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CENTRAL TUNISIA RURAL DEVELOPMENT

RANGELAND DEVELOPMENT PROJECT

No. 664-0312.8

INTERIM EVALUATION

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ACRONYMS

ACSAD	Arab Center for Study of Arid-Dry Lands
FAO/RAB PROJECT	North Africa/Middle East Regional Rangelands Project
ICARDA	International Center for Agricultural Research in the Dry Areas
INRAT	Institut National de la Recherche Agronomique de Tunisie Tunisie
IRA	Institut des Régions Arides
INRF	Institut National de la Recherche Forestière
IRSIT	Institut Regional des Sciences, d'Informatique et Telecommunications
MAB	Man and Biosphere Program
ODS	Office du Développement du Sud
ODTC/CTDA	Office de Développement de la Tunisie Centrale/ Central Tunisia Development Authority

CTRD Rangeland Development Project Evaluation
April 20, 1988

Description of the Evaluation

The purpose of this evaluation is to provide the GOT and USAID mission with an overall assessment of the progress that has been made over the past six years of implementation, and to offer recommendations on actions that should be taken in this final year of AID funding to the project.

In undertaking this large task the evaluation team made several site visits to the field to inspect project demonstrations and activities and to interview farmer participants. Numerous discussions were held with a host of project staff and GOT officials (see annex for list), and all relevant documentation was read and digested in an attempt to learn as much about the project, its achievements and impact. In short, a significant amount of research and writing was accomplished in the short two weeks that was allotted to this exercise.

The methodology employed by the team was simple. We used the Scope of Work (Annex III) as a guide and responded to all of the questions included in it. Data was gathered based on field site observations, personal interviews and available project materials. The short time period did not allow extensive data collection, however, so that some very broad questions, such as economic and social impacts, could not be answered in great detail. Nevertheless, we feel that the information contained in this document is accurate and contains a realistic sense of the state of progress to date.

Overall Appraisal

The Rangeland Development Project was designed to respond to the particular development needs of Tunisian farmers living on degraded rangelands in the semi-arid to arid regions of the country. Its purpose was two-fold, to introduce improved rangeland management and stockraising practices to farmers in in Central Tunisia, and to develop a competent range management unit which could provide continuing technical assistance to farmers and stockman in the region. The project is making satisfactory progress toward achievement of these objectives. However, the expected level of magnitudes of some of the outputs have not yet been reached at this time.

Project purpose is being achieved through Technical Assistance provided by the contractor, purchase and delivery of commodities and training of OEP staff. These inputs appear to be adequate to

strengthen the Range Management Unit in OEP and to prepare it for a long range program of rangeland improvement and management and increased sheep production in Tunisia.

Assumptions related to both purpose and outputs are generally valid with some exceptions. The rotation grazing program was over-emphasized in the assumptions as was the degree to which staff and demonstrations would influence other pastoralists. However, with some changes in emphasis on an increased extension effort the project could help correct the latter problem.

The methodology used to achieve contract goals appears to be generally satisfactory. The technical staff has effectively identified constraints to rangeland and sheep production and have implemented strategies to alleviate the problems. Technical strategies appear to be sound though, due to climatic conditions have not proved to be as consistently beneficial as anticipated.

A principle objective of the project was to improve rangeland and sheep productivity and extend the appropriate improvement techniques and information to other farmers. To accomplish this, baseline information is required against which to measure changes in productivity. Based on information available to the evaluation team baseline data or information are presently limited, making it difficult to quantify the magnitude of change resulting from project interventions. This problem could be alleviated in part during this next year by collecting production data on both treated and non-treated land and animals. This would provide some measure of effectiveness of project interventions and a guide for future development of program interventions.

Institutional linkages are an important part of attaining success in this project as the science of rangeland development is a relatively new discipline. Much remains to be learned about appropriate and productive interventions. This project has contributed much to what we know about plant species and land improvement technology in Tunisia, but there are many other organizations involved in rangeland development that have new ideas, strategies and innovative research that could benefit the project. The project presently maintains links with the Projet PAM (World Food Organization), Projet RAB (FAO-supported), Forestry Service, Soil Conservation Service, PDRI, and others in implementing its activities. These links need to be further strengthened and others developed. This more coordinated approach will produce more development in a shorter amount of time than through a series of unlinked multiple actions.

RECOMMENDATIONS

The following recommendations summarized from the main body of the report represent the team's opinion on major actions that should be considered by OEP, USAID and OSU in implementing this project over the next 12 months (remaining period of AID assistance). It's important to note that recommendations are not made for each section contained in the scope of work, but only for those areas we feel require priority attention.

1. An agricultural economist with specialization in farm management or range economics should be hired for a short-term consultancy to examine more closely the costs and returns for various rangeland management practices in the full range of ecological areas encompassed by the project (pg. 10).

2. Strong consideration should be given to hiring a short-term extension specialist (preferably local), who can train technical staff and design a long-term, applied extension program (pg. 13).

3. Project funds, presently estimated between $55,000 - 70,000, be deobligated from the Rangeland Development Project, and reobligated to the Technology Transfer Project to complete the training of the remaining students (pg. 14).

4. Careful attention should be given to passing on major responsiblity and decision-making on technical matters to the project technicians. They are well trained academically and need to engage in responsible and challenging field work to fulfill their potential (pg. 14).

5. The RMU should continue to expand the straw ammoniation project, but should examine the options for expansion very carefully to assure that it does so at the lowest possible cost. It is recommended that the project hire a short-term consultant, who could assist in examining these options and also formulate least-cost feed models (pg. 19).

6. That the project follow through with the purchase of the three seed-cleaning machines for GRAPOUFAST (estimated cost $75,000), and if further research leads to the conclusion that no U.S. manufacturer can provide equipment satifying compatibility, spare parts and maintenance criteria, then a source/origin waiver should be issued to purchase non-US (pg. 24).

7. That OEP take immediate steps to alleviate the situation existing in the collective lands by opening up and managing the grazing of forage, and if deficits exist then reintroducing its subsidized concentrate program to help farmers through this difficult year (pg. 27).

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8. That the project hire a local sociologist with strong experience in community organization who will train staff in communication techniques; design and implement a program of organization/development of the local community management committees; and conduct appropriate research in advance of future project interventions. This should be done through the project's TA budget (pg. 28).

9. That OEP staff coordinate with the CTDA sociological unit and make field trips to potable water sites to observe community resource management in action (pg. 28).

10. That the project staff organize a quarterly seminar series to include all of the organizations involved in rangeland development. This would facilitate information exchange, research sharing, and new ideas on development (pg. 32).

11. That all three parties OEP, OSU, and USAID meet together regularly twice a month to implement activities in the remaining 12 months of the AID-supported part of the project (pg. 32).

12. That OEP immediatly furnish USAID with the collective land documentation to satisfy the present on-going CP (pg. 32).

13. That OEP repair damaged project equipment that is salvageable and prepare adequate shelter facilities for storing old and new equipment. Strong consideration should be given to ensuring spare parts availability for all new equipment to be purchased in the future (pg. 33).

Responses to the Specific Questions Raised in the Scope of Work

I. What is the effectiveness of project activities?

A. Range Management

1. To what extent have project personnel been able to identify and address production constraints on the rangelands of Central Tunisia?

The project was designed to help improve the economic welfare of Central Tunisian farmers through the use of selected interventions in rangeland improvement and management and animal production and husbandry. These interventions were to be carried out in seven gouvernorates of the semi-arid area of Central Tunisia. Average annual precipitation varies from approximately 150 mm in the southern part of the project area to approximately 400 mm in the north. In addition, as is often the case in semi-arid climates, fluctuations in annual precipitation are extreme. These fluctuations in precipitation and in forage production compound the problems of grazing land management and livestock production in semi-arid lands.

Constraints to production on Central Tunisian rangelands include: (1) The relatively low production of rangelands in the semi-arid environment, (2) The extreme yearly fluctuations in forage production, (3) The ecological deterioration of rangelands, (4) The relatively small number of adapted forage species available for rangeland revegetation, (5) The political and cultural situation which seems to limit communications between farmers and GOT officials, (6) The land tenure system which confines farmers to small land holdings and (7) The large numbers of animals per unit of land.

These constraints are being addressed with varying degrees of success by project personnel. Production constraints of low productivity and extreme annual fluctuations of forage production of rangelands are being addressed through programs of rangeland seeding, establishment of forage reserves, planting of annual forages and implementation of improved grazing land management techniques (Table I.). The ecological deterioration of rangeland is being addressed through a program of resting or deferring rangeland from grazing. The plant materials and seed production programs in the project are contributing to alleviating the problems associated with lack of adaptaed forage plants and inadequate seed supplies.

Political, cultural and land tenure problems, while recognized as constraints, are more difficult for project personnel to address directly. However, the limited extension program has contributed to better communications between farmers and GOT officials and project staff. Farmers in the project areas are becoming aware of

the project and its objectives. Even so, there seems to be a high degree of skepticism among some farmers regarding the true nature of the project and the contributions it is making to their welfare. Lines of communication within the project remain a problem. A serious effort should be made during the remainder of the project to improve and strengthen communications. This may be accomplished in part by technicians spending more time with the farmers discussing the project, its technical aspects and its objectives. The technicians need to listen carefully to the farmer during these discussions to determine his needs, desires and ideas and to feed these ideas back into the project planning and implementation. The farmer committees should be more strongly encouraged to organize themselves to manage their own rangeland resources, and project technicians need to use them more for guaging the appropriateness of project interventions. Meetings should be held in all project areas where farmers can meet with technicians, OEP and other project related people to learn about the project, its technical activities and social and economic implication. Technicians should prepare pertinant but simple bulletins explaining all aspects of the project, technical, social, and economic and distribute them to local project staff and literate farmers. In the final analyses there must be more time spent with the farmer providing him with information but more importantly getting his ideas and view points.

Major constraints of production and management of Central Tunisian rangelands have been addressed by the project. Project intervention should continue with adaptations as necessary to accommodate the harsh and variable environment.

Table 1 - Range Management Accomplishment to December 1987

(from Workplans, September 1987 to May 1988)

	No. of Beneficiaries	Hectares Sites	Hectares Reseeded	Hectares Rested	Hectares Forage Reserves	No. of Annual Forage	No. of Water Basins
1982	142	2	773.5	207	6	63.7	1
1983	259	6	1757.0	495	62	371.0	2
1984	661	14	1387.0	698	77	806.0	6
1985	1350	37	2409.5	-	786.8	831	7
1986	1618	30	1661.5	111	2002	495.5	0
1987	1339	41	1952	0	2127.2	93.7	0
Total	5369	130	9940.5	1511	5061	2600.7	16

2. What is the potential for future rangeland resseding in Central Tunisia based on the results thus far?

Rangeland reseeding should continue to be a part of the rangeland improvement and management program for Central Tunisia. However, climatic conditions and fluctuations in annual precipitation will have a strong influence on the degree of success or failure in any given year. Close attention will have to be given to species selection, site characteristics, land preparation, seeding techniques and management of established seeded species. For example there are local species, such as Dactylis, adapted to sites in this area which should be developed. Various medicago cultivars have different site adaptations, cactus is more adapted to sandy soils while Atriplix has a higher tolerance for salty soil than some other species.

Based upon progress to date it is expected that the Plant Materials and Seed Production interventions of the project will continue to successfully select adapted forage plants and produce adequate seed for planting. Even so, it will be necessary to match forage plant growth potentials and limita- tions to sites where they are to be seeded. For example, Douglas E. Johrson in his End of Tour Report recommends that Jemalong medic be planted only in areas receiving in excess of 300 mm of annual precipitation. He also points out that other medic cultivars may be adapted to areas receiving only 200-250 mm of annual precipitation.

It appears that the potential for future rangeland reseeding is high. There will always be a degree of risk in range seedings associated with the harsh environmental factors in which the seeding is being done. However, with close attention given to species selection, site selection, proper planting techniques and management of established stands, rangeland reseeding should continue to be an effective means of increasing forage production and alleviating problems of large year to year fluctuations in forage production.

Reseeding of deteriorated rangelands and establishment of permanent vegetation cover on marginal farmlands are also important aspects of the project. However, it appears that in some cases, in order to increase chances for success, better lands are being selected for reseeding. While this is understandable, it may contribute little to the longer-term objectives of the project as the farmer may plow out previously-seeded pasture species on his better land to plant wheat. Only through resolution of the constraints on the more marginal and degraded rangelands will the project be able to establish a more permanent and productive vegetative cover consistent with the original objectives of the project.

3. What is the relative economic efficiency of rangeland actions such as reseeding, ripping, planting forage reserves, resting and managing rangelands?

Doug Johnson, in his end of term report, presented economic analyses on all of the practices mentioned here except for resting and managing rangelands. Table 2. summarizes these analyses by showing the initial investment, expected annual cash flows, and the internal rate of return. In the limited amount of time available to this review, it was not possible to do a thorough economic analysis on each of these interventions. Some reasons why it would not necessarily be valid to do so become apparent when the assumptions behind Johnson's calculations are examined. Notice that there are three sets of figures for reseeding, five for cactus, and two for acacia plantation. These different sets of figures reflect different assumptions about the conditions on the site and the characteristics of the farm operator.

Some of the variables that are likely to be quite different from one site to another include labor availability, soil type and suitability, and local rainfall amounts. In addition, the ultimate value of all these rangeland improvements to the farmer is the additional forage that it produces. In other words the value actually accrues through the increased production of sheep, and since individual farmers' needs for forage varies, the value of a similar rangeland improvement could also vary from one individual to another.

The main point to be made here is that the relative economic value of these practices needs to be compared for each farmer's situation. The best approach would be to use spreadsheets, including, but not limited to, the internal rate of return calculator developed by Johnson, on a case by case basis to determine the "best" practice. This would necessitate having extension staff available, who are trained in farm management or economics, who could assist farmers in analyzing the economic impact of enterprise or production practice selection. This is probably an unrealistic goal given the large number of farmers that could potentially require such assistance.

