PD-AAX-939
ISN 56635

UNCLASSIFIED

PROJECT PAPER

NIGER
RANGE AND LIVESTOCK PROJECT
(683-0202)

USAID/NIGER

AGENCY FOR INTERNATIONAL DEVELOPMENT

UNCLASSIFIED

(Rev. 1-78)
Aug 97, Ch 9, Pt 3

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS PART I

1. TRANSACTION CODE: A (A = ADD, C = CHANGE, D = DELETE)

PAF

2. DOCUMENT CODE: 5

3. COUNTRY/ENTITY: Niger

4. DOCUMENT REVISION NUMBER:

5. PROJECT NUMBER (7 digits): 683-0202

6. BUREAU/OFFICE: A. SYMBOL: AFR; B. CODE: 01

7. PROJECT TITLE (Maximum 40 characters): Niger Range and Livestock

8. PROJECT APPROVAL DECISION — ACTION TAKEN: A (A = APPROVED, D = DISAPPROVED, DE = DEAUTHORIZED)

9. EST. PERIOD OF IMPLEMENTATION: YRS. 4 QTRS.

10. APPROVED BUDGET AID APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 77 F. GRANT	E. 1ST FY 77 G. LOAN	H. 2ND FY 78 I. GRANT	H. 2ND FY 78 J. LOAN	K. 3RD FY 79 L. GRANT	K. 3RD FY 79 M. LOAN
(1) F&N	111B	078		1500		1500		1500	
(2)									
(3)									
(4)									
TOTALS				1500		1500		1500	

A. APPROPRIATION	N. 4TH FY 80 O. GRANT	N. 4TH FY 80 P. LOAN	Q. 5TH FY R. GRANT	Q. 5TH FY S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1) F&N	829				5329	
(2)						
(3)						
(4)						
TOTALS	829				5329	

11. PROJECT FUNDING AUTHORIZED (ENTER APPROPRIATE CODE(S)): 1 = LIFE OF PROJECT; 2 = INCREMENTAL LIFE OF PROJECT

A. GRANT: 2 — U. LOAN:

C. PROJECT FUNDING AUTHORIZED THRU: FY 80

12. INITIAL PROJECT FUNDING ALLOTMENT REQUESTED ($000)

B. ALLOTMENT REQUEST NO. 1

A. APPROPRIATION	C. GRANT	D. LOAN
(1) F&N	1500	
(2)		
(3)		
(4)		
TOTALS	1500	

13. FUNDS RESERVED FOR ALLOTMENT

TYPED NAME (Chief, Service/Mission):

SIGNATURE:

DATE:

14. SOURCE/ORIGIN OF GOODS AND SERVICES: [X] 000 [ ] 941 [ ] LOCAL [X] OTHER 935

15. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

FOR PPC/PIAS USE ONLY	16. AUTHORIZING OFFICE SYMBOL	17. ACTION DATE MM DD YY	18. ACTION REFERENCE (Optional)	ACTION REFERENCE DATE MM DD YY

AID 1330-8 (7-78)

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

COUNTRY : Niger

PROJECT : Range and Livestock

PROJECT NO: 683-0202

Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended (the "Act"), I hereby authorize a Grant to the Government of Niger ("Cooperating Country") of not to exceed one million five hundred thousand United States Dollars ($1,500,000) during FY 77 to assist in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The project shall consist of providing technical assistance, training, goods and related services (a) to conduct a range resource study and related activities in the pastoral zone of the Cooperating Country, involving a detailed assessment of range conditions to determine its carrying capacity and recommend grazing patterns, aerial photography and ground verification surveys for mapping and to determine feasibility of accelerating the process of vegetation, construction and improvement of earth water catchments in conjunction with the organization of herder associations and the implementation of a pilot range management activity and an investigation of the technical and economic feasibility of reducing grass fire damage in the area, and (b) to conduct a livestock production study and related activities in the pastoral zone, including a comparative assessment of traditional and improved livestock systems, an assessment of all major livestock markets in the pastoral zone, support for the cooperating country livestock program in the area to improve the health of herds in the project zone, construction of four livestock posts and ten livestock handling facilities and an assessment of recurrent costs involved in improving livestock services in the area and the manner in which these costs may be financed by the Cooperating Country (hereafter referred to as the "Project").

b

I approve a total level of A.I.D. appropriated funding planned for the Project of not to exceed Five Million Three Hundred Twenty Nine Thousand and Three Hundred United States Dollars ($5,329,300), Grant, during the period FY 1977 through FY 1980, including the amount authorized above and additional increments of 1,500,000 in FY 1978, $1,500,000 in FY 1979 and $829,300 in FY 1980 subject to the availability of funds and in accordance with AID allotment procedures.

I hereby authorize the initiation of negotiation and execution of the Grant Agreement by the officer to whom such authority is delegated in accordance with A.I.D. regulations and Delegation of Authority, subject to the following terms, together with such other terms and conditions as A.I.D. may deem appropriate:

A. Source and Origin of Goods and Services

Except for ocean shipping and drug and pharmaceutical products, goods and services financed by A.I.D. shall have their source and origin in the United States or Niger, except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Grant may be procured in any eligible source country except the Cooperating Country; drugs and pharmaceutical products under the Grant shall have their source in the United States or Niger and their origin in the United States.

B. Waivers

Based upon the justification set forth in Annex A of the Project Paper, I hereby waive the requirement of Section 110(a) of the Act that the Cooperating Country make a contribution to the Project at least in an amount equal to twenty-five percent of the cost of the Project.

/s/ GOLER T. BUTCHER

Goler T. Butcher
Assistant Administrator for Africa

C

ANNEX A

REQUEST FOR WAIVER OF THE TWENTY-FIVE PERCENT REQUIREMENT

Section 110(a) of the FAA as amended requires that the recipient country contribute at least 25% of the total cost of an AID supported project. This requirement may be waived on a case by case basis. The RDO Niamey, based upon the following, requests such a waiver for the Niger Range and Livestock Project.

