.2** Live grading system for reporting number, classes and value of marketing. Since this is input for above activity, it is not needed until time is ripe for market news service.
- C.3** Upgrade meat inspection system with more attention to sanitation. Not relevant to project.
- C.4** Improved quality standards for meat. Not relevant to project.
- C.5** Publicize more widely the services available to farmers through the Extension Services and from Extension Specialists on the Livestock Project. As Extension Service increases its capacity to respond, more publicity has been and will be given to it. However, rather than making a special effort to encourage use of AID technicians on government farms as recommended by Larsen, primary emphasis is being given to serving small farmers.
- D.1** Reduce government subsidies on poultry feed. Desirable but politically difficult and probably would not reduce demand enough to significantly increase the availability of cattle feed.

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- D.2 Change price controls on meat and milk. GOT has the question under study and some increase in the farm price of milk, at least, is likely in the near future. Enterprise analysis (pp. 10) shows, however, that both beef and dairy operations are quite profitable even at present prices.
- D.3 Remove law prohibiting the slaughter of female cattle. Prospects may have been enhanced by livestock survey which showed livestock numbers much greater than expected.
- D.4 Limitations or some restrictions on exports of concentrate feeds (bran, oats, etc.). OEP staff have requested this through OCA channels.
- D.5 Control of land use must be resolved before significant improvement of range land can be realized. Because resolution of this intractable problem does not appear likely in the near future, the inclusion of range management within the project, as proposed in the original PROP submission has been dropped.
- D.6 Improve planning for seed and fertilizer production and distribution. The Livestock Extension Service has undertaken direct responsibility for production of forage seed. AID assistance to this effort is included in the project. OEP also assists in distribution of fertilizer for forage production.
- D.7 Eliminate price ceilings, at least on classes of meat that appeal to the higher income consumer. See D.2
- E.1 Technical assistance on the Livestock Project to include specialists in forage and grass seed production, dairy production and marketing, and possibly sheep production (in addition to continuation of major thrust in direction of increasing feed production and improving care and management of livestock). It is proposed to add a forage seed specialist to current team. When tour of present livestock advisor ends, he is to be replaced by advisor with extensive experience with dairy cattle. Sheep advisor dropped for reasons cited in D.5. Marketing advisor not included because problem is of relatively low priority at this time and falls outside the area of responsibility of the GOT cooperating agency.

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E.2 For ongoing economic analysis and marketing support for the subsector, two economists, a livestock and meat marketing specialist, and an agricultural statistician could be added to the Mission staff.

Personnel ceilings obviously do not permit expanding direct hire support staff for the project. Some of the functions proposed for the economists, insofar as these relate to project activities, will be carried out by the economist to be added to the advisory team. The work of the proposed ag statistician in continuing the activities launched with the Livestock Survey is being done by short-term USDA advisors working with the Planning Bureau of the Ministry of Agriculture, which has been assigned this responsibility.

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