A next best alternative might be the hiring of a short-term consultant who could at least do an in-depth analysis for each intervention for a representative or typical farmer in each of the several different ecological areas covered by the project. It would be necessary to conduct a separate analysis for varying tenure situations as well, such as private farmers, members of collectives and managers of state farms. It is estimated that such an approach might be completed over the course of one or two months by a consultant familiar with range management and farm management decision making tools.

Another point needs to be made about comparing these rather diverse kinds of rangeland management practices. Whereas the purpose of reseeding, ripping and resting of rangelands is mainly to enhance the annual, year-to-year productivity of the range, that of the

forage reserves is to provide a reservoir of emergency feedstuffs to be used in drought periods. As such they would not necessarily need to show as high an average annual return to be a useful component of a farm portfolio. A relatively low annual return, when measured over many years, might be an acceptable price that a farmer would pay to be insured against catastrophic loss in a drought year. Without the forage reserve he might have to sell off his entire flock, whereas with the reserve he would usually be able to at least keep most of the breeding herd.

Table 2 - Summary of Economic Analyses on Rangeland Interventions

	Initial Investment	Exp.Ann. Cash Flows	IRR
	($TD/Ha)	($TD/Ha)	(%)
Reseeding (Medicago)			
1. Separate Disc & Drill	50	12.75X5 yrs	8.7
2. Combined Disc & Drill	45	12.75X5 yrs	12.9
3. Separate Disc & Drill 4-year production	50	12.75X4 yrs	.8
Ripping Rangelands	95	12X10 yrs	4.5
Forage Reserves			
A.1. Cactus	121.5	-35X4 yrs 1/ 21X15 yrs	2.4
2. Cactus	121.5	-65X4 yrs 51X15 yrs	7.9
3. Cactus	121.5	-95X4 yrs 81X15 yrs	10.3
4. Cactus	121.5	-125X4 yrs 111X15 yrs	11.8
5. Cactus	121.5	-155X4 yrs 141X15 yrs	12.8
B.1. Acacia	695.1	0X4 yrs 103X15 yrs	7.7
2. Acacia	695.1	0x4 yrs 67X15 yrs	3.7

1/ Negative cash flows for the first 4 years then positive flows for the following 15 years after harvesting begins.

Recommendation:

An agricultural economist with specialization in farm management or range economics should be hired for a short-term consultancy to examine more closely the costs and returns for various rangeland management practices in the full range of ecological areas encompassed by the project.

4. How much can project activities be expected to improve the production on the rangelands?

Project activities that are expected to improve rangeland production include reseeding, establishment of forage reserves, planting annual forages and resting or deferring rangelands from grazing. The establishment of water points is intended to help with better distribution of livestock on rangeland areas and contribute to more effective utilization of rangeland forages. While all of these activities have been and will continue to be influenced by environmental factors, properly applied they will contribute to increased forage production on rangeland. This increased forage production should be accompanied by increased livestock production.

Hard data providing actual amounts of increased forage production as a result of various intervention are limited. However, some information was extracted from Johnson's End of Tour Report that provides some limited insight into the relative production of non-treated and some treated land (Table 3). For example in El Brikate, non-treated plots had an average production of 7.46 grams of dry matter per square meter (GDM/M2) as compared with 70.1 and 44.3 GDM/M2 for reseeded-and rested and reseeded-and-managed plots, respectively. While no non-treated production information was available for the other locations shown, the treated plots had production levels for various treatments that would appear to be significantly higher than would be expected on non-treated rangeland.

Our field observations and discussions indicate that medic seeded on good sites on average to good years has produced "several times" the amount of forage as was produced prior to medic seeding. The physiological and morphological characteristics of cactus allow it to utilize available moisture more effectively than most other plants. Thus, cactus plantings, once established, can contribute significantly to rangeland productivity and provide a feed source even during the drier years. Acacia and Atriplex species, once established on sites to which they are adapted, also provide high quality forage and increase rangeland productivity. Based upon field observations during this evaluation the contributions of rangeland resting to increased productivity are moot. However, given sufficient time, rest should contribute to

increased plant vigor and may allow establishment of new seedlings. Increases in rangeland productivity resulting from rest alone in this semi-arid environment will be limited and slow. Concerning the other range improvement techniques, ripping and scarification were applied during the 1982-84 period resulting in noticeable improvements in regeneration of vegetative cover. More thought should be given in the future to reinstituting these measures where appropriate.

Despite the lack of data - experience, research, and observations in other semi-arid environments around the world indicate that the project's interventions should contribute significantly to rangeland forage productivity. Treated areas could be expected to yield forage a factor of 3-5 times over untreated areas. However, the problems of low rainfall and yearly fluctuations will continue to constrain production but these impacts may be reduced by project activities.

Table 3 - Average Standing Crop Measurements
(Taken from Douglas E. Johnson, End of Tour Report)4/

Location	Treatment				
	No Treatment	Reseeded + Rested	Reseeded + Managed	Short Grazing	Seeded to Forage Barley
	GDM/M2	GDM/M2	GDM/M2	GDM/M2	GDM/M2
Brikate 1/	7.46	70.1	44.3	-	-
El Alaa 1/	-	26.9	194.3	25.9	-
Nasrallah 1/	-	77.6	-	-	-
Fosanna 2/	-	-	-	-	376.6
Kasserine 3/	-	133.9	-	-	-

1/ N = 10
2/ N = 4
3/ N = 5
4/ Data selected from end of tour report and summarized.

5. Can project actions reduce the effects of widely fluctuating annual precipitation and growing conditions, thereby contributing to the stability of agricultural production?

As indicated above, widely fluctuating annual precipitation and growing conditions are serious constraints to rangeland production and agricultural stability. The rangeland improvement and management interventions of the project are intended to reduce the effects of the wide annual fluctuations. This is being accomplished through the seeding of medic and other adapted annual

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forages, establishment of cactus. Acacia and Atriplex plantings are intended to serve a like purpose but their establishment has been less successful and more costly. Proper livestock management will allow utilization of forage growing between the rows of plants (cactus, Atriplex, Acacia) in the forage reserves thus contributing to production in normal years without damaging the forage reserve effect of the plantings.

In theory the water points should also contribute to reducing effects of the fluctuation in annual precipitation and growth. Water can be utulized as an effective tool in livestock distribution allowing more effective utilization of forages on rangeland. However, based on field observations during the evaluation, the effect of water basins appeared to be limited. This was due not to the lack of need for water but to the design, maintenance, location, and cost of the water basins observed. These factors should be given close attention by staff if further development of water points is planned.

6. How effective is the range management unit in explaining the rationale for proper range management to the farmers of Central Tunisia and enlisting their cooperation?

If the project is to be successful, the range management unit must identify problems, develop workable solutions, demonstrate their effectiveness, and then extend the information to the farmer. The range management unit has successfully identified and implemented rangeland improvement and management techniques. With regard to information exchange the evaluation team did not have the opportunity to personally observe the project staff engage in explanation or teaching activities, so our perceptions of their effectivess is based on general observations and interviews with staff and beneficiaries. Nevertheless, we feel that much educational work remains to be done. Farmers with whom we talked were generally happy with the animal health program and to some extent with the concentrate subsidy. However, there appeared to be a lack of understanding or acceptance of the rationale behind the project concept of proper range management. In some cases farmers were not accepting at all of the project's interventions. For example, in our interviews in the collective land areas of El Brikate and Kasserine-Sud, some farmers were of the opinion that they would prefer discontinuing their participation in the project, despite their initial enthusiasm. Part of the explanation for varying degrees of farmer acceptance may be the traditional independence that is a characteristic of farmers world-wide. But to some extent it also reflects a lack of sufficient communication between technical staff and farmer. The need remains for the range management unit and OEP to develop better channels of communication with the farmers, to inform them clearly about all aspects of the project, to provide them with

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simplified (but correct) information about what can be expected from the rangeland and livestock development programs. And finally to followup to ensure that the transfer of new practices takes hold. In reality, the Range Project is an "extension" project. New technologies and approaches are developed but they have little value if the farmer doesn't accept and adopt them. Thus staff must be very conscious of the educational aspect of the project. Unfortunately, there presently exists little extension training or background in the present staff. Their strengths are in production but not in the communicative aspects of development. For these reasons we would strongly encourage management and staff to establish closer links with the CTDA extension group in Kasserine. There has been major investment in upgrading the capabilities and effectiveness of that group, and they could be very useful to the RMU in setting up short-term training with field visits to observe extension techniques, and in developing an action-oriented extension plan for the project.

RMU staff can start the extension process now on their own. Several of the technical staff have received training in the U.S. and are well-equiped to do some technical writing. We would encourage staff to start writing and disseminating bulletins and reports, in Arabic, that explain the experimental results and implementation experiences obtained in the previous years of the project. These would be very informative for those project farmers who can read, and for relaying practical information on rangeland development to other institutions engaged in the same type of interventions.

RECOMMENDATION: Strong consideration should be given to hiring a short-term extension specialist (preferably local), for the duration of the next 12 months, who can train technical staff and design a long-term, applied extension program.

7. Have project personnel been adequately trained in appropriate range management methods, including the use of computers for analysis, planning, and management of the rangelands?

Project personnel have been adequately and well trained in the technical aspect of range management methods. Ten individuals have completed U.S. training in various aspects of rangeland management and sheep production. Of those, five remain with the project. Three have BS degrees and two MS degrees. In addition, short term training has been provided for other range technicians. Additional staff are now taking degree training at U.S. Universities. Most will finish before the Project's PACD. However, six students will need more time to complete their degree requirements. Recognizing the need for well-trained people to continue the work of the project, we recommend that some funding mechanism be utilized to support the completion of this training.

RECOMMENDATION: That Project funds, presently estimated between $55,000 - 70,000, be deobligated from the Rangeland Development Project, and reobligated to the Technology Transfer Project to complete the training of the remaining students.

Computers

Those technicians who have had long-term degree training in the U.S. seem to be comfortable with using the computer for word processing. To a lesser extent they also have some familiarity with spreadsheets although most of that experience seems to be using the spreadsheets developed by others. A need exists for further training of technicians in the development of spreadsheet models for data analysis and decision-making tools. This is an activity that could be helpful in the next 12 months of the project since several of the technicians already have a dgree of familiarity with spreadsheets and their use.

In the course of normal project activities, the technicians are confronted with many situations where they need to record large amounts of data--experimental plot results, lists of cooperators, records of interventions, and records of market prices and stocks are but a few examples. Relational data base programs could facilitate the organization and retrieval of these records and could be made to interact with word processing and spreadsheet programs. Development of such an integrated computer data system would be a much longer term goal than the simple spreadsheet training, however, and should be taken as the next step, probably after the AID component of the project is over. Finally, as with all computerized operations -- no matter how simple -- it is always useful to have one person in the office who is knowledgable about computer hardware, so that new programs can be more easily installed when they are purchased, and minor repairs and maintenance can be done on-site.

To develop a practical short-term training program for staff, OEP might contact the newly-established Kairouan computer representative, the CTDA in Kasserine, the Ministry of Agriculture's Agricultural Policy Implementation Project, and IRSIT's Computer Technology Project. All of these entities have past experience in training and would be useful sources of information.

RECOMMENDATION: Careful attention should be given to passing on major responsiblity and decision-making on technical matters to the project technicians. They are well trained academically and need to engage in responsible and challenging field work to fulfill their potential. We have seen other projects with training components and it's well known that returned graduates are a strong attraction for other institutions. This project is

no different. We are impressed with the quality of technical personnel and know that in the future there will be strong outside competition for their services. We feel that since the project trained these individuals, they should remain in the project at least for a few years to carry on the work here. However, at their level of capacity they must be given a commensurately high level of responsibility and decision-making authority on technical matters. Otherwise the project risks losing these individuals to other more responsible positions elsewhere. The reputation of this project, which extends beyond the borders of Tunisia, was established because of the ability of personnel to venture into new areas of technology, test ideas, and otherwise do things that other institutions wouldn't attempt.

B. Sheep Production

1. Are the extension efforts in the sheep production program effective in implementing appropriate agricultural practices?

The sheep production program contains extension activities which are designed to work with cooperating farmer, collect production information, and extend this information to other interested sheep producers. For example: the evaluation team visited with one cooperative farmer whose sheep were divided into two-20 head lots. One lot was to receive experimental rations and the other was to receive no care or ration other than that being provided to the remainder of the flock. The program was set up to follow the ewe and lamb performance from breeding through weaning. Ewes receiving experimental treatments received 2-300 grams/day of supplement N 5 for a two-month period during flushing and during laction they received 300-350 grams per day of a similar ration. Lambs were provided ration No 9 in a creep feeder. They were started at 50 grams/day when two weeks old and worked up to 200-250 grams per day at 14 weeks of age. Lamb weights were to be taken periodically and final weights taken at weaning. It is expected that lambs receiving experimental rations will weigh 15 to 20 Kg at weaning time and the non-treated lambs about 15 Kg. In addition to the experimental rations, all sheep received the same health care and other husbandry practices. It is planned that once this research is completed, information from this activity will be made available to sheep producers to show the value of adopting improved stockraising techniques.

Despite what seems to be a good research approach, some previously-completed demonstrations such as this, seem to have been unsuccessful in expanding farmer understanding of the importance of these new techniques. The reasons for this apparent lack of success are uncertain. However, it may be related in part to the small amount of time that the technicians have to spend with the farmers. Staff appear to be overextended and unable to

followup closely on their expanding operations. Also, long travel distances from Kairouan to the outlying farm areas preclude spending long periods of time with client farmers. Finally, inadequate per diem constrains technicians from remaining in the field more than one day at a time.