The Country

Niger is on the UNCTAD list of "Relatively least developed countries". With a per capita GNP of approximately $100 it is one of the poorest of these countries. Furthermore, it was one of the countries most seriously affected by the recent Sahelian drought and has yet to recover from the effects of that disaster.

The GON has demonstrated an increasing commitment to economic development and improving the standard of living of its people. In the current three year development plan, the GON will raise development investment to 25% of GDP as compared to 10% of GDP before the drought. The GON will finance approximately 10% of the total programmed development investment from its own resources with the other 90% financed primarily through Grants and Loans from the European Development Fund, the World Bank and bilateral development assistance. It is the opinion of the RDO Niamey that the GON is supporting as much of its development programs as can reasonably be expected.

The Project

The GON has identified the livestock herds and range resources of the pastoral zone as a major national resource and is committed to the preservation and improvement of its range resources by balancing animal numbers with carrying capacity of the range. The Range and Livestock project is seen by the GON as a key to the development and implementation of this policy.

The first phase of this project is essentially a pilot activity that will enable the GON to develop a comprehensive program for Range Management and Livestock Production in Niger's Pastoral Zone. A new office has been created in the GON Ministry of Rural Development and is currently

being staffed to oversee and implement all livestock projects in the pastoral zone. While the GON contribution to the total project cost is only eight percent, this does not represent an insignificant effort nor reflect the GON's actual commitment to the project. The GON has committed an almost equal number of professional personnel to the project as the AID financed expatriate staff. But, due to the salaries and support cost of expatriate personnel in Niger (44% of the AID funded project cost) and the relatively low salaries paid to GON personnel, the GON share appears lower when computed in dollars than it would if all inputs were compared in kind.

Given the long term experimental nature of this project and the need of the GON to invest its scarce resources in projects with immediate economic returns, it would not be reasonable at this time to expect the GON to meet the requirements of Section 110(a) for this project. The GON simply cannot afford 25% of the research costs involved in the development of an ecological, social and economically sound range livestock program. It is therefore felt that this project meets the intent of Congress in that support of the project has been demonstrated by the recipient and meets all of the requirements of the legislation for waiver eligibility and the AID guidelines in Handbook 3.

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ANNEX B

SUBJECT: Request for a Procurement Waiver for Construction Materials and other Commodities from Code 000 (United States) to Code 935

Problem: To authorize a procurement waiver from Code 000 (United States) to Code 935 (Free World) for the purchase of $319,000 of construction materials in support of the Niger range and Livestock Project (683-0202), your approval is required.

Discussion: The Niger Range and Livestock project is designed to assist the GON in the development of a national policy of range management and animal productivity that is economically profitable as well as environmentally and socially sound. Because of the continuing environmental degradation caused by drought and overgrazing in the country's pastoral zone the GON considers this project critical to the rational development of a major national resource.

The first phase of the project is designed to (a) develop a national range management and animal productivity policy and (b) to create the institutional and legal framework required to implement this policy. The development of a national range/livestock policy will result from a series of studies and pilot activities designed to provide the data upon which a sound policy can be formulated. Creation of the institutional/legal framework requires, in part, the construction of a limited number of livestock stations and handling facilities in the project zone.

Of the $1.1 million programmed for commodities and construction in this project (this is equal to 20% of the life of project costs of $5,329,000), a waiver for Code 935 procurement is requested for $319,000 worth of material (29% of the total scheduled for commodity and construction procurement).

The requested waiver will allow locally available but non US or Nigerian origin purchase of cement, reinforcing steel, roofing, and a variety of other materials for construction of livestock stations and other stock handling facilities in the project area. Code 935 procurement will assure that these materials, normally stocked in Niger, will be available when needed. This will permit construction of these facilities to proceed as scheduled

4

in the project design. Since these facilities are needed to support project activities, their completion as scheduled is critical for successful implementation of the project.

Recommendation

For the above reasons the Project Committee concurs with the requested waiver and recommends you authorize the procurement of $319,000 worth of construction materials from code 935 countries.

APPROVE /s/ GOLER T. BUTCHER

DISAPPROVE _____

DATE AUG 25

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ANNEX C

INITIAL ENVIRONMENTAL EXAMINATION

Project Location	:	Niger
Project Title	:	Niger Range and Livestock
Funding	:	$5,239,000
Life of Project	:	Four years
IEE Prepared by	:	Herbert N. Miller Assistant Program Officer ADO/Niamey
Environmental Action Recommended	:	Negative Determination Concurrence

David Shear
Director, Office of Sahel
and Francophone West
African Affairs

Assistant Administrator's Decision : APPROVED /s/ COLER T. BOTCHER

DISAPPROVED _____

DATE AUG 25

Clearances:

AFR/SFWA:JKBurke KB
AFR/DR:DDibble
AFR/DR:CHusick

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

THRU : DAA/AFR, W. Haven North

FROM : AFR/DR, John L. Withers

SUBJECT: Environmental Threshhold Decision

PROJECT TITLE: Niger Range and Livestock

PROJECT NUMBER: 683-0202

COUNTRY : Niger

ENVIRONMENTAL THRESHHOLD DECISION RECOMMENDATION: "Negative Determination"

Problem: A.I.D. Regulation 16 requires that this A.I.D. financed action be examined from the viewpoint of its potentiality for having a significant effect on the human environment. If the result of this study indicates the action will not have a significant detremental effect on the human environment, then an official finding to this effect called a "Negative Determination" must be signed by the Assistant Administrator of the relevant A.I.D. Bureau.

FINDING: The Project Review Committee and the members of my staff responsible for the implementation of A.I.D.'s Environmental Procedures have reviewed this project and its proposed actions from the viewpoint of its environmental aspects and A.I.D.'s Regulation 16. They are in full accord with the design team's and the Mission's findings on pages 201-208 of the Project Paper. These findings support a conclusion that this proposed action is not an action which will have a significant detremental effect on the human environment, and is, therefore, not an action for which an Environmental Assessment or an Environmental Impact Statement will be required. A "Negative Determination" as provided for in A.I.D. Regulation 16 is therefore recommended.

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: A (A = ADD, C = CHANGE, D = DELETE)

PP

2. DOCUMENT CODE: 3

3. COUNTRY ENTITY: NIGER

4. DOCUMENT REVISION NUMBER:

5. PROJECT NUMBER (7 digits): 683-0202

6. BUREAU/OFFICE: A. SYMBOL: AFR; B. CODE: 01

7. PROJECT TITLE (Maximum 40 characters): Niger Range and Livestock

8. ESTIMATED FY OF PROJECT COMPLETION: FY 80

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 77; B. QUARTER 4 (Enter 1, 2, 3 or 4); C. FINAL FY 80

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 -)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL	492	8.0	500.0	3804.8	1524.8	5329.3
(GRANT)	(492)	(8.0)	(500.0)	(3804.8)	(1524.8)	(5329.3)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY		17.9	17.9	-	440.8	440.8
OTHER DONOR(S)						
TOTALS		25.9	517.9	3804.5	1965.6	5770.1

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 77 F. GRANT	E. 1ST FY 77 G. LOAN	H. 2ND FY 78 I. GRANT	H. 2ND FY 78 J. LOAN	K. 3RD FY 79 L. GRANT	K. 3RD FY 79 M. LOAN
(1) FN	113	095		500		2846.8		1163.9	
(2)									
(3)									
(4)									
TOTALS				500		2846.8		1163.9	

A. APPROPRIATION	N. 4TH FY 80 O. GRANT	N. 4TH FY 80 P. LOAN	Q. 5TH FY - R. GRANT	Q. 5TH FY - S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1) FN	818.6	-	-		5329.3	
(2)						
(3)						
(4)						
TOTALS	818.6				5329.3	

12. IN-DEPTH EVALUATION SCHEDULED: MM YY 07 79

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

2 (1 = NO, 2 = YES)

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Walter Sherwin Actg. Regional Dev. Officer

TITLE: for Albert R. Baron, Regional Development Officer

DATE SIGNED: MM 05 DD 16 YY 77

15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AID 1330-4 (9-76)

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT REVIEW PAPER FACESHEET

1. TRANSACTION CODE: C (A ADD, C CHANGE, D DELETE)

PRP

2. DOCUMENT CODE: 2

3. COUNTRY/ENTITY: NIGER

4. DOCUMENT REVISION NUMBER: 1

5. PROJECT NUMBER (7 digits): 683-0202

6. BUREAU/OFFICE: A. SYMBOL: AFR; B. CODE: 01

7. PROJECT TITLE (Maximum 40 characters): Niger Range and Livestock

8. PROPOSED NEXT DOCUMENT: A. 3 PP; B. DATE MM YY: 05 77

9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION: A. INITIAL FY 77; B. FINAL FY 80

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 -)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL	492.0	8.0	500	3574.6	1706.2	5280.8
(GRANT)	(492.0)	(8.0)	(500)	(3574.6)	(1706.2)	(5280.8)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY		17.9	17.9		440.8	440.8
OTHER DONOR(S)						
TOTALS		25.9	517.9	3574.6	2147.0	5721.6

11. PROPOSED BUDGET AID APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. FIRST FY 77 F. GRANT	E. FIRST FY 77 G. LOAN	LIFE OF PROJECT H. GRANT	LIFE OF PROJECT I. LOAN
(1) FN		095		500		5280.8	
(2)							
(3)							
(4)							
TOTAL				500		5280.8	

12. PROJECT PURPOSE (Maximum 480 characters) [X] "X" IF DIFFERENT FROM PID

1. The preparation of a comprehensive Range Management Plan and Livestock Extension program to optimize animal production in the pastoral zone.

2. The development of the institutional capacity to begin to implement such a program.

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15? IF YES, ATTACH CHANGED PID FACE SHEET.

[ ] 1 - NO 2 - YES No PID Facesheet available

14. PLANNING RESOURCE REQUIREMENTS (Staff/Funds)

Site Resource Inventory and Design Team

15. ORIGINATING OFFICE CLEARANCE

SIGNATURE

TITLE

DATE SIGNED MM DD YY

16. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION MM DD YY

AID 1330-3 (3-76)

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT IDENTIFICATION DOCUMENT FACESHEET

To Be Completed By Originating Office

1 TRANSACTION CODE: C (A = Add, C = Change, D = Delete)

PID

2 DOCUMENT CODE: 1

3. COUNTRY/ENTITY: NIGER

4 DOCUMENT REVISION NUMBER: 1

5 PROJECT NUMBER (7 digits): 683-0202

6 BUREAU/OFFICE: A Symbol: AFR; B Code: 01

7 PROJECT TITLE (maximum 40 characters): Niger Range and Livestock

8. PROPOSED NEXT DOCUMENT: A 3 (2 PRP, 3 PP) B DATE MM YY 05 77

9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION: a INITIAL FY ___ b FINAL FY ___

10 ESTIMATED COSTS ($000 or equivalent, $1)

FUNDING SOURCE	Life of Project
a AID Appropriated	5280.8
b OTHER U.S. 1	
b OTHER U.S. 2	
c Host Country	440.8
d. Other Donor(s)	
TOTAL	5721.6

11 PROPOSED BUDGET AID APPROPRIATED FUNDS ($000)

A APPROPRIATION	B PRIMARY PURPOSE CODE	C PRIMARY TECH CODE Grant	D Loan	E FIRST FY 77 Grant	G Loan	LIFE OF PROJECT H Grant	I Loan
(1) FN	113	095		500		5280.8	
(2)							
(3)							
(4)							
			TOTAL	550		5280.8	

12 SECONDARY TECHNICAL CODES (maximum six codes of three positions each): 078 | 039

13. SPECIAL CONCERNS CODES (maximum six codes of four positions each): BS | DEC | PART

14 SECONDARY PURPOSE CODE

15 PROJECT GOAL (maximum 240 characters)

The development of a system of Range Management in the pastoral zone for the preservation of this resource and increased income of traditional herdsmen in the pastoral zone

16 PROJECT PURPOSE (maximum 480 characters)

1. The preparation of a comprehensive Range Management Plan and Livestock Extension program to optimize animal production in the Pastoral zone.