A stronger extension effort is essential if the project is to be successful in promoting lasting stockraising practices. Good extension programs must be built on valid information, adapted to client conditions and made available to him in an understandable and exceptable manner. We recommend as a longer-term measure that the project reassess its strategy in terms of staffing and numbers of interventions in order to develop more concentrated followup contact with farmers involved in on-going activities.

Note-- the recommendation made earlier on hiring a Range and Sheep Extension Specialist.

2. Do the activities of the sheep production program contribute to the development of a working relationship between the project and participants?

The activities of the sheep production program do contribute to the development of a working relationship between the project and its participants. Nevertheless, there are indications that this relationship is fragile due to the previously discussed lack of concentrated extension followup. All comments on extension previously made apply to this question.

3. Is the current sheep production program effective in implementing project objectives and in addressing sheep production problems?

The sheep production program is active and attempting to increase sheep production based upon improved rangeland production, use of feed supplements, forage reserves, health programs and other husbandry techniques. The major accomplishment of the sheep management program are shown in Table 4. It is noted that the program has involved over 8,000 beneficiaries. They have benefited primarily by taking advantage of health programs and feed subsidies. The degree to which the effectiveness of the program is tied to the subsidy components is uncertain but may be significant. It is also difficult to ascertain the actual relationship between sheep program per se and other aspects of the program. That is, it is difficult to determine whether the farmers are in the program to obtain the subsidies or to help achieve the broad objective of improved rangelands. The interventions of the sheep program are sound from the standpoint of sheep production and thus should be encouraged. At the same time, attention should be given to more fully integrating the

sheep production intervention with the broad project objectives. This could be accomplished in part through more extensive use of the forage calendar. This would help identify periods of forage excess and deficit. Based upon this information rangeland improvements and forage production programs could be more efficiently developed and implemented.

Table 4 - Sheep Management Accomplishments 1/

	N of Beneficiaries	N of Vaccinations	N of Animals Drenched	N of Animals Dipped	N of Rams Distributed	N of Hay Bales Distributed	Kg of Concentrate Distributed
1982	95	3,604	1,990	0	0	0	26,800
1982	871	17,741	10,743	1,175	7	390	77,360
1984	1,286	28,723	16,894	7,622	184	1,371	187,245
1985	1,700	49,962	35,416	12,257	123	0	121,390
1986	1,709	4,150	29,222	10,917	42	3,600	23,500
1987	2,507	77,064	74,202	13,522	31	0	272,300
Total	8,168	181,244	168,467	45,493	387	5,361	708,595

1/ This table from Project Workplan Sept. 1987 - May 1989.

4. Can the project effectively demonstrate that a reduction or a stabilization in animal numbers can be offset by an increase in lambing rates? Is this a realistic objective within the social constraints of Central Tunisia?

Research, experience and observation in the western world have shown conclusively that lambing rates and increased lamb weights can effectively offset reductions in ewe numbers. However, it is extremely difficult to get this concept accepted in many parts of the developing world where livestock numbers provide a high social acceptance, where the animal herd is the reserve bank account, and where it is believed that larger numbers of livestock will provide added security and likelihood of survival during periods of adversity.

During the life of this project periodic drought and low forage production have reduced the opportunities to establish and manage a forage resource upon which a program of increased sheep production with reduced ewe numbers can be realized. Compounding the problem is the land tenure problem of small holding and the high human and

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animal populations. The farmers are conservative and have little risk capital. Though the rangeland improvement and sheep production techniques of the project are aimed at increasing output while stabilizing or reducing animal numbers, to date, based upon our observations, it has not yet accomplished this objective. If accomplished at all it will require many years, a continued strong range and livestock program, and an effective extension effort.

5. To what extent are farmers involved in the decisions being made regarding the sheep program?

It appears that the farmers involvement in the sheep program decision making process is at two levels. At one level the farmers make the decisions about husbandry and management of their flock based upon their understanding of what is good for the sheep and themselves. At the project program level it appears that based upon limited observations, the farmers presently have little input to the decision process. It would appear that the program could be strengthened and intervention more effectively implemented if more emphasis was placed on involving farmers in planning and decision making.

C. Ammoniation of Straw

Is the ammoniation of straw program economcally sound?

From the perspective of the Range Management Unit of OEP, the program is able to provide this service in a cost effective manner. The total cost of ammoniating straw is .028 dinar per kg of straw treated. OEP charges large farmers (more than 500 bales) .030 dinar per kg of straw treated, which covers all costs, both variable and fixed. The service is provided to small farmers at a subsidized rate of 0.15 dinar per kg.

The analysis showed that the addition of a 20 ton supply vehicle to hawl the ammonium nitrate from Gabes to Kairouan would increase the cost to .040 dinar/kg treated. An additional 6 smaller vehicles would result in a cost of 0.38 dinar/kg.

The cost per kg of added digestible energy (UT) when the straw is treated is very low compared to the cost of buying other feeds, even subsidized barley grain. Another benefit of the HN3 treatment is addition of non-protein nitrogen, which ruman bacteria can convert to protein. The cost per kg of added crude protein (CP) is much lower than from alternative purchased feeds.

From the perspective of farmer who has not purchased the untreated straw yet, it is necessary to compare cost per unit of energy and crude protein including both the price of the straw and the cost

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of the ammoniation treatment. This analysis showed that the ammoniated straw supplied kg of energy and kg of crude protein more economically than commonly purchased roughages such as oat-vetch hay or oat hay (if the nutritional increases from ammoniation are as large as preliminary data indicate). An interesting sidelight to this analysis is that barley grain is the cheapest source of both energy and protein due to the government subsidized price.

A more detailed analysis is available in Annex I providing calculations of various scenarios of straw ammoniation activities.

Recommendation: The RMU should continue to expand the straw ammoniation project, but should examine the options for expansion very carefully to assure that it does so at the lowest possible cost. It is recommended that the project hire a short-term consultant during the last year of AID funding, who could assist in examining these options and also formulate least-cost feed models. These linear programming (LP) models could be designed to allow project staff to make purchased feed recommendations that could save farmers considerable amounts of cash. This could be particularly important in an agricultural economy that is relatively cash poor. It is estimated that this activity could be completed in about a month by either an animal nutritionist who is familiar with least-cost LP models, or an agricultural economist that works extensively with livestock. There are models available in the United States that are standardized for various types of livestock, but they may need to be customized for the unique feeds available in Tunisia--both purchased and farm produced.

2. How effective have project technicians been in providing the ammoniation service to farmers that request treatment?

During the evaluation, project technicians maintained that the demand for straw treatment was continually growing. In table 5 however, it is apparent that the tons actually treated has been declining, except that there has been a recovery in 1988. There have admittedly been several technical problems. Ammonia was difficult to obtain in one year, and last year breakdowns incapacitated one of the vehicles for quite a long time. The mechanical difficulties have been partially overcome by only filling the tanks to about 75 to 80% capacity, but that increases costs and reduces efficiency.

In the future increased attention will have to be paid to maintenance of the ammoniation equipment, and if the fleet of portable application rigs is expanded, the project should assure that they buy equipment for which service and spare parts is readily available. The planned addition of a large capacity supply tank rig should reduce the amount of down time for empty application vehicles and also reduce the time spent driving to Gabes to pick up ammonia.

Table 5 - Tons of Straw Treated with Anhydrous Ammonia by Projet Parcours, 1985-1988

Year	Tons of Straw
1985	1600 MT
1986	1200 MT
1987	1142 MT
1988	1500 MT (preliminary Estimate)

3. How well does this ammoniation program integrate with other project activities and promote overall project goals?

Because this program provides a high quality roughage at a reasonable price, it fits in well with the other project activities and promotes the overall goal of the project. By using the treated straw, farmers can cut back on hay, which is relatively expensive, in the summer, late fall dry period. This feedstuff is probably more appropriate in the central and northern parts of the project area than in the south since these areas are closer to the straw production areas in the north. As previously mentioned, it may be possible to economize on feed even further by utilizing least cost feed formulation models that would allow farmers to take advantage of short-term fluctuations in relative feed prices. It may be possible, for example to increase the utilization of barley, which is relatively cheap for its concentrated nutritional value, and increase the use of cactus in periods when it is not traditionally used.

4. Does ammoniation of straw increase the grazing pressures on rangelands by encouraging farmers to maintain larger flocks throughout the late summer-fall dry season?

At this time, the amount of straw that is ammoniated is such a small proportion of the total amount of straw fed that it is hard to imagine it could increase grazing pressure by encouraging farmers to maintain larger flocks throughout the late summer-fall dry season. Usually by the time farmers start to feed treated straw, there is little forage left to be grazed anyway.

5. Does this ammoniation program promote stability in sheep prices and production levels across years and can it be expected to increase stability in the future?

The availability of treated straw has more value as a mechanism for getting through the normal, late summer, early fall dry season than it does for helping to survive drought years. The main justification for this statement is, again, that the amount available is just a drop in the bucket compared to the entire

amount of roughage and forage consumed in the project area. It is hard to imagine that the RMU will ever have enough staff or equipment to have a large aggregate impact with this program compared to what they might have with the forage reserve program.

D. Plant Materials Development

1. Are the proper species of plants being developed for Tunisian needs? What are the productive potentials for these plants growing under Tunisian range conditions?

In general the plant materials being propogated and introduced to farmers by the project are appropriate for the needs of the Tunisian rangeland farmer. Many plant species have the potential of increasing forage production by 3 to 4 times over present output. However, there are a host of contraints to achievement of these gains that can only be solved by good research. Much research has already been conducted by the project in the past six years concerning selection and testing of plant species. This has yielded valuable information on productivity, nutritional values, and climactic/soil requirements. This research and the subsequent propogation of the most promising species needs to be continued with further emphasis on native plants. Atriplex halimus apart, only a limited number of native species have been used to date in project areas. We would recommend looking into more use of Artimisia herba alba and Periploca leavigata for heavily degraded areas, such as El Brikate area, instead of the Agropyrum ssp and Dactylis ssp that was planted.

We would encourage a stronger effort be made in the "assessment" of the success rate of planted species under varying conditions, so that technicians can more efficiently tailor particular species to appropriate climactic and ecological areas. For example, Medicago arborea is a very good forage crop but its use should be promoted in areas receiving more than 350 mm/yr of rain. Acacia cyanophylla is more appropriate for the more arid regions of 200 mm/yr precipatation while Atriplexe is a hardy plant that can thrive in the harsher areas.

There is much to learn in this discipline and we would recommend that project technicians develop closer ties with the numerous institutions involved in plant materials development (which include, the FAO RAB Project, the Arid Lands Institute, INRAT, INRF, the MAB Program, the Sedjnane Project, ODS, ICARDA, and ACSAD, among others) to learn more about the types of plants they are using in their activities. There is also much that can be learned by subscribing to information services, such as the regional documentation network established by the RAB Project through the CNDA in Tunisia, Algeria and Morocco, the JORDOC network in Jordan, and the worldwide CARIS network. This is a

quick and efficient way to get up-to-date information on plant materials research being successfully conducted in neighboring projects and countries.

2. Is the plant material strategy technologically feasible and based on sound scientific principles?

An overall view of what the project has accomplished and what its present strategy is leads us to answer yes to this question. However, there does need to be a more rigorous scientific approach to the plant materials research with much more attention to data collection and analysis and the development of a more thorough development strategy. For example, technicians are not fully knowledgeable about production data, nutritional quality, or potential uses of some of some of the fodder shrubs they are introducing. This type of "homework" must be done if plant material development is to take the most efficient and productive course.

Beyond this we would suggest the technical staff explore the technology of direct seeding of palatable, native fodder shrubs, such as Periploca leavigata and Helianthemum spp. It is much less costly than the nursery development, transplanting and irrigation that is presently done and has been proven technically-feasible in semi-arid areas similar to Tunisia. Short visits to Syria and Libya where this technology has been applied could be very useful in expanding the technical horizons of the staff and in further refining the project's plant materials development strategy.

3. Are project goals for the plant materials unit reasonable? Do Tunisan counterparts and staff have sufficient expertise to ensure a continuation of the program after the project (AID-supported portion) has ended?

The general goal of the plant materials program is to increase forage output in the project area. Beyond this there does not seem to be more specific interim objectives leading to achievement of this longer-term, overall goal. It's important to establish this specificity so that activities can be more efficiently tailored toward achievement of defined targets and progress can be adequately measured.

On the question of technical expertise, it appears that the project staff have the technical capacity to continue the plant materials activities after the AID support has been completed. This capacity will be significantly increased after the return of trainees presently studying in the U.S. is completed so that the program should be able to be competently implemented on a long-term basis.

E. Seed Production

1. Can this program be expected to provide adequate quantities of adapted seed at a reasonable cost of production?

Yes, locally-produced seeds are significantly cheaper than imported varieties, especially considering the importance of foreign exchange. Imported seed costs are enormous and any program which can offset these will make significant contributions to the economy. It should be noted that local seed costs are still relatively high for some species and that only through economies of scale in production and more efficient cleaning will costs start to drop.

We would like to comment on the selection of pastoral seed types for the production program. We feel more emphasis should be given to the collection of more native species from the different ecological sectors of the country. The project should engage in small-scale collection and multiplication of foundation seeds. Species such as, Artemisia herba-alba, Stipa lagascae, Stipa parviflora, Argyrolobium uniflorum, Periploca leavigata, Lolium rigidum, Plantago albicans, Echiochilon fruticosum and Vicia spp. should be sought out. They are very adaptable to arid lands and could enhance the effectiveness of the reseeding program.

As a longer term measure the project might want to consider establishing field centers in the three broad ecological areas of the country where it can collaborate with local organizations doing pastoral seed selection research. These centers might be located in the north linked to the Sedjnane Project and Tabarka Pastoralism School; in the central part with the Forestry Department and the different "Offices de Developpement", and in the south with the IRA, the Forestry Department and the ODS.