2. The development of the institutional capacity to begin to implement such a program.

17 PLANNING RESOURCE REQUIREMENTS (staff/funds)

Design Team - Leader, Economist, Range Manager, Animal Husbandry, Engineer, Sociologist

18 ORIGINATING OFFICE CLEARANCE

Signature

Title

Date Signed MM DD YY

19 Date Document Received in AID/W, or for AID/W Documents, Date of Distribution MM DD YY

AID 1330-2 (3 76)

NIGER RANGE AND LIVESTOCK

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NIGER RANGE AND LIVESTOCK

I. Project Summary and Recommendations

A. Facesheet (Attached)

B. Recommendations

This project paper recommends

- grant funds of $5,329,300
- a waiver of the requirement that the recipient country fund 25 percent of the cost of this project
- a waiver permitting the local purchase of certain equipment and commodities for this project

C. Project Description

The project addresses in two phases the problem of low productivity and deteriorating range conditions in the pastoral zone of Niger. Phase I, which is proposed in this document, consists of studies and pilot interventions to (1) provide information on the existing livestock production system, (2) measure the impact of various productivity-increasing interventions, and (3) establish the technical and social feasibility of preserving the Sahelian rangeland. The pilot interventions and studies will be conducted in the central pastoral zone of Niger. This project will also include training and construction to establish the basic infrastructure required to develop a long-term program based on the above studies. A Phase II project is envisioned to implement a long-term action program to protect the range resources and increase animal productivity based on the Phase I studies.

Specific activities included in this project are:

1. a series of range resource and water development studies and a pilot range management effort with one or two groups of herders who traditionally graze their animals in contiguous areas, to provide a basis for a range management plan in the project areas;

2. a sociological study of traditional herder range use and animal husbandry practices which will, among other things, establish the social feasibility of increasing the control over range use in the pastoral zone;

3. a livestock production system study of two groups of herding families: half as a control group and half to receive a complete health care and disease control package, supplementary feeds, and access to salt and minerals:

4. a series of short-term studies to provide data on human and cattle populations, legislative issues related to range management, and recurring cost implications of expanded Government of Niger (GON) programs in the pastoral zone.

In addition, this project will begin laying the groundwork for a Phase II action program by:

1. constructing livestock stations in the project area:

2. sending Nigeriens to be trained in the U.S. in the fields of livestock extension and range management;

3. developing local training capability in range management and livestock extension: and

4. advising the GON on the organizational, manpower development, and land tenure implications of comprehensive livestock and range management programs in the pastoral zone.

The end result of these studies and interventions will be a cost effective and implementable range management plan and livestock productivity program that meets technical needs of the area and is amenable with traditional grazing practices.

USAID will provide personnel, commodities, construction and training. Personnel will include a range management advisor, an animal husbandry advisor, an agricultural engineer, a rural sociologist, a marketing economist, an agricultural economics research assistant, animal-science research assistant, and eight field workers under personal services contracts. In addition, an estimated 27 man-months of short-term consultants will be required. The commodities and equipment component consists largely of vehicles and other items required to carry out the studies and pilot interventions. Construction is required for the livestock stations. The training proposed consists of ten degree programs, thirty-six months of short-term non-degree programs, and local training.

The GON will provide full-time counterparts to the senior U.S. personnel, paramedical personnel and vaccines for animal health services to the study herds mentioned above, training facilities and personnel for local training, personnel and equipment for recorded extension programs aimed at herders via radio transmission and tape cassettes, land for livestock facilities, and an evaluation and study team to assist in the development of the Range Mangement program for the pastoral zone at the end of this project.

While there are no other donors contributing financial support to this project, France and Saudi Arabia are assisting in projects in other parts of the pastoral zone and the World Bank (IBRD) is expected to begin a livestock project in the area south of the project zone. These projects will have a common goal of contributing to the development of the Nigerien livestock industry and a GON infrastructure to administer further work. The project is consistent with strategy for livestock development as set forth for the Sahel Development program by the Working Group on livestock of the CILSS and the Club des Amis.

II. Project Background and Concepts

A. The Livestock Sector in Niger

1. Livestock is of major importance in Niger as a means of livelihood for a large percentage of the population, as a source of food as a source of revenue for rural investment, as a source of foreign exchange, and as an important element in the evolution towards a modern agricultural system.

2. The importance of the livestock sector in the economy has been detailed in various analyses including AID's Niger Development Assistance Plan, the World Bank's Economic Memorandum dated May 13, 1976, and the more comprehensive Bank analysis entitled Current Economic Position and Development Porspects of Niger, dated August 20, 1974.

3. The Club des Amis du Sahel has identified livestock as a key production sector in the Sahel Development Program (SDP). The CILSS/Club Livestock Working Group concluded in its report of April 1977 that the two long-term objectives to pursue under the SDP were:

- The increase in animal production to satisfy increasing internal demand;

- The increase of revenue and quality of the lives of the producers.

4. Niger Government efforts in the first years after independence were mainly focused on veterinary programs to improve animal health and on programs to provide additional water in the pastoral zones. The rinderpest eradication program which the US supported as a regional effort to eliminate this disease is an example from the sixties. The large, costly boreholes and pumping stations in the northern part of the country in places like Abalak, Tchintabaraden and Abala are also examples from the sixties.

5. Beginning in the seventies, efforts have been made to foster mixed farming, the use of animal traction and on-farm feeding of livestock in the southern farming zone. These efforts have been programmed mainly as components of regional agricultural development projects. Along with these efforts in the farm belt, increased attention has been given to development of the pastoral zone. In about 1968, the Government had determined to proceed with the further development of stock watering points in the pastoral zone. However it was recognized that first an overall survey of the grazing resources in the area would be needed in order to insure a balance in water, pasture and animals. This led to the funding by France of a series of comprehensive studies on the situation of the zone as it existed before the drought and of the modernization of the zone. A summary of the conclusion of these studies was published in May 1973. It pointed to the need to develop systems of range management based on the creation of grazing districts and limitations of grazing in accordance with annual carrying capacity.

6. The imperative need for range management was brought home with a vengeance by the devastating drought of 1973. About 2 million cattle, a million sheep, a million goats and 150,000 camels, horses and donkeys were lost. It was as if, in the United States, the country's cattle population had suddenly in the space of six to nine months, been cut by 44 million head. Losses were nationwide but the herders in the pastoral zone were the hardest hit losing on the average two-thirds of their cattle. In addition, the pasture lands in the north suffered serious degradation from very heavy overgrazing.

Table I: Changes in the Livestock Sector 1972 and 1975

	National herd (000)		Exports (head)	
	1972	1975	1972	1975
Cattle	4,110	2,455	181,096	50,708
Sheep	2,650	2,050	47,674	36,713
Goats	6,100	5,154	95,216	50,206
Camels	330	228	4,427	1,805

7. Following the drought, the Government's program and strategy has been conditioned by the necessity to undertake emergency measures for drought recovery and rehabilitation. But in looking ahead, it has been guided by a strategy suggested initially by the French-financed SEDES/IEMVT studies. This suggested strategy endorsed for the pastoral zone by all observers thus far, can be stated simply as geographic specialization in the various stages of animal production: (a) calf production, (b) growth to maturity, and (c) fattening for slaughter and export. The production of calves, young male sheep and goats is to be the specialization of the pastoral zone. Growth and finishing are to take place further south in the agricultural area.

8. The project proposed in this paper addresses the problem of livestock development in the pastoral zone. The problem is two-fold: First there is a concern for the rational use of some 20-25 million hectares of land too arid to support farming but well suited for livestock production; and second there is a concern for the well being and livelihood of nomadic herders, a half or million or more, who are primarily dependent on stock raising for their livelihood. These herders represent today the poorest group in Niger.

9. The project is the outgrowth of discussions with the GON which began in 1975 and which led to a formal request for AID help to work on this problem in a triangular area demarcated by the towns of Tahoua-Tanout-Agadez. This area comprises some 4 1/2 million hectares of range land in the heart of Niger's cattle country. It is an area which is representative of the range management and stock raising situation found generally in the Sahelian zone. It is the area which provides much of the livestock sold in the rural markets of southern Niger, the urgan centers of Niamey, Maradi and Zinder and the export markets on the coast.

10. The project review paper was reviewed by both governments in the spring of 1976. The aim is a program in the project area which would institute, in two phases, systems of range management and herd management, thereby raising animal productivity and increasing herder income while at the same time protecting the grassland resources of the area. The broader goal of this effort is to develop and implement range management and animal husbandry systems and strategies in the project area which can be used throughout the pastoral zone over the next 20 to 25 years.

B. The Pastoral Zone in Niger

11. The zone is defined as the area lying approximately within the 200 to 400 mm isohyetal lines (see map page 6a). The area is vast, stretching about 1500 kilometers from the Malian border on the west to Lake Chad in the east. It comprises an estimated 23.5 million hectares of land. The southern limit of the area follows the 400 m isohyetal line and was defined by Niger law 61-5 dated May 26, 1961. This law restricts crop cultivation north of the southern limit except by special authorization. In fact some rainfed farming is carried on in the zone, particularly since the drought, as nomads faced with loss of their herds have attempted to raise a cereal crop of millet with the limited rainfall available.

12. Vegetation in the zone is sparse with most of the perennial grasses having been replaced with the less favorable annual grasses as the major sources of forage. The period from about 1954 to 1968 were exceptionally good rainfall years in Niger, and as a result pasture conditions were generally good. During that period the national herd more than doubled, and the numbers of nomad herders increased substantially, both by reason of natural population growth and by the influx of Fulani herdsmen from Nigeria.

13. Starting about 1968, the French funded important studies of the grazing and water resources of the zone. These studies provide the best available analysis of the area and its resources, as it existed before the drought in 1973. Reference in particular should be made of the agrostological study published in 1972.* This study, which is based on surveys carried out in the period 1969 and 1970, notes extensive degradation of the pasture lands in the zone due to overgrazing, and makes a number of recommendations for controlling the irrational exploitation of the grazing and stock watering resources of the area. The study notes destruction of the grasslands was a result of:

- too intensive grazing during the wet season;
- overgrazing in the dry season;
- widespread grassland fires;
- destruction by herders and animals of trees and bushes.