2. Does the program effectively integrate with GOT projects to promote attainment of GOT goals for seed production?

Overall GOT goals in seed production are to lessen the foreign exchange costs, provide adapted seeds to farmers in the quantities demanded, and to expedite the shipment of seeds to the farm on a timely basis. The strategy of the project if fully supported and implemented properly over the long term, will provide support to all of these objectives. However, to hasten this process, the project should further enforce its coordination and linkage with other entities involved in plant materials development, such as the Projet PAB and the IRA. Its linkage to GRAPOUFAST has strong potential for significant paybacks and this association needs to be supported on a long-term basis.

Some discussion is necessary at this point on the project's relationship with GRAPOUFAST. We feel from our knowledge of the institution that GRAPOUFAST can make a significant contribution to the project's objectives in seed multiplication and preparation. This working relationship needs to be encouraged. There is the question of the project providing seed cleaning equipment for GRAPOUFAST which we have examined in limited detail. There does appear to be a need to improve the efficiency of present seed-cleaning operations which is being done with very old equipment. The project provision of three machines, as proposed by the OSU Seed Production Advisor, bears merit. If the project intends to give strong support to the seed production program, as we think it should, then the purchase of this equipment would provide benefits to the project of a long-term nature.

There is some discussion of whether GRAPOUFAST will soon be privatised thus making the project's equipment donation to a private organization questionable. Our discussions with the GRAPOUFAST Director do not lead us to believe that this will happen anytime in the near future. Nevertheless, this is an issue beyond the scope of the team that must be decided upon between USAID and OEF.

Finally, if equipment is purchased then accute attention must be paid to its compatibility with existing and future GRAPOUFAST seed cleaning equipment, access to spare parts, and maintenance service. With the information we have gathered we do not feel that there are U.S. firms that can provide the required equipment while fulfilling these other criteria.

Recommendation: That the project follow through with the purchase of the three seed-cleaning machines for GRAPOUFAST (estimated cost $75,000), and if further research leads to the conclusion that no U.S. manufacturer can provide equipment satifying compatibility, spare parts and maintenance criteria, then a source/origin waiver should be issued to purchase non-US.

3. Have Tunisian personnel been trained in appropriate seed production techniques and do they have the skill level necessary to continue the project after AID assistance has ended?

At present the technical capabilities in seed production techniques appear adequate, however, there should be some further orientation to the climactic/environmental requirements of various seed species. Once the program is expanded and the project is producing seed above its present minimum levels, at least two technicians should receive training in storing techniques, harvesting methods, and new propogation technology. Beyond this, project personnel should be able to carry on the program at a competent level after the AID support portion has ended.

II. What is the projected economic impact of the project?

The logical approach taken in the original Project Paper's Economic Analysis strikes us as being basically sound, but the conclusions the author reached seem wildly overoptimistic. The assumptions made regarding improvements in management of the sheep flock have not been nearly approached. Unfortunately we have to base this conclusion on gut feel as there was not sufficient time within this short evaluation period to collect any real data on lambing rates, percentages of lambs sold versus retained for breeding, selling weights or market premiums for larger or higher quality lambs. The analyst assumed that by the fifth year of the project, lambing rates would increase from 40 to 95%, that the number of head would decrease by 60% and and that the selling weight would increase from 19 to 29 kg. Our experience would suggest that the lambing rate may have increased to 60 or 70% and that numbers would not decrease because that was socially untenable. We had no information on selling weight increases. Unfortunately, these revised performance figures, or lack of data on them, casts serious doubt upon the subsequent internal rate of return calculations. Another serious shortcoming in the analysis is that no allowance was made for reductions in performance during drought years, which past experience indicates occur with approximately 33% probability.

We did not have time to verify the assumptions made about numbers of sites or numbers of participants per site. Even if they are reasonably accurate however, we think the analysis is overly optimistic about the degree to which gains will be maintained after the end of AID involvement. There is an implicit assumption that farmers will continue to buy concentrates in the same amounts after the participation subsidies are withdrawn. Our conversations with the farmers at El Briket seem to refute this.

These criticisms notwithstanding, the methodology employed seems satisfactory. In order to apply it however, it will be necessary to expend considerably more effort in surveying farmers to ascertain their performance in sheep production, and to more carefully assess both historic and anticipated future levels of project cooperation. This is simply beyond the time frame that we have available to evaluate this project. I would recommend that if a detailed economic analysis of impact is needed, then a 4 week TDY of an experienced agricultural economist will probably be required to do a worthwhile job.

III. What is the impact of project activities on local farming systems?

This project has introduced several production practices that are new to Central Tunisia--options that local farmers have never

considered before. They now have a much larger number of technically feasible alternatives. This is a mixed blessing for a farmer with limited analytical skills. They are probably quite adept at considering and deciding among the traditional options but they do not have enough information to evaluate the new practices on an equal basis. In addition to weighing the potential physical consequences of adopting new practices, they should also be aware of the economic consequences.

As the project's practices become more widely adopted, there will be larger supplies of several existing forages (e.g. cactus pads, acacia leaves) but there are also new ones that were never available before (ammoniated straw). Some of these forages will eventually findtheir way into either the cash commodity market or there will be opportunities to lease grazing rights on other owners' lands. This situation lends support to the earlier recommendation for developing economics and sociology capabilities on the RMU staff, or for working more closely with extension staff from other agencies that may be better prepared to address such issues.

IV. What are the social ramifications of this project?

In such a short time period as this evaluation it is not possible to do an in-depth social analysis of this project. We could only do surface observations of various situations existing on collective and private lands, and then through interviews with staff and participant farmers try to ascertain whether in fact the project had some impact on the social fabric of the community.

The project has now been on-going for six years and has intervened in range/farmland in seven gouvernorats. Its land development and animal health programs have been introduced and tested with several thousand participants. While the extent of this program of intervention might appear to be significant, real social impact appears limited. With the few private farmers whom we observed and interviewed, there seemed to be a general acceptance of the program and its message. When asked if they would continue to apply land development and animal health techniques after project assistance ended, most answered affirmatively. Whether in fact they would, remains to be seen. We did not have the opportunity to talk with participants who have continued to apply improved agricultural techniques after leaving the project. We were not able to find data during our limited evaluation that would indicate significant changes in income levels as a result of the project's interventions. Nevertheless, for most private farmers, our very limited impression is that project activities form a small part of their economic activities. Thus it's difficult to imagine that there has been more than marginal social change in their lives.

On the collective lands there is a different story to tell. We were only able to visit two (El Brikate and Kasserine Sud) of the several collective land areas, but our interviews with several farmers in both areas indicate major disatisfaction with the program as it is presently structured. The problems are complex but center on the restrictions to grazing. Significant progress has been made by the project in revegetating these degraded lands and farmers seemed genuinely aware of the project's positive impact. But now it is perceived that after several years, participants should be able to reap what they have produced. Unfortunately, both areas are passing into a transition phase where OEP's land development job is winding down and responsibility for management of the community resources is passing on to the Forestry Service. Administratively, Forestry has not yet formally accepted this responsibility so neither organization is actively managing the land, except for preventing grazing until the outstanding administrative arrangements are settled. (See further discussion of this administrative issue in section VII). The net result is that farmers, in this very serious drought year, cannot graze their animals, and at the same time have no access to the project's subsidized concentrate activity which is terminated. There are no alternatives for them except to sell all of their sheep. In summary, the project's impact on these collective land inhabitants is socially untenable and is causing major economic disruption in their lives.

From the organizational standpoint the project has also had little impact on the farmers. It was originally proposed that local committees would be organized and strengthened so that they would have the capacity to manage their own communal range resources. Unfortunately, this development was not aggressively supported and local organizations existed only on paper. If this development had taken place then the present situation would have been mitigated because OEP would probably have allowed self-management of the grazing lands.

We now come to the present situation where the project risks losing all of the "good will" that it has generated in the past by its successful reseeding/planting activities. Farmer households are experiencing hardship that is unnecessary.

Recommendation: That OEP take immediate steps to alleviate the situation existing in the collective lands by opening up and managing the grazing of forage, and if deficits exist then reintroducing its subsidized concentrate program to help farmers through this difficult year.

Intervention in collective lands is a complex undertaking. It requires a comprehensive understanding of the community and its social mores. Project staff simply do not have this type of

training and background that can enable them to successfully undertake this long-term task. Ultimately, the goal should be to prepare the community to manage its own resources in an environmentally and economically-sustainable manner. But unless staff are intellectually equipped to develop local capacity, then interventions will be short-lived. We have queried staff and others for recommendations on how to resolve problems encountered in developing collective lands. The responses have pointed out a critical need for the services of a sociologist to augment the capabilities of the project staff. We would enthusiastically support this idea. A trained sociologist could provide technicians with a new perspective in interacting with local communities, while providing valuable guidance in how to effectively implement technical interventions. At the same time, this individual can start the process of developing local community management capabilities so that farmers can have a say in utilizing their own resources.

Recommendation: That the project hire a local sociologist with strong experience in community organization who will train staff in communication techniques; design and implement a program of organization/development of the local community management committees; and conduct appropriate research in advance of future project interventions. This should be done during the next 12 months through the project's TA budget.

On a longer-term basis we would strongly encourage the project to retain this sociologist as a permanent member of the staff. The sociological unit of the CTDA in Kasserine has been very successful in developing local community organizations under the AID-assisted Potable Water Project. Their experience could provide staff with important information on successful social interventions and development approaches.

Recommendation: That OEP staff coordinate with the CTDA sociological unit and make field trips to potable water sites to observe community resource management in action.

A more detailed social impact discussion in french is found in Annex III.

Lessons Learned

The farmer must be fully involved in the planning, decision making process and implementation of the project. The ultimate success of the project is dependent upon him. He is the one who must carry out the activities upon which increased production from land and livestock are dependent. Without the farmer's full involvement some project interventions may be carried out, people may be trained and commodities purchases, but the main objective of increasing productivity of the land and the economic welfare of the farmer will not have been realized.

V. To what extent does the ultimate success of this project depend upon or relate to integration with other AID and GOT programs?

The project is linked to a number of institutions in implementing its activities. This linkage is essential to the successful achievement of project objectives. For example, the extensive cactus planting activity has been done in association with the Projet PAM. This joint activity has resulted in larger areas of plantations than could have been achieved singly.

Research is an integral component of any successful rangeland development program. There are no easy solutions to regenerating degraded arid lands. Finding answers requires patient testing of plant materials in various ecosystems. It requires new approaches and ideas. There are numerous institutions conducting this research and no one group has a monopoly on the technology. The Range Project has to maintain its links to these other organizations to access new research and information if it is to achieve lasting solutions in Central Tunisia.

The Range Project was conceived as one of several other activities falling under the CTRD "umbrella" project. Designers envisioned close coordination between the project staff and the CTDA in Kasserine. This linkage never really developed and in the 1984 project redesign was dropped. Although not critical for the project in terms of its success, ties to the CTDA could be extremely beneficial. It has a well-developed extension service which could assist OEP staff in upgrading its capability in this area. It has also established the sociological unit under the Potable Water Project which could be extremely beneficial to the project as it moves ahead in developing community management of collective lands.

VI. To what extent have on-the-job training and short-term participant training contributed to developing a Range Management Unit that will provide continuing technical assistance to the farmers in Central Tunisia? Is the long-term training being provided adequate and is it focused on the appropriate subject matter in order to provide the necessary senior staff for future rangeland development in Tunisia?

This question was essentially answered earlier in the Range Development and Plant Materials sections. Training has been one of the major components of the project. It has been highly successful in leading to the development of a competent and dedicated Range Management Unit. Long-term training did focus on appropriate disciplines for the most part. There were some deficiencies -- notably, agricultural economics, extension and rural sociology. These can be covered by accessing such skills

from other local institutions. Short-term training has been valuable in providing updated information on technologies and "filling in" the learning gaps. On-the-job training has been an essential complement to the academic side, resulting in a well educated staff. We already made the point that we were impressed with staff skills and warned of a competition from other institutions for their services. We would however, recommend that technicians be given more decision-making responsibility on technical matters. This is important in fully developing the potential of these otherwise very competent technicians. In short, there is a competent staff in place that is capably implementing the project and will continue to do so in the future.

VII. Other Points of Discussion

A. Collective Lands Mangement

The problem of the collective lands referred to previously in the social analysis section was not originally forseen in the project paper. This project design envisioned having the Forestry Service as the managers of the collective land resources after OEP had finished the development of appropriate forage reserves. It was expected however, that the local farmer committees with the partial assistance of OEP would in fact do the actual management, with Forestry in the background as an legal authority that could limit land degradation in those rare cases that the local management concept failed. In fact, it has not turned out that way. The local committees were never really developed. OEP started and finished its development activities without the participation of the Forestry Service, then turned over management to the Forestry Service which has balked at accepting this responsibility. The farmer is caught in between.

In hindsight it becomes very obvious that first and foremost, no long-term development can take place unless farmers are involved in the process from the first day and everyday thereafter. They must be organized and trained in such situations to accept final responsibility for the sustainable management of their own resources. To undertake this type of "community development" requires a plan, technicians with backgrounds in sociology and extension, and a commitment from the community.

Secondly, this process of transferring management responsibility from one government agency to another -- agencies with totally different development philosophies -- is bound to fail unless there is full agreement on the issues from day one and close coordination thereafter. Forestry's non-involvement in the production development phase early on in the project meant it was not sensitized to the development dynamics that were taking place in the previous years. It would have been very difficult for it

so late in the game to assume a community-oriented management role, especially given its resource-oriented philosophy. Any future intervention contemplated for the future must be "joint ventures" with all parties involved equally from the start. This does not guarantee success, but it is a necessary condition given the present administrative arrangement between OEP and Forestry.