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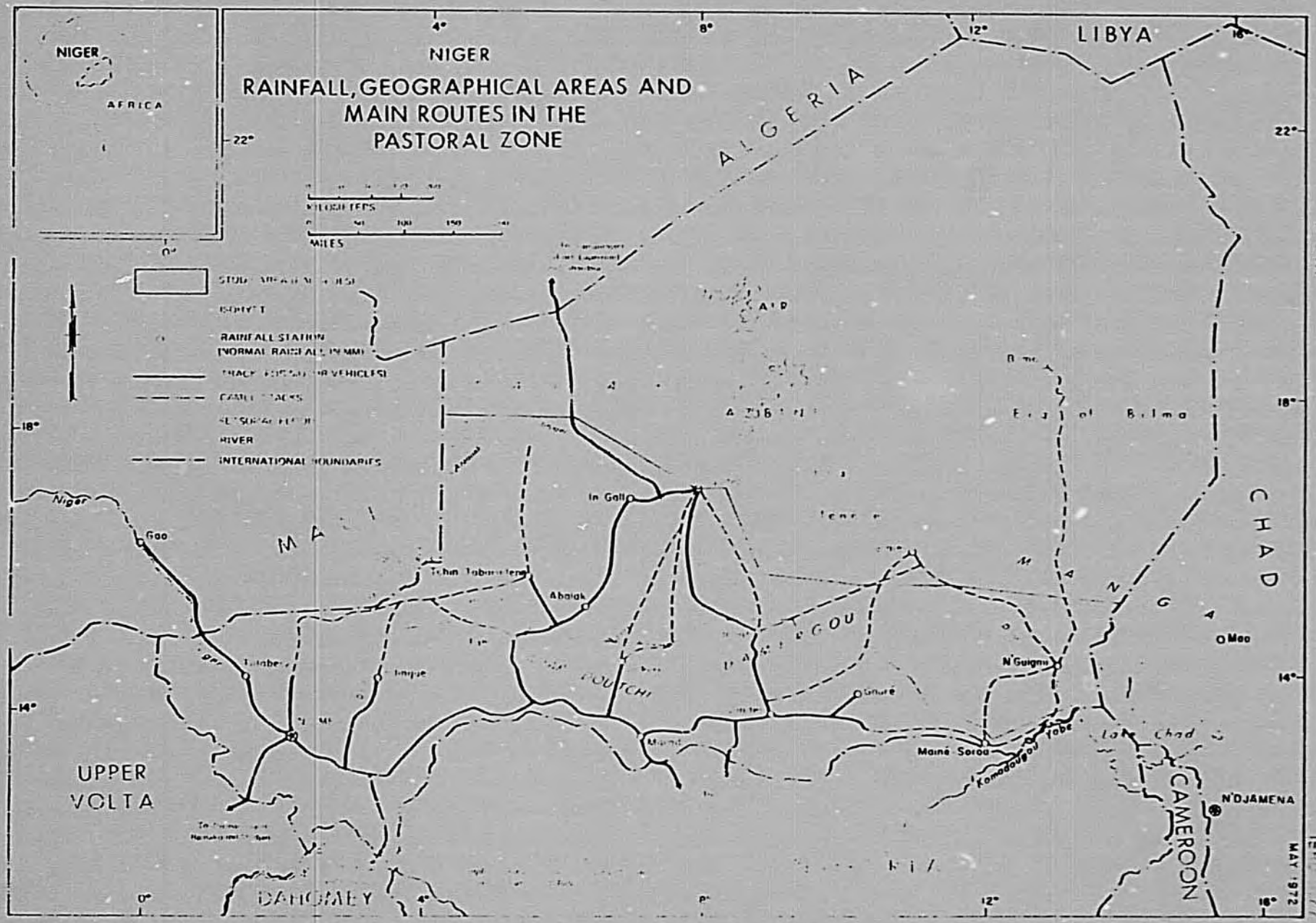
* Institut d'Elevage et de Médecine Véterinaire des Pays Tropicaux, "Modernisation de la Zone Pastoral du Niger - Etude Agrostologique", Paris, January 1972.

MAP I



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14. The surveys just cited were carried out after the poor rainfall year of 1968, but cannot, of course, reflect the much more extensive degradation and destruction of grazing lands that occurred as a result of intense and widespread overgrazing in 1973/74. Since no overall surveys have been conducted since 1970, the extent of the damage has not been assessed and an evaluation of the potential of the Sahelian grasslands has been recommended by the Club/CILSS Livestock Working Group. The establishment of a system for providing accurate appraisals of the condition of pastures and their animal carrying capacity in the project area is an essential part of the present project.

15. There is thus no current estimate of the carrying capacity of the ranges in the pastoral zone. What we do have are the rough estimates prepared in the IEMVPT/SEDES study just cited for the year 1969/70. That study showed a theoretical carrying capacity of about 1.6 million tropical bovine units (TBU) during the dry season and about 3.2 - 3.4 million during the wet season. These estimates of carrying capacity compare to estimates of actual numbers in the pastoral zone in 1969/70 of about 1.3 million TBU in the dry season, and 1.73 million in the wet.*

Table II: The Different Sectors of the Pastoral Zone, Carrying Capacity and Estimated Animal Population in 1969/70

	Animal Population (In TBUs	Theoretical Carrying Capacity Dry Season)
North Djerma Ganda	81,000	108,000
South Tamesna	192,000	213,000-309,000
N. Dakoro-Tadess Plain InGall-Agadez-Tamesna	381,000	452,000-505,000
N. Tanout-N. Goure	186,000	160,000-190,000
Maine	273,000	382,000-412,000
North Lake Chad	35,000	63,000-66,000
Lake Chad & Kadzel	147,000	176,000-187,000
	1,295,000**	1,665,000*

Source: SEDES/IEMVT, op cit

* The wet season runs from July to November and the dry season from December to June. ATBU is equivalent to 250 kilograms of live weight for cattle or 10 sheep or goats.

** The Ministry of Plan reports a different estimate of 1,570,000 TBU's in the pastoral zone (dry season) in 1970.

16. As a consequence of the drought, the national herd declined castastrophically in 1973/74, from an estimated 4.9 million TBUs in 1972 to 3.0 million in 1974. Before the drought, about 3/5th of the herd were pastured in the pastoral zone during the wet season; then a large portion were moved south into the farm belt leaving only about 1/4th in the zone during the dry season from December to June. Thus in 1972, 3 million TBUs of livestock grazed in the zone during the wet period (July-November) when pasture conditions are best. About 1.6 million units were left to face the more difficult and dry period, according to estimates compiled by the Ministry of Plan, the number of animals using the zone declined to 1.7 million units during the wet season, and to only 770,000 TBUs during the dry season. Ministry of Plan estimates suggest that by 1980, dry season pasturing may reach 1 million units and wet season pasturing 2 million units.

17. The human population of the zone was estimated by SEDES (op cit) to amount to about 600,000 persons circa 1970. Most of these were Tuaregs and Fulani, with smaller ethnic groups of Kanouri, Toubous, Hausa, Arabs, and others. The present population of the zone is unknown. Despite natural growth, it is considered that the population has probably declined as many nomads moved south after the drought. A population census is to be conducted in the country in the fall and winter of 1977, and should provide better data within a year.

18. There is also very little recent information about composition and size of families, consumption patterns and family income. Based on some rough judgments about the average size of herds in the area, it has been estimated that per capita income may range from close to zero for indigent families who lost all during the drought to up to $120 per person for more favored families. The average per capita income for herders is considered probably around $50-60 per year, somewhat below that of sedentary farmers in the south.

19. Water is the great problem in the area. Formerly all wells were privately owned, and the controls exercised by well owners contributed in some extent to controlled grazing. Additional public water points, including costly boreholes and pumping stations, were developed during the sixties. In recent years, development of boreholes and other water supply sources has been tempered by the growing realization that something needs to be done to control grazing. There are also a large number of cement lined public wells financed by the Government and hence open on a first come first serve basis. By far

TABLE III: Distribution of Livestock in Ninger 1970-1972-1974-1980 TBU's (TBU - 250 Kg live animal)

Years		Total Livestock in Thousands		Distribution in Thousands of TBUs			
				Dry Season December - June		Wet Season July - November	
		Head	TBU	Pastoral Zone	Agr. Zone	Pastoral Zone	Agr. Zone
1970	Cattle	4.000	3.200	960	2.240	2.080	1.120
		8.700	870	185	685	550	540
		345	345	345	-	345	-
		570	285	80	205	150	135
			4.700	1.570	3.130	2.905	1.795
1972	Cattle	4.200	3.360	1.010	2.389	2.185	1.175
	Sheep-goats	9.150	915	195	721	375	540
	Camels	345	345	345	-	345	-
	Horses-asses	570	285	80	205	150	135
			4.905	1.630	3.275	3.055	1.850
1974	Cattle	2.200	1.760	360	1.400	1.060	700
	Sheep-goats	7.100	710	150	560	290	420
	Camels	235	285	200	85	285	-
	Horses-asses	420	245	60	185	130	115
			3.000	.770	2.230	1.765	1.235
1980	Cattle	2.240	2.240	450	1.790	1.340	900
	Sheep-goats	8.700	870	185	685	330	540
	Camels	310	310	310	-	310	-
	Horses-asses	540	270	75	195	140	130
			3.690	1.020	2.670	2.120	1.570

Source: Ministére du Plan, Niger

the largest number of watering points remain the traditionally dug wells. During the wet season and extending into the dry season, reliance is also placed on shallow wells called "puisards" and natural ponds.*

20. The further development of water resources needs to be preceded by measures to institute controls on grazing and range management. The various studies also are clear on the need to improve traditional wells in order to reduce pollution and disease.

21. Transportation and communications in the area are difficult and limited, and principally on a north-south axis. Two major routes are Tahoua-InGall-Agadez, and Zinder-Tanout-Agadez. The first, the "Route de l'Uranium", is to be improved to a first class paved road using funds provided by companies exploiting the uranium deposits in the Air mountains. Construction is to start in 1978. Niger is currently seeking Arab and European funding to upgrade the Agadez-Tahoua-Zinder road, with some likelihood that this could come about in the next five year plan scheduled for 1979-84. Using its own funds, the Government is improving the existing track from Filingué to Bani-Bangou in the North Djermaganda to an all-weather laterite surfaced road. The Government is including in the forthcoming five year plan, dependent upon donor funding, a secondary laterite-surfaced east-west axis which will run Tillabery-Ouallam-Filingué-Tahoua-Dakoro-Tanout-Gouré. This axis will do a great deal to facilitate transport and communications in the area just south of the zone, particularly the project area between Tahoua and Tanout. The Government also plans to develop the track running from Dakoro north-east to Aderbissinat. Finally the new paved highway from Goure to Maine Soroa to N'Guigmi on Lake Chad, the "Route de l'Unite", funded by Canada, has opened up access to the eastern sector of the zone.

22. The improvement in transportation facilities which is taking place should do a great deal to reduce costs of development in the area, and eventually of marketing. With easier access, the relative cost of installing and operating livestock facilities for animal health, extension, marketing, etc., should be reduced significantly in the coming decade. Better roads should also lessen the heavy costs of consumer goods, distribution including food grains. A major problem in the area is the need to provide a measure of supplementary feed during the end of the dry season. Improved roads should contribute to easing this problem.

23. Markets in the pastoral zone are few in number and far apart. Main markets lie south of the zone. (See map following page). There are also a large number of north-south cattle trails used to move animals on hoof to the southern livestock markets and then on

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* For a fuller description of water resources in the pastoral zone and the project area, see Annex E.

for export into Nigeria, Benin, Togo, Upper Volta, Ghana and the Ivory Coast. In recent years AID funded a cattle trails project* through the Entente Fund which provided for a new trail from the North of Tahoua to the North of Abala, and then improved trails from Abala to Niamey, from Bani-Bangou to Niamey to Upper Volta and from Dosso to Dahomey. The project financed some 15 wells for stock along the trails, constructed seven veterinary posts in isolated areas along the Malian, Upper Volta and Benin borders, and provided additional cattle market facilities in nine locations in Tahoua and Niamey Departments.

24. Livestock facilities in the pastoral zone until very recently have been limited to veterinary offices in the arrondissements comprising the zone. Administratively the zone is covered by six departments and 17 arrondissements. Principal arrondissement centers include Ouallam, Filingué, Tchintabaraden, Agadez, Dakoro, Tanout, Mayaki, Goure, Diffa and N'Guigmi.

25. From the foregoing it is apparent that the pastoral zone with an area of over 20 million hectares and a carrying capacity of over a million livestock units in the dry season, and two to three times that in the wet season represents a major national resource. However, the problems of the zone are deep rooted. Grasslands have been seriously misused and are degenerating under pressure of man and animal. Productivity of herds is low. Access is difficult and costs of marketing and distribution and the installation of service facilities are high. The population is poor, largely illiterate and unschooled. The potential exists to establish range management systems which will protect and in some measure help regenerate these extensive ranges. The potential also exists for significant increases in the productivity of herds and hence increased offtake. The modernization of the zone and increased productivity hold promise for improving the standard of living and the quality of life of the many herding families in the zone.

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* See Annex A for a description of this project.