For the longer term we would urge OEP to rethink this administrative arrangement with the Forestry Service. Farmers that we interviewed were extremely critical of this organization. Farmers felt that Forestry involvement meant loss of ownership to the land. In fact, this is what has indirectly happened in El Brikate and Kasserine Sud. Before the project intervention, farmers were free to graze the collective lands at will. Now they are effectively restricted from using land that once was theirs.

Given this administrative system was a particular development of the project and the fact there are many collective lands not managed by the Forestry Service, we feel the OEP should do away with this arrangement and work directly with the collective land farmers on a long-term basis. OEP's rangeland development strategy is "people-oriented" and if the project can upgrade its community development capacity, the project should achieve more success in the future.

B. Linkages

Much has already been said about the importance of linkages with other organizations in information exchange. One way to promote this is to organize "seminars on rangeland development" to discuss ideas, present research and implementation results, and basically share information. There is much to learn on the subject and an informal setting can lead to communication that might not be effected in formal meetings.

One idea that came out of our interviews with those doing rangeland work was the need for a coordinated national strategy on rangeland development in Tunisia. Presently, there are various organizations, each with their particular agenda, and no one really coordinating efforts. A national range development strategy that defined the country's objectives and how it wished to achieve them would provide the framework within which all organizations could concentrate their efforts. It would be a much more efficient and productive approach than what is presently being attempted. In this regard, the seminar idea previously mentioned would be an ideal venue for rangeland specialists to start the process of developing a strategy. Under the project's direction, output from the seminar could be fed to OEP central for policy consideration.

Recommendation: That the project staff organize a quarterly seminar series to include all of the organizations involved in rangeland development. This would facilitate information exchange, research sharing, and new ideas on development.

C. Communication

There is one year left of AID project assistance and in that time a number of important activities to implement. Successful achievement will require close coordination and communication among all three implementing parties -- OEP, OSU and USAID. The only way this can be done is if the three meet together on a regular basis to assign responsibilities and coordinate implementation. We would strongly recommend:

Recommendation: That all three parties OEP, OSU, and USAID meet together regularly twice a month to implement activities in the remaining 12 months of the AID-supported part of the project.

D. Conditions Precedent

The project has an on-going CP on collective land interventions. According to the CP requirement in the Project Agreement, AID must be presented with formal documentation that shows there are no outstanding tenure problems on the collective lands and that the Directorat of Forestry has assumed management authority of these areas. From a legal standpoint this documentation is very important for both AID and the GOT. We understand that an on-going CP remains to be fulfilled on two of the collective land areas in which the project has intervened (El Brikete and Kasserine Sud). We have talked with OEP and they have shown us the documentation and given assurances that this will be passed to USAID immediatly.

Recommendation: That OEP furnish USAID with the collective land documentation to satisfy the present on-going CP. This should be completed immediatly.

E. Commodities

The project is in possession of a large amount of equipment, some of it noticeably in disrepair. There is also a lack of adequate protective facilities. Since the project is contemplating future procurement of a substantial amount of new equipment we feel it incumbent that existing problems be rectified in advance of new equipment arrival.

First, an inventory should be made of all present equipment, noting those items in disrepair. Priority should be given to repairing them so that they can be of use in project activities.

(If spare parts problems exist and cannot be resolved, this should be taken into account before purchasing new equipment).

Second, a roof should be put on the storage shed at Jebibina. Our inspection revealed significant rust damage to equipment there. The project has made a significant investment in equipment and it should be preserved for long-term use. Additionally, OEP should make the necessary preparations to ensure that there will be adequate protective facilities for the new equipment that the project is ordering.

Finally, spare parts must be a primary consideration in the procurement of all new equipment. We as well as project personnel have all had prior experiences with unusable equipment due to spare parts unavailability. We would just reinforce the point that this is a problem to minimize in the future.

Recommendation: That OEP repair damaged project equipment that is salvageable and prepare adequate shelter facilities for storing old and new equipment. Strong consideration should be given to ensuring spare parts availability for all new equipment to be purchased in the future.

F. Continuation of this Rangeland Program

The semi-arid regions of Tunisia form much of the country's land mass and contains the majority of the poorer elements of the society. A major investment has already been made by the GOT and AID to implement a rangeland development program to address the needs of this target population. However, the constraints to development are complex and require a long-term commitment to be resolved. We would strongly urge the GOT to maintain this commitment and support continuation of this project after AID assistance has ended. For AID we point up this project as worthy of continued support if the Mission's tight funding constraints are reduced in the future.

ANNEX I

AMMONIATION OF STRAW PROGRAM

The question raised in the Scope of Work for the Evaluation is, "Is the Ammoniation of Straw Program Economically Sound?" In answering that question the analyst must immediately ask another question, "Economically sound for whom?"

The first perspective is that of the Range Management Unit of OEP. It is providing a service to Tunisian farmers and although profitability is not a motive, it should be providing that service in a cost-effective manner. Their objective is to provide a low cost, high quality forage to small farmers to help them get their flocks through the normal, late-summer, early-fall dry period. At present the cost of ammoniation is subsidized for small farmers but the rate charged to larger farmers is supposed to cover the cost of providing the service. An accurate analysis of the costs of providing the ammoniation service can assist the RMU in determining the charge necessary to cover costs. Also of interest from the provider's side is whether there would be an economic incentive for private operators to begin offering the straw ammoniation service. Apparently one such operator is already in business. A spreadsheet model was devised which will calculate the costs of providing the ammoniation service under a variety of different scenarios of equipment available and geographical coverage of the service.

Another perspective is whether the ammoniation program is economically sound from the farmer's point of view. While ideally the cost of ammoniated straw should be compared with the cost of providing all alternative feeds, including on-farm grown forage, time did not permit such a detailed analysis. Instead, the cost of the ammoniated straw will be compared with the cost of other feedstuffs that might alternatively be purchased to carry the flock through the dry season.

Provider's Perspective. Table 1 shows the spreadsheet model that was devised to calculate the cost of providing the ammoniation service. We begin by describing the attributes of the straw to be treated and the amount of improvement in nutritional quality that results from the treatment. Also included in this section is the cost of the basic material components that the RMU must purchase to treat the straw.

The next section of the table lists the attributes of the portable ammoniation units--the small trucks that technicians actually take to the farms. At the present time the RMU has

two such units, one with a capacity of approximately one metric ton of NH3, the other with a capacity of two tons. In order to simplify the model, the performance data used was an average of that for the two vehicles. If the program is to expand in the future, it will likely settle on a fleet of identical or standard-sized units. This simplification may have introduced some error into the analysis, but it should be relatively small compared to that resulting from "educated guessing" at some of the other cost parameters.

The third section of the table lists attributes of a supply vehicle that makes the trip from Kairouan to Gabes to pick up the anhydrous ammonia. Presently the RMU does not have a separate supply vehicle. The portable units must each travel all the way south to Gabes--a distance of 440 km round trip--whenever they are empty. The model could accomodate this by using the same attributes for the supply unit as were used for the portable units. Note that zeros were entered for purchase, repair, insurance, and opportunity (interest) costs so that fixed costs for the supply vehicles would not be counted twice. The RMU has already ordered a 20 ton tank that will be mounted on a tractor-trailer rig to be used as a supply vehicle. When that vehicle is available, it will make the supply run to Gabes on a much less frequent basis and the portable units will only need to drive back to Kairouan for refilling. This will entail a large saving in technician time. A question that needs to be addressed is whether it will save money.

The last section of the table shows the costs which have been calculated for providing the ammoniation service. Variable costs include ammonia, plastic film for covering the stack, fuel for the trucks, and repairs. Fixed costs include depreciation, interest, insurance and labor. Labor was included under the fixed cost catagory on the assumption that the technicians and drivers would be employed by OEP whether there was an ammoniation project or not. Costs are given per ton of straw, per kg of straw, per kg of added digestible energy (UF), and per kg of added crude protein. The latter two cost calculations are of interest since one of the benefits of ammoniation is that it supposedly increases not only the palatability of the feed, but also the energy and protein content (or more accurately, it adds nonprotein nitrogen which rumen bacteria can convert into protein). Since the RMU will be charging farmers only enough to cover the cost of providing the service, it will be interesting to compare these costs to the cost per unit of nutrient of various feeds in the next section.

It is interesting to note that using (for the most part) independently gathered data, this analysis calculated a cost of 28 millimes per kg of treated straw for the operation as it is currently organized. This is very close to the figure of 30 millimes calculated by Johnson. The largest components of this cost are for the ammonia, which doesn't vary on a per unit basis with the amount applied, and fuel.

The cost of per additional UF is .104 Dinar which compares very favorably with the cost of a Kg of UF in barley grain (.106 Dinar at the drought emergency price or .128 Dinar at the normal price). The cost of the added crude protein is .444 Dinar/kg which is, as will be shown later, inexpensive compared to other sources of additional protein. This assumes that the UF value of the straw increases from .2 to .5, and that the CP value increases from .04 to .11 as a result of the treatment. If we lower our expectation of feed value improvement--to an increase to .35 UF and to .7 CP--the cost of an additional kg of UF increases to .207 Dinar and the cost of an additional kg of CP rises to 1.036 Dinar.

Two additional scenarios were examined. In the first--shown in table 2--the planned purchase of a 20 T supply truck was factored in. The cost of treatment increases to 40 millemes per kg of treated straw. Although labor costs decreased, depreciation and interest cost increases more than offset the savings. It should be mentioned however that the labor charge used in the analysis was simply the wage rate ofthe technician and drivers. The RMU may decide that the labor saved is worth more to the overall program than the additional cost.

In the second scenario--shown in table 3--the effects of expanding the fleet of portable units to 6 trucks was examined. It was assumed that this would go along with a significant expansion of the ammoniation program. These trucks could be based in other gouvernorats to further reduce the amount of travel time for technicians and drivers. With these assumptions, the cost of providing the service came back down somewhat to 38 millemes per kg.

From this preliminary analysis there does not appear to be tremendous potential for profitability for private vendors to provide this service, at least at a price of 30 millemes per kg.

Farmer's Perspective. In table 4 the costs per kg of digestible energy (UF) are compared for commonly available feedstuffs in Central Tunisia. Several traditional feedstuffs such as olive and acacia clippings are excluded from this and the following table because the market for them is less organized, and the units in which they are sold (wagonload or

pickup truck load) is somewhat vague. Those that are included are usually readily available in centralized cash markets.

Using the low price estimates, if we accept that digestible energy will increase from .2 to .5 UF/kg, the cost per kg of UF for treated straw is lower than for any of the other forages in the table. The only feeds that have a lower cost per unit are concentrates--barley, wheat bran and mixed concentrate. While it would be tempting to recommend that farmers should therefore feed more concentrates to satisfy the energy requirements, one must keep in mind that ruminants require roughage in their diet. If the more conservative estimate of increase (from .2 to .35 UF) is used, treated straw becomes more expensive for energy than oat-vetch hay which is the other common purchased roughage. It also exceeds the cost of cactus pads on a UF basis. According to project technicians, cactus is usually limited to only half of the diet in order to maintain body condition. Thus it appears that ammoniated straw is an attractive roughage if the digestibility increase is as substantial as is claimed.

Using the higher price estimates--which would be more in line with drought conditions--alfalfa pellets is the only roughage that is cheaper per UF than ammoniated straw (again, using the high improvement assumption). It is doubtful that they are available in any great supply. With the low improvement assumption, oat-vetch hay is again more economical.

In table 5 there is a similar analysis for cost per unit of crude protein in the feed. Using the low price, high improvement assumption, ammoniated straw is not the cheapest protein supplying roughage but it is quite competitive with alfalfa pellets, which as previously mentioned are only available in limited supply. What is surprising, is that barley grain is actually among the cheapest sources of protein, just as it was the cheapest source of energy. This is largely due to the fact that the Tunisian government controls the price of barley (and other concentrates) at a below-market level. Another way of looking at the situation is that hay is a comparatively expensive source of both protein and energy. It is left to the reader to peruse the shifts in relative cost for the other three sets of price and nutritional improvement assumptions. Again, the comparative economy of the treated straw relies on the assumption of nutritional improvement.

Due to the importance of this assumption, it might be advisable for the project to do some more lab testing of treated straw, and perhaps conduct some small scale, tightly controlled feeding trials to verify the nutritional benefits.

Another important point needs to be brought out here. Although this analysis used only two price scenarios--one where they were all low and in the other they were all high--prices are not perfectly correlated. The relative price advantage could shift from year to year, from one region to another, and even change during the year. In addition, the basic nutritional requirements of the sheep flock change substantially during the year depending on stages of gestation and lactation (Johnson, et. al, 1988). It seems highly probable to this analyst that potential exists for economizing on feed costs by taking advantage of relative price movements.

Table 1 - Costs of Providing Straw Treatment: Current System

Ministry of Agriculture	Bart Eleveld
Office of Livestock and Pastures	Agricultural & Resource
Projet Parcours	Economics Department
Kairouan, Tunisia	Oregon State University

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Estimation of the Cost of Providing Ammoniated Straw to Farmers
Costs are calculated on the following bases:

- per ton of straw
- per kg of straw
- per kg of added forage units (UF)
- per kg of added crude protein (CP)

Go to cell A68 for summary table

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Attributes of Straw and Treatment	
Kg NH3/Kg Straw	.03
% Dry Matter (DM)	90
Forage Units per kg of DM--untreated	.2
Forage Units per kg of DM--treated	.5
Crude protein in untr. straw (%CP)	4
Crude protein in treated straw (%CP)	11
Cost of NH3 (D per T of NH3)	257
Cost of plastic (D per T straw)	.9

Attributes of Portable NH3 Units	
Capacity of portable NH3 units (T)	1.5
Number of portable NH3 units	2
Ave. round trip dist. (km)	200
Number of ammoniation trips per year	30
Straw treated per trip (T)	24
Maximum tons allowed by cap.	50.0
Total NH3 applied per unit (T)	21.6
Straw treated per unit (T)	720
Total straw treated, all units (T)	1440

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Ave. length of fill-up trip (km)	0
No. of treatment trips per fill	2.1
Fuel cons. of unit in km/l	5.8
Fuel price (D per l)	2.7
Total fuel use per unit (l)	1034
Man months of labor per unit	14
Wage rate of operator (D/mo.)	200
Purchase cost of portable unit	20000
Expected life of portable unit (yrs)	8
Lifetime repair cost (% of P. P.)	75
Annual repair cost per unit (D)	1875
Insurance cost per year (D)	230
Opportunity int. rate on inv.(%)	5

Attributes of Supply Unit

Capacity (T)	1.5
Dist. of supply trip (km rd. trip)	440
No. trips needed per year	28.8
Fuel consumption rate (km/l)	5.8
Fuel price (D per l)	2.7
Total fuel use for supply unit (l)	2185
Man months of labor	4
Wage rate of operator (D/mo.)	200
Purchase cost (D)	0
Expected life of supply unit (yrs)	10
Lifetime repair cost (% of P. P.)	75
Annual repair cost (D)	0
Insurance cost per year (D)	0
Opportunity int. rate on inv.(%)	5

Costs of Ammonia Program (All figures in Dinars)

	Total	per ton straw	per kg straw	per kg added UF	per kg added CP
Ammonia	11102	7.7	.008	.029	.122
Plastic	1296	.9	.001	.003	.014
Fuel	11485	8.0	.008	.030	.127
Repairs	3750	2.6	.003	.010	.041
Tot. Var. Cost	27634	19.2	.019	.071	.305
Depreciation	5000	3.5	.003	.013	.055
Interest	1000	.7	.001	.003	.011
Insurance	230	.2	.000	.001	.003
Labor	6400	4.4	.004	.016	.071
Tot. Fixed Cost	12630	8.8	.009	.032	.139
Total Cost	40264	28.0	.028	.104	.444

Table 2 - Costs of Providing Straw Treatment: Addition of 20 T Supply Unit

Ministry of Agriculture
Office of Livestock and Pastures
Projet Parcours
Kairouan, Tunisia

Bart Eleveld
Agricultural & Resource
Economics Department
Oregon State University

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Estimation of the Cost of Providing Ammoniated Straw to Farmers
Costs are calculated on the following bases:

- per ton of straw
- per kg of straw
- per kg of added forage units (UF)
- per kg of added crude protein (CP)

Go to cell A68 for summary table

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Attributes of Straw and Treatment	
Kg NH3/Kg Straw	.03
% Dry Matter (DM)	90
Forage Units per kg of DM--untreated	.2
Forage Units per kg of DM--treated	.5
Crude protein in untr. straw (%CP)	4
Crude protein in treated straw (%CP)	11
Cost of NH3 (D per T of NH3)	257
Cost of plastic (D per T straw)	.9

Attributes of Portable NH3 Units	
Capacity of portable NH3 units (T)	1.5
Number of portable NH3 units	2
Ave. round trip dist. (km)	200
Number of ammoniation trips per year	30
Straw treated per trip (T)	24
Maximum tons allowed by cap.	50.0
Total NH3 applied per unit (T)	21.6
Straw treated per unit (T)	720
Total straw treated, all units (T)	1440
Ave. length of fill-up trip (km)	0
No. of treatment trips per fill	2.1
Fuel cons. of unit in km/l	5.8
Fuel price (D per l)	2.7
Total fuel use per unit (l)	1034
Man months of labor per unit	14
Wage rate of operator (D/mo.)	200
Purchase cost of portable unit	20000
Expected life of portable unit (yrs)	8
Lifetime repair cost (% of P. P.)	75
Annual repair cost per unit (D)	1875
Insurance cost per year (D)	230
Opportunity int. rate on inv.(%)	5

Attributes of Supply Unit

Capacity (T)	20
Dist. of supply trip (km rd. trip)	440
No. trips needed per year	2.2
Fuel consumption rate (km/l)	1.7
Fuel price (D per l)	2.7
Total fuel use for supply unit (l)	570
Man months of labor	.2
Wage rate of operator (D/mo.)	200
Purchase cost (D)	100000
Expected life of supply unit (yrs)	10
Lifetime repair cost (% of P. P.)	75
Annual repair cost (D)	7500
Insurance cost per year (D)	500
Opportunity int. rate on inv.(%)	5

Costs of Ammonia Program (All figures in Dinars)

	Total	per ton straw	per kg straw	per kg added UF	per kg added CP
Ammonia	11102	7.7	.008	.029	.122
Plastic	1296	.9	.001	.003	.014
Fuel	7126	4.9	.005	.018	.079
Repairs	11250	7.8	.008	.029	.124
Tot. Var. Cost	30774	21.4	.021	.079	.339
Depreciation	15000	10.4	.010	.039	.165
Interest	6000	4.2	.004	.015	.066
Insurance	730	.5	.001	.002	.008
Labor	5636	3.9	.004	.014	.062
Tot. Fixed Cost	27366	19.0	.019	.070	.302
Total Cost	58141	40.4	.040	.150	.641

Table 3 - Costs of Providing Straw Treatment: Expansion to 6 Portable Units

Ministry of Agriculture
Office of Livestock and Pastures
Projet Parcours
Kairouan, Tunisia

Bart Eleveld
Agricultural & Resource
Economics Department
Oregon State University

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Estimation of the Cost of Providing Ammoniated Straw to Farmers
Costs are calculated on the following bases:

- per ton of straw
- per kg of straw
- per kg of added forage units (UF)
- per kg of added crude protein (CP)

Go to cell A68 for summary table

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Attributes of Straw and Treatment	
Kg NH3/Kg Straw	.03
% Dry Matter (DM)	90
Forage Units per kg of DM--untreated	.2
Forage Units per kg of DM--treated	.5
Crude protein in untr. straw (%CP)	4
Crude protein in treated straw (%CP)	11
Cost of NH3 (D per T of NH3)	257
Cost of plastic (D per T straw)	.9

Attributes of Portable NH3 Units	
Capacity of portable NH3 units (T)	1
Number of portable NH3 units	6
Ave. round trip dist. (km)	50
Number of ammoniation trips per year	30
Straw treated per trip (T)	15
Maximum tons allowed by cap.	33.3
Total NH3 applied per unit (T)	13.5
Straw treated per unit (T)	450
Total straw treated, all units (T)	2700
Ave. length of fill-up trip (km)	200
No. of treatment trips per fill	2.2
Fuel cons. of unit in km/l	8.3
Fuel price (D per l)	2.7
Total fuel use per unit (l)	504
Man months of labor per unit	14
Wage rate of operator (D/mo.)	200
Purchase cost of portable unit	20000
Expected life of portable unit (yrs)	8
Lifetime repair cost (% of P. P.)	75
Annual repair cost per unit (D)	1875
Insurance cost per year (D)	230
Opportunity int. rate on inv.(%)	5

Attributes of Supply Unit

Capacity (T)	20
Dist. of supply trip (km rd. trip)	440
No. trips needed per year	4.1
Fuel consumption rate (km/l)	1.7
Fuel price (D per l)	2.7
Total fuel use for supply unit (l)	1069
Man months of labor	.2
Wage rate of operator (D/mo.)	200
Purchase cost (D)	100000
Expected life of supply unit (yrs)	10
Lifetime repair cost (% of P. P.)	75
Annual repair cost (D)	7500
Insurance cost per year (D)	500
Opportunity int. rate on inv.(%)	5

Costs of Ammonia Program (All figures in Dinars)

	Total	per ton straw	per kg straw	per kg added UF	per kg added CP
Ammonia	20817	7.7	.008	.029	.122
Plastic	2430	.9	.001	.003	.014
Fuel	11052	4.1	.004	.015	.065
Repairs	18750	6.9	.007	.026	.110
Tot. Var. Cost	53049	19.6	.020	.073	.312
Depreciation	25000	9.3	.009	.034	.147
Interest	8000	3.0	.003	.011	.047
Insurance	730	.3	.000	.001	.004
Labor	16836	6.2	.006	.023	.099
Tot. Fixed Cost	50566	18.7	.019	.069	.297
Total Cost	103615	38.4	.038	.142	.609

Table 4 - Cost/Kg of Digestible Energy (UF) for Feedstuffs in Central Tunisia
(Prices and Costs in Tunisian Dinars)

Feed	Low Price Estimate Price/Unit	Low Price Estimate Cost/Kg UF	High Price Estimate Price/Unit	High Price Estimate Cost/Kg UF
Oat Vetch Hay	2.000 D/ 20 kg bale	.247	4	.494
Treated Straw NH3	1.300 D/ 15 kg bale	.193 1/) .275 2/)	2.8	.415 1/ .593 2/
Straw	1.000 D/ 15 kg bale	.370	2.5	.926
Concentrate	7.000 D/ 50 kg sack	.173	7	.173
Wheat Bran	4.250 D/ 50 kg sack	.148	4.25	.148
Oat Hay	2.000 D/ 20 kg bale	.370	4	.741
Barley Grain	9.500 D/ 100 kg sack	.106	11.5	.128
Green Cactus	0.010 D/ .8 kg pad	.250	.25	.625
Alfalfa Pellets	.110 D/kg	.222	.165	.333

1/ UF increases from .2 to .5/kg dry matter from NH3 treatment
2/ UF increases from .2 to .35/kg dry matter from NH3 treatment

Table 5 - Cost of Crude Protein (CP) for Feedstuffs in Central Tunisia
(Prices and Costs in Tunisia Dinars)

Feed	Low Price Estimate Price/Unit	Low Price Estimate Cost/Kg UF	High Price Estimate Price/Unit	High Price Estimate Cost/Kg UF
Oat Vetch Hay	2.000 D/ 20 kg bale	1.235	4	2.469
Treated Straw NH3	1.300 D/ 15 kg bale	.875 1/) 1.376 2/)	2.8	1.886 1/ 2.963 2/
Straw	1.000 kg/ 15 kg bale	1.852	2.5	4.630
Concentrate	7.000 D/ 50 kg sack	1.296	7	1.296
Wheat Bran	4.250D/ 50 kg sack	.630	4.25	.630
Oat Hay	2.000 D/ 20 kg bale	2.222	4	4.440
Barley Grain	9.500 D/ 100 kg sack	.880	11.5	1.065
Green Cactus	.010 kg/	3.676	.25	9.191
Alfalfa Pellets	.110 kg	.815	.165	1.222

1/ CF increases from .04 to .11 of dry matter from NH3 treatment.
2/ CF increases from .04 to .07 of dry matter from NH 3 treatment.

ANNEX_II

SOCIAL_ANALYSIS

Projet d'Aménagement et de Gestion des Parcours de la Tunisie Centrale
Section sociale : Texte provisoire de l'evaluation

1. But_et_Activités_du_projet

Le Projet d'Aménagement et de Gestion des Parcours de la Tunisie Centrale a deux objectifs principaux:

- L'amélioration de l'aménagement des parcours et des pratiques d'élevage chez les éleveurs de la Tunisie Centrale.
- La formation d'une Unité d'Aménagement de Parcours composée de techniciens assurant l'amélioration et la continuité de l'assistance technique auprès des éleveurs de la région.

Les_Contraintes

Les contraintes d'ordre physique relévent des conditions climatiques marquées par un régime variable de précipitations qui entraine une certaine irrégularité de la production végétale et des ressources alimentaires, tant pour l'homme que pour les animaux, et surtout une imprévisibilité de la distribution des pluies, ce qui constitue un frein pour l'intensification des exploitations de la part des agriculteurs.

Il y a aussi un cheptel dont les besoins dépassent les ressources fourragères, ce qui entraine une certaine surexploitation des parcours, ceux-ci étant collectifs, leur contrôle insuffisant et non rigoureux, non organisation des éleveurs et des ayant-droits, tout cela tend à accentuer le problème.

Les contraintes d'ordre technique sont issues de l'inadéquationdes pratiques de production de l'agriculture et de l'élevage. La production ovine se trouve limitée par l'irrégularité et l'insuffisance des parcours et de la production fourragère, mais surtout par la non application des techniques plus intensives de conduite des troupeaux et par l'état sanitaire de ce même troupeau.

En général, les contraintes d'ordre social sont formulées par les institutions, leur structures et leur mode de fonctionnement qui n'offrent pas assez d'occasions aux bénéficiaires pour participer à la résolution des problèmes. Parfois les éleveurs ne sont pas consultés, ni concernés par conséquence par les fins des aménagements faits.

Les autorités (service des forêts) pratiquent dans quelques cas la politique de mise en défense et ne reconnaissent le droit d'usage

des parcours collectifs de la part des riverains qu'au temps qu'ils jugent opportun.

Compte tenu des contacts entre intervenants et malgré un certain niveau de coordination, les différentes activités ne sont pas intégrées d'où l'absence d'une approche multidisciplinaire integrée et un tas d'actions séparées qui peuvent avoir un grand rendement et une meilleure fructuation lors de la systématique maintenance des rapports.

Les Opportunités

Les techniques de production peuvent et sont en mesure de s'améliorer au profit d'une meilleure conduite de troupeau, d'un aménagement plus rationnel.

La population peut être à la hauteur des problèmes posés avec l'intensification des travaux de vulgarisation et l'adoption de certaines mesures d'organisation sociale tout en incitant la collaboration des intéressés dans tout le processus d'aménagement depuis l'identification, la conception jusqu'à la fin, cette phase d'importance pertinente où les bénéficiaires prennent en charge les réalisations afin de les promouvoir et d'assurer leur bonne gestion.

2. Observations et Conclusions

Se référent au Scope of Work, je me suis employé à répondre aux questions que je qualifie de pertinentes:

Jusqu'à quel point est-ce que l'Unité d'Aménagement de Parcours a réussi à introduire un aménagement rationnel des parcours chez les éleveurs en Tunisie Centrale et à quel point a-t-elle réussi à les impliquer?

S'il faut juger de cela à partir des réalisations, il est évident que l'Unité d'Aménagement de Parcours a réussi à introduire un aménagement de parcours basé sur les dernières acquisitions de matérial assez perfectionné et a eu la collaboration de bons techniciens bien formés et spécialisés soit en aménagement de parcours, en production ovine ou en production de matériel végétal.

Mais si l'on se réfère aux bénéficiaires, il faut faire la différence entre les U.C.P.s et les éleveurs usant de leurs parcelles privées ou de leur parcours collectifs.

Les U.C.P.s, vu leur propriété assez importante en comparaison avec les autres éleveurs, offrent généralement un terrain utile pour des réalisations plus ou moins intenses. Ceci soulève la question de l'éfficacité et de la continuité de ces réalisations aussi importantes au point de vue de l'O.E.P., cette même position peut être maintenue et valorisée par les bénéficiaires. Est-ce que ces institutions ont vraiment besoin de l'assistance technique

du projet? Sont-elles les cibles souhaitées par le projet? Oui, elles le sont et il faut bien considérer leur contribution positive au succès du projet.

Les éleveurs usant de leurs parcelles privées sont conditionnés d'avance par l'étendue des terres dont ils disposent, et comme ça ils ne cèdent que ce qui excède pendant les bonnes années. Pendant les autres années, ils n'honorent pas leur obligation envers la partie qui les assiste. Ce comportement est compréhensible et peut être amélioré par une meilleure sélection, déjà en cours, des sites susceptibles à l'intervention du projet et une assistance de plus en plus intensive visant la sauvegarde des réalisations, la gestion de plus en plus rationnelle et surtout l'intériorisation de la valeur de plus en plus importante des parcelles aménagées pendant les années de disette que les bonnes années.

Les éleveurs usant de parcours collectifs sont généralement de petits exploitants très dépendants de l'élevage, ils vivent aux alentours, le cheptel représente pour eux une activité économique de grande importance. Si leur parcours traditionnel est en vue d'aménagement, ils se sentent déposséder de leur droit d'usage. Ce sentiment peut être remédié en exposant les grandes fins que vise le projet en faisant valoir l'intérêt, le bénéfice et les compensations provisoires dont ils peuvent réjouir.

En conclusion pour le dernier cas, et selon nos observations limitées il semble qu'il n'est pas facile de se féliciter du succès auprès d'eux et ceci est dû à plusieurs raisons dont la politique des interventions étatiques qui donne peu d'importance à la participation des bénéficiaires et pratique généralement une intervention de grande envergure mais bornée à des fins purement techniques. De plus les conseils de gestion des usagers des parcours collectifs n'ont pas retenu une assez grande attention lors de l'identification, de la conception et en entamant les réalisations ce qui a entrainé une certaine négligence de la part des usagers envers le respect de la mise en défense de certain parcours privés ou collectifs.

<u>Est-ce que les efforts de vulgarisation entrepris en matière de production animale sont appropriés avec les traditions d'élevage?</u>

Il faut noter parmi les efforts de vulgarisation entrepris en matière de production animale les conseils relatifs à la conduite des troupeaux, les pratiques nouvellement introduites afin d'améliorer l'espèce en fournissant des élèves béliers reproducteurs de race barbarine à des prix subventionnés, la distribution des aliments de bétail, les soins vétérinaires, les démonstrations ovines et les journées d'information en élevage ovin et la construction des bassins de rentention.

Les élèves béliers reproducteurs de race barbarine à des prix subventionnés ont servi chez quelques fermiers, mais d'autres s'en sont débarrassé sous prétexte qu'ils sont "froids". Des efforts supplémentaires en suivi et vulgarisation ont prouvé l'efficacité de ces améliorations, il suffit d'insister sur la continuité de cette innovation.

La distribution des aliments de bétail sont fournis aux adhérents du projet pour la compensation de leur parcours mis en défense après aménagement. Ceci a encouragé les éleveurs à adhérer au projet et à courir le risque des parcours dont ils se sont faits déposséder le droit d'usage.

Les soins vétérinaires pratiqués communément avec la collaboration de la production animale ont vu un peu de réticence de la part des éleveurs pendant les premières tentatives, mais après l'intensification des journées de vulgarisation et surtout après avoir surmonté les petits dégats de la non vaccination, les éleveurs marquent cette activité comme l'une des plus réussies du projet. A propos des citernes ou des bassins de retention qui peuvent revenir moins cher si on encourage l'initiative des éleveurs à en construire, avec une meilleure sélection de leur emplacement, des bassins privés peuvent être mieux entretenus et à usage bénéfique et ceci contribue à une desserte en eau souhaitée par les éleveurs.

Est-ce que les activités entreprises en matière de production animale contribuent ou non au développement de relations d'étroite collaboration entre le projet et les éleveurs?

Oui, ceci est très apparent chez les deux parties. Une remarque que presque tout le personnel de l'O.E.P. a soulevé c'est que les éleveurs sont des victimes de plusieurs contraintes et cette observation reflète une tendance chez les cadres qui veulent bien aider la population. Cette dernière, malgré les réserves qu'elle a sur quelques aspects du projet, reconnaît les efforts entrepris pour son profit tel que les bassins de retention ou les traitements pour les ovins. Cette approche a pu favoriser une mutuelle compréhension entre les deux parties et une étroite collaboration est observée surtout entre le projet et les U.C.P.s.

Est-ce que le projet est effectivement arrivé à démontrer que la réduction ou la stabilisation de l'effectif peut être compensée par une amélioration de la qualité du troupeau? Cette réalité est-elle objective en tenant compte des contraintes sociales en Tunisie Centrale?

Non. Cela dépend de beaucoup de facteurs et surtout du rôle de l'élevage dans le système d'exploitation agricole. L'élevage joue un rôle important dans le revenu des exploitations, l'équilibre de celle-ci et aussi leur pérennité; la majorité des exploitants

pensent que l'élevage ovin est indispensable et constitute le complément naturel des cultures céréalières et des arbres fruitiers. Outre son rôle de production, cet élevage permet de faire face rapidement à des dépenses imprévues, de constituer des réserves en cas de mauvaise année. Il permet en outre de faire face aux risques. L'élevage reste aussi très extensif. l'alimentation du bétail est conditionnée par les aléas climatiques. La proportion de cette alimentation qui provient de la végétation naturelle est fonction de la taille des exploitations. Les petits exploitants sont plus dépendants des parcours collectifs. Pendant les années à bonne pluviosité, le système d'exploitation permet une certaine autosuffisance en céréales et une certaine satisfaction des besoins alimentaires pour les ovins. Ceci montre l'étroite intégration entre les spéculations différentes dans un système d'agriculture mixte, sculpté par les conditions naturelles et socio-économiques et entretenu et assumé par les hommes, comprenant céréales - arbres fruitiers - élevage, ce dernier joue le rôle de régulateur et de réserves pour éviter les risques ou les besoins imprévus. Tout plan d'aménagement de parcours et en général toute activité ou intervention doit prendre ces réalités en considération. Leur prestige peut y être pour quelque chose et ça peut aussi s'expliquer par la dépendance totale entre propriété, risque et prestige. Vendre du troupeau est plus facile à digérer par l'éleveur que de vendre une partie de sa terre, et malgré cela, il faut aussi poser la question pourquoi vendre ou même stabiliser le troupeau, cette démarche ne peut se faire, pour lui, que pour remédier à de grandes obligations ou des besoins très poussés. La notion que la qualité vaut plus que la quantité ou peut la compenser n'est pas encore intériorisée vu les causes citées auparavant et se rapportant au système et aux conditions de vie, au prestige et à l'entourage.

Dans quelle mesure est-ce que les éleveurs sont impliqués dans les décisions prises et se rapportant au programme de la production animale?

Pas beaucoup. Les éleveurs sont les maîtres de leurs décisions en ce qui concerne leurs troupeaux, ils continuent à maîtriser leur rôle d'éleveur, et leurs habitudes de conduite des troupeaux. One peut remarquer leurs attitudes de refus ou d'approbation des innovations introduites par le projet mais ils ne semblent pas très impliqués par les décisions prises et se comportent d'une manière sélective envers les différentes activités du programme de production animale. Jusqu'à maintenant et malgré les succès eu dans ce programme, il semble que les bénéficiaires se comportent comme avant. ils veulent bien bénéficier des avantages du projet, mais dans l'intention de profiter des services gratuits ou subventionnés. Il faut les entrainer dans une démarche de participation minime aux frais pour que ce service ou autre compensation mis à leur profit seront plus ressentis en valeur et seront par conséquent demandés et continus et intériorisés comme tradition dans l'aménagement ou la conduite du

troupeau. La participation des populations bénéficiaires est un facteur primordial pour le succès. Et elle peut être incitée par l'intensification de la vulgarisation, et du suivi qui repose sur la collecte des données et leur traitement de façon constructive afin d'aboutir à une confiance réciproque et une entraide fructueuse.

3. Recommandations

Court Terme

a. Sociologue pour des missions de courtes durées afin d'aider l'U.A.P.

b. Formation en informatique aux cadres de l'O.E.P.

c. Multiplication des bassins de retentions privés ou collectifs.

d. Rôle pour les femmes à travers quelques activités et animation sociale. Vu l'étroite relation entre l'élevage, la sauvegarde du patrimoine et les femmes ou les filles rurales, L'O.E.P. peut fournir un effort pour mobiliser ces dernières de façon directe ou indirecte pour le succès des objectifs globaux à travers une opération visant la diversification des sources de revenus des familles rurales plus ou moins dépendantes de l'élevage comme activité et des parcours comme ressource.

e. Différentes actions dans chaque site (tenir compte des spécificités). Vu la grande étendue de la zone d'intervention du projet et la multitude diversité des conditions géographiques, économiques et sociales, une diversification des types d'interventions est souhaitée afin de pouvoir prendre en compte les différents climats, les différentes spéculations agricoles et surtout les différents niveaux d'organisation sociale d'où les voeux et les besoins différents.

f. Vu l'importance des sujets abordés par les institutions contactées et ayant une relation avec l'aménagement pastoral, la recherche ou la gestion dans ce domaine, vu aussi la necessité capitale de leur coordination afin de promouvoir ce secteur, et pour franchir des pas vers une stratégie nationale d'aménagement pastoral, un séminaire peut par l'initiative de l'OEP être un forum d'extreme importance en vue de maintenir une étroite collaboration entre les services et les départements interessés et évoquer une meilleure comprehension du domaine.

Long Terme

a. Création d'institutions à vocation pastorale.
Dans le contexte de responsabilisation de la gestion des parcours collectifs, les conseils de gestion doivent être munis d'un certain pouvoir de participation à la planification et à la

réalisation et surtout un plus grand pouvoir en matière de gestion quand l'intervention de l'Etat prend fin. Pour cela des mesures législatives peuvent définir les devoirs de ces comités et leurs droits ainsi que les procédures de création et les modes de fonctionnement.

La création de ces institutions est très bénéfique pour la vulgarisation, l'integration des aménagements, l'organisation des activités, la gestion des réalisations et la contribution à la solution des problèmes qui peuvent survenir.

L'organisation des institutions se fera développer selon les cas, et les tâches seront fixées selon les capacités de chaque cas. Les plans d'aménagements et les modalités de gestion des parcours collectifs peuvent être négociés avec l'institution pastorale en question.

b. Quelques interventions au services des bénéficiaires Une certaine attention doit être accordée aux conditions de vie des bénéficiaires tel l'encadrement possible des femmes rurales et surtout les jeunes filles pour promouvoir leur capacité et leur savoir faire au service du projet, en améliorant le niveau de vie à travers la diversification des sources de revenus de la famille pastorale tel que le travail de la laine, le tricot, la couture, l'artisanat et le petit élevage.

De petites actions en matière d'aménagement des ressources disponibles en eau tel que les sources, les puits de surfaces et les bassins de retention peuvent bien participer à l'amélioration du niveau de vie des bénéficiaires, de leurs spéculations agricoles et de leurs troupeaux (A étudier la faisabilité d'une adduction d'eau au site Elgrine, puisqu'il y a un point d'eau à 800 mètres).

c. Intensification de la vulgarisation et du suivi
La vulgarisation peut mettre l'accent sur l'organisation des groupes cibles de façon régulière à partir les thèmes qui touchent le plus à leur activités et préoccupations tout en montrant l'intérêt et les avantages (matériels et futurs) de leur collaboration, de leur organisation et du rapport qu'ils auront à entretenir avec les interventions du projet. Au fur et à mesure que le travail avance, des concertations de groupe et des discussions seront entamées pour décider de quoi, qui et comment.

La vulgarisation doit aussi se moduler selon les objectifs spécifiques et les réalités pertinentes du terrain. Le succès dépend beaucoup de la façon de prendre les gens et d'exploiter leur savoir faire.

d. Sociologue au sein de l'Unité de l'Aménagement des Parcours

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e. Une et un assistant sociaux au sein de chaque agence.

4. Leçons

Absence d'Une Stratégie Nationale d'Aménagement des Parcours
Il est facile de constater cette absence par la multitude des actions entreprises qui favorisent la création d'emploi, alors que les petits propriétaires auraient aimé rester les utilisateurs des parcours collectifs d'où la conséquence de non entretien des exploitations privées ou collectives, le non respect de la mise en défense pourtant nécessaire pour quelques temps et pour quelques parcelles. Ce qu'il faut entreprendre c'est la rationalisation de la gestion des parcours et surtout pas se cantonner à des restrictions non souhaitées par la population des mesures qui provoquent des attitudes de rejet allant à l'encontre des fins projetées par les promoteurs.

Problème Foncier

Le code des forêts pourrait tenir compte de la valeur agropastorale des parcours, et reconnaître le droit d'usage des populations riveraines. Il est donc souhaité que les législations futures comprennent quelques mentionnements sur les comités de gestion des parcours, leur participation et le pouvoir dont ils pourraient être doté en tant que propriétaires ou usagers.

Problème Législatif

Après avoir mentionné quelques remarques sur le code forestier comme un ensemble de règles visant à assurer le développement de la conservation des végétations et de leur exploitation rationnelle, celui-ci ne peut pas aller à l'encontre de la présence et de la survie des populations riveraines des parcours qui peuvent et sont en mesure de participer à la protection du patrimoine si une concession est engagée avec eux. Les institutions des usagers des parcours collectifs peuvent être une partie responsable d'un compromis visant l'amélioration des aménagements et un gestionnaire plus ou moins rationnel des réalisations, avec l'assistance technique et la supervision de tutelle de l'O.E.P. ou du département des forêts.

L'intégration du Système d'Exploitation Agricole

Il est de plus en plus évident que le système d'exploitation agricole représente un tout au point de vue des petits propriétaires, l'élevage doit son importance à sa fonction de régulateur et de soupape de sécurité contre les risques. Toute initiative de développement en milieu pastoral doit prendre cela en compte et ne doit pas aller à l'encontre.

Les Institutions des Usagers des Parcours

Les conseils de gestion des parcours peuvent se constituer de la même façon dont régissent les associations d'intérêts collectifs (A.I.C.) nouvellement institutionnalisées par l'amendement du code des eaux loi 35 du 6 juillet 1987 et les decrets 1261, 1262 du 27 octobre 1987 et le decret 150 du 12 janvier 1988. Le changement à apporter c'est l'emploi des ressources en eau pour la conservation du sol et l'intégration des aménagements à faire avec l'importance capitale d'une vue globale de l'écologie et de l'interdépendance entre eau et toute vie humaine, animale et végétale. La création de ces institutions doit partir du principe majeur de limiter les dégradations, pour organiser les parcours et respecter les restrictions s'il y a lieu sans faire déposséder totalement les usagers de leur droit d'usage.

ANNEX III

SCOPE OF WORK - EVALUATION

RANGE DEVELOPMENT SUBPROJECT

664-0312.8

Interim Evaluation

I. THE PROJECT

The Range Development Subproject "Projet Parcours" is addressing the problem of deteriorating rangeland on both collective and private lands in the Gouvernorats of Kairouan, Sidi Bouzid, Kasserine, Gafsa, Siliana, Kef and Zaghouan. The project agreement was signed by A.I.D. and the GOT on June 5, 1981. The "Office de l'Elevage et des Paturages" (OEP) of the "Ministere de Production Agricole et Agro-alimentaire" (MPAAA)is implementing the project with technical assistance provided by Oregon State University (OSU). The contract for the Tunisia Range Development and Management Project between the OEP of the MPAAA and OSU was extended to May 19, 1989. The project extension was approved and signed September 4, 1986 by the Ministry of Agriculture to introduce improved range management and stockraising practices to the poor majority in Central Tunisia.

Based upon a positive independent evaluation in May 1984, additional funds were committed to the project through an ammendment approved July 16, 1985 by the USA and GOT. The Government of Tunisia's contribution increased by 4,367,000 Tunisian Dinars and USAID's contribution increased by US$2,720,000. The total AID contribution is $5,600,000 with $2,915,000 in loan funding. The Government of Tunisia contribution is estimated at the equivalent of approximately $8,000,000.

OEP provides technical assistance to participant farmers and subsidies as incentive for them to try the new and improved range management practices. The technology is adapted to local situations and education is provided to encourage farmers to accept financial responsibility and continue the improved practices.

The U.S. contribution includes technical assistance (resident and TDY), participant training (long term and short term) and commodity assistance. The project is described in detail in the contract, the project paper, the 13th Amendment, and in other project documents (Annual Reports and TDY Reports) available in USAID/Tunis, and in the project headquarters in Kairouan.

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The two principal objectives of the project are (1) to introduce improved rangeland management and stockraising practices among farmers in Central Tunisia; and (2) to form a range management unit (RMU) composed of trained project technicians to provide continuing technical assistance to stock growers and farmers in this region. Procurement of commodities is a major input to meet these objectives.

The first of these two objectives involves improvement of collective and private rangelands in the target area. The rangeland and stock improvement is being attempted through:

1. Acquiring plant materials for rangeland revegetation from both foreign and domestic sources.

2. Production of foundation seed for selected native species.

3. Revegetation of rangelands.

4. Fertilization of reseeded rangelands.

5. Implementation of improved grazing management on native range including deferred grazing and grazing systems.

6. Installation of forage reserves.

7. Delineation and protection of rangelands from trespass animals.

8. Development of water points for stock use.

9. Development and implementation of a straw ammoniation program.

10. Development and implementation of a comprehensive sheep husbandry program including supplemental feeding, breeding, drenching and vaccination for flock health.

11. Construction of sheep dips.

12. Extension to farmers of improved practices for range and animal production.

The second objective is being approached through a 3-phase training program: first, on-the-job training carried out by resident advisors and trained project personnel for their Tunisian counterparts; second, short-term training at Oregon State University for field technicians; and third, long-term training (2 years) at universities in the United States. The long-term training includes 24 scholarships in the following areas:

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12 scholarships for specialization in rangeland improvement. 2 scholarships for specialization in forage crop and rangeland plant materials development.

3 scholarships for specialization in sheep and goat production.

4 scholarships for specialization in seed production.

1 scholarship for specialization in extension methods.

1 scholarship for specialization in socio-economic aspects of rural (rangeland) development.

1 scholarship for agricultural engineering.

II. PURPOSE OF THE EVALUATION

The evaluation team is charged with the following reponsibilities:

1. Evaluate the Project

a. to determine if the "Projet Parcours" is achieving the overall purpose(s) as stated in the Project Grant Agreement, contract and the amendments. This will include assessment of the continuing validity of linkages between outputs and purpose(s) and the assumptions relevant to both;

b. to judge the effectiveness of project actions to date and make recommendations for future activities;

c. to evaluate the methodology as defined in the contract used to achieve the contract goals.

d. to determine the adequacy of "projet parcours" inputs and progress toward outputs including prospect for achievement of outputs within scheduled time frame for the project.

e. to assess linkage between the "projet parcours" and other ongoing range institutions and projects.

2. Based on the evaluation, recommendations should be made concerning techniques to improve utilization and preservation of the rangelands.

a. Recommendations on how implementation of the project should be changed or continued within funding levels committed by A.I.D. and GOT.

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b. Alternative approaches and policies to range development that should be considered by the GOT, OSU and USAID.

General Concerns and Issues

Among the specific questions that need to be addressed are the following:

1. What is the effectiveness of project activities?

a. Range Management

(1) To what extent have project personnel been able to identify and address production constraints on the rangelands of Central Tunisia?

(2) What is the potential for future rangeland reseeding in Central Tunisia based on the results thus far?

(3) What is the relative economic efficiency of rangeland improvement actions such as reseeding, ripping, planting forage reserves, resting and managing rangelands?

(4) How much can project activities be expected to improve the production on rangelands?

(5) Can project actions reduce the effects of widely fluctuating annual precipitation and growing conditions thereby contributing to the stability of agricultural production?

(6) How effective is the range management unit in explaining the rational for proper range management to the farmers in Central Tunisia and enlisting their cooperation?

(7) Have project personnel been adequately trained in appropriate range management methods including the use of computers for analysis, planning and management of rangelands?

b. Sheep Production

(1) Are the extension efforts in the sheep production program effective in implementing appropriate agricultural practices?

(2) Do the activities of the sheep production program contribute to the development of a working relationship between the project and participants?

(3) Is the current sheep production program effective in implementing project objectives and in addressing sheep production problems?

(4) Can the project effectively demonstrate that a reduction or a stabilization in animal numbers can be offset by an increase in lambing rates? Is this a realistic objective within the social con straints of Central Tunisia?

(5) To what extent are farmers involved in the decisions being made regarding the sheep program?

C. Ammoniation of Straw

(1) Is the Ammoniation of Straw Program economically sound?

(2) How effective have project technicians been in providing this service to farmers that request treatment for their straw?

(3) How well does this program integrate with other project activities and promote overall project goals?

(4) Does ammoniation of straw increase the grazing pressure on rangelands by encouraging farmers to maintain larger flocks throughout the late summer-fall dry season?

(5) Does this program promote stability in sheep prices and production levels across years and can it be expected to increase stability in the future?

D. Plant Materials Development

(1) Are the proper species of plants being developed for Tunisian needs? What are the productive potentials for these plants growing under Tunisian range conditions?

(2) Is the strategy for plant material development based on sound scientific principles and is it technologically feasible?

(3) Are project goals for the plant materials unit reasonable? Do Tunisian counterparts and staff have sufficient expertise to ensure a continuation of the program after the project has ended?

E. Seed Production

(1) Can this program be expected to provide adequate quantities of adapted seed at a reasonable cost of production?

(2) Does this program effectively integrate with other GOT projects to promote attainment of government goals for seed production?

(3) Have Tunisian personnel been trained in appropriate seed production techniques and do they have the skill level necessary to continue the program after the project has ended?

(2) What is the projected economic impact of the project? The team should provide an up-dated economic analysis of the existing project and of any proposed alternatives.

(3) What is the impact of project activities on local farming systems?

(4) What are the social ramifications of this project?

(5) To what extent does ultimate success of this project depend on or relate to integration with other A.I.D. and government programs?

(6) To what extent have on-the-job training and short-term participant training contributed to developing a Range Management Unit that will provide continuing technical assistance to farmers of Central Tunisia? Is the long-term training being provided adequate and is it focused on the appropriate subject matter in order to provide the necessary senior staff for future rangeland development in Tunisia?

III. TEAM QUALIFICATIONS

A five-person joint evaluation team composed of both Tunisian and American professionals will conduct the evaluation. It should be made up of individuals who together cover the following professional areas of expertise:

1. Range livestock management including management of semi-arid ecosystems and sheep husbandry.

2. Forage plantation management (arid agro-forestry) with with experience in conservation and management of collective arid lands.

3. Agricultural economics including experience in evaluation of AID projects and with range land and/or mixed farming systems.

4. Anthropology/sociology including familiarity with North African rural societies both sedentary and migratory.

The fifth person, the team leader, should have experience in management of agricultural development projects and possess knowledge of A.I.D. documentation requirements.

French language skills and past overseas experience are desirable but not essential for all team members. The team, as a unit, should have sufficient French and Arabic language skills for it to operate as a team independent of a translator. The GOT (MPAAA) will submit names of two team members specializing in anthropology/rural sociology and Forage Plantation Management. OSU will submit names of two members covering the other skills listed above, which may be U.S. contractors financed by A.I.D. under an IQC work order. All individual team members will be approved by USAID/Tunis and the GOT/MPAAA.

IV. METHODOLOGY

The evaluation will involve reading project documentation, visiting field locations, contacting project beneficiaries and interviewing key persons from Oregon State University and the "Office de l'Elevage et des Paturages" of the MPAAA. The team will be expected to present an executive summary of their evaluation, and recommendations for adjustments in project activities at the end of the evaluation to representatives of A.I.D. and the MPAAA (OEP).

The team will leave a draft copy of their final report with A.I.D. and the GOT prior to departure from Tunisia. The final report must be submitted no more than 45 days later.

V. TIMING

The evaluation is expected to require approximately 2 weeks work. Field work in Tunisia should start on/or about March 28, 1988. Team members will be provided copies of project documents as soon as the team is selected.

ANNEX IV

LIST OF CONTACTS

Mr. Taieb Bel Haj, Président Directeur Général, Office de l'Elevage et des Paturages, Tunis
Mr. Khamaies Dhif, Project Director, Rangeland Development Project
Mr. Salah Chouki
Mr. Mouldi Laribi
Mr. Mounir Louhaïchi
Mr. Farhat Salem
Mr. Ezayer Frija
Mr. Missaoui Ali
Mr. Taoufik Nasr
Mr. Mohamed Haddad, Chef d'Agence, Kairouan
Farmers, El Briquette
Mr. Seibre, Chef de Site, Kairouan
Mr. Nasri, Chef d'Agence, Siliana
Mr. Mlik, Chef d'Agence, Kasserine
Mr. Mansouri, Chef de Site, Gafsa
Mr. Soumri, Agence Siliana
Mr. Mohsen Slimi, Agency Siliana
Mr. Zouhair Seddik, Chef de Site, Zaghouan
Mr. Hydri Mosbah, Chef de Site, Kairouan
Mr. Jabeur Ammar, GRAFOUPAST
Mr. Taoufik Ketata, Service des Forêts, Kairouan
Mr. Naffati Mohamed, IRA, Medenine
Mr. Hechmi Ben Romdhane, OEP/DRS, Gabes
Mr. John Hall, Projet RAB
Mr. Mohamed Souissi, OEP Tunis
Mr. Nejib Saadi, D/CES, Tunis
Mr. Mongi Ben Hassen, Projet PAM, Tunis

SITE VISITS

Project Office Kairouan
Private Farm Kairouan
El Briket, various sites of collective land
OEP warehouse - forage reserves, Chebikha, El Grine, research sites
OEP Siliana Office
UCP Farm, Siliana
SODAL Farm, Siliana
OTD Farm, Mohsen Limam, Le Krib
Private Farm, Laroussen
Jebibina OEP farm
UCP plantation, Zaghouan
OEP Office, Gafsa
Private farms, Gafsa
Project Research plot, Gafsa
GRAFOUPAST Office, tunis
GRAFOUPAST seed cleaning facility, Borj El Amri
Seeding sites and OEP warehouse, Jebibina
ODTC, Kasserine
Kasserine Sud, Collective Lands
OEP Office, Kasserine

ANNEX V

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Project Paper - Tunisia Range Management Project, May 27, 1981

10th Amendment to the Project Loan and Grant Agreement, June 5, 1981

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