C. Government Policies for the Pastoral Zone

26. Government planning for the zone has been based on a determination to modernize livestock production in the zone and on a recognition that somehow the ranges must be protected and preserved from overgrazing. Government thinking, and possible program interventions were well summarized in the short summary report of the conclusions which emerged from the SEDES/IEMVT studies on the zone.* Written by a well known French authority, B. Peyre de Fabregues, the report concludes that systems of range management must be devised, in concert with the traditional herders of the zone, and that it would seem that the only solution is to create grazing districts (unités pastorales) in which carrying capacity can be balanced with herd numbers, and in which better herd management and productivity can be achieved. We cite this particularly because it is very close to the conclusion which most observers of the livestock situation of the country have reached, including those in the Ministries of Rural Development and Plan. The CILSS/Club strategy paper on livestock in the Sahel (draft dated April 1977) makes the same point:

> "the need to protect pasture land against overgrazing will require immediate action not only to understand the situation but to manage a relatively large area in a relatively brief period of time. These actions are all the more necessary since other sources of animal feed in the farming zones have not yet been developed."

27. In preparation for this project paper, discussions were held with the senior policy people in the Ministry of Rural Development and in the Ministry of Plan. The result was a summary statement (also drafted in April 1977) of the principal points guiding Niger in its planning for modernizing the pastoral zone. The statement (translated) follows:

> "The Government policy for the modernization of the pastoral zone is based on the basic need for organization of animal production activities in the zone, and on the need to relate and integrate this production with livestock in the farming zone. The policy needs to take into account the following points:
>
> (a) A system of range management needs to be established throughout the zone. This means balancing annual grazing with the carrying

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* Institut d'Elevage et de Médecine Véterinaire des Pays Tropicaux, "Synthèse des Etudes de la Zone de Modernisation Pastorale du Niger - Amelioration de l'Exploitation Pastorale", Paris, May 1973.

capacity of the ranges in order to stop further deterioration of the grasslands and to gradually improve their quality. The size of herds will have to be adjusted to the carrying capacity of the ranges;

(b) animal productivity needs to be increased. In the pastoral zone, this means specialization in reproduction of young ('vocation naisseuse') and hence a modification in herd composition to increase the number of productive females, which in turn will lead to an increase in reproduction and offtake rates. To realize this aim, male animals will have to be marketed earlier. The policy will be to 'destock' males and infertile females.

(c) there is a need to provide assistance to herders to help them develop and adopt better systems for herd management and for range management. Ranges ought to be reserved for the herders customarily using them. Range management systems should be introduced only with the advice and consent (le concours) of the herders; and enforcement of range management should be done by the herders themselves.

(d) there is a need to create an agency for the modernization of pastoral zone. This agency will be responsible for extension and information work with the herders. In each grazing district, an organization of herders will be established to insure control (enforcement) of the range management system.

(e) herders will need to be helped to form associations; a system of credit and cooperation for herders will need to be established.

(f) structures for marketing, finishing and fattening will be needed, in order to insure the sale of animals from the pastoral zone at incentive prices for the producers.

(g) balanced herds will include cattle, sheep, goats, camels, horses and donkeys; however the raising of cattle and sheep will be encouraged.

(h) social actions will need to be undertaken - health, training and education, literacy, etc.

(i) there will be a need to insure the supply of food grains and other products (tea, sugar, etc.) at reasonable prices.

D. Government Planning for the Pastoral Zone

28. Government plans to improve roads in the areas were summarized in paragraph 21. This section reviews plans for interventions to address directly the problems of livestock in the area.

29. Multiplication Centers. As part of its interim three year program, for drought recovery and rehabilitation, the GON has undertaken to establish "multiplication" centers in the pastoral zone. These are meant to be a source of quality animals for the herdsman of the zone. They are also supposed to serve as extension centers for demonstrations, training and information. They are also planned to be used as centers for the distribution and possibly the production of supplemental feed. The Center at Ibesseténe (80,000 ha), 80 km northeast to Tahoua, is being funded by FED (231 million CFA) and is about 80% completed. Four others are being funded by Saudi Arabia and are under construction. One at Khoul is in the USAID project area, another north of Dakoro is just south ot it, and the one at Belbedji is due east of Tanout. A fifth is being located in Diffa Department west of N'Guigmi. The extension programs planned to be carried out in these centers is of interest as an indication of the kinds of activities the Livestock Service is proposing to increase animal productivity and to protect the ranges. A description of the Ibesseténe project has therefore been attached as Annex B to this paper.

30. Zones d'Interventions. The Societé d'Etudes et de Développement Economique et Social (S.E.D.E.S) produced in 1975 a study recommending four areas of intervention in the regions of south Tamesna, InGouchal, Tejira and Manga. These areas are situated in representative portions of the pastoral zone and are designed to demonstrate what intensive projects to institute range management and to improve herd management and increase productivity and output can accomplish under existing conditions in the country. They are also intended to help define the long-term strategy for the development of the pastoral zone. The SEDES proposal specifically entails the eventual establishment of an office for pastoral zone modernization.

The four projects were presented initially to the Niger Government in 1975, and then in revised form in 1976. The Government is attempting to raise foreign funding (probably Arab) for the four projects which the SEDES revised report costed at 2.9 billion francs cfa ($11.7 million). The recent (April 1977) CILSS/Club des Amis Livestock Working Group has included these projects among its recommendations for funding. However, the estimated costs presented by the GON and cited in the Working Group's report now give 5 billion cfa (about $20 million) as the total cost. The projects proposed are interesting because they do outline in detail and in area-specific terms proposals to increase offtake from the herds in the project areas, and to protect and improve the grazing lands.

31. The USAID Project is considered by the Government to be central to its effort in the pastoral zone. The area of the activity is defined by the towns of Agadez, Tahoua and Tanout. However in the first phase activity is to be concentrated in the trapezoidal area demarcated by the towns of Abala, InGall, Agadez, Aderbissinat. Phase I activity would be focussed in the main west of longitude 8° E. The project is fully described in succeeding portions of this report.

32. The World Bank Project. In connection with its rural development project in the Development of Maradi, the World Bank has recently (February-March 1977) proposed an ambitious program for livestock in the "central region" of Niger, including both portions of the northern pastoral zone and of the southern farm belt. The area of activity will, according to Bank representatives and the Government be limited to the Departments of Maradi and Zinder. The action to be undertaken in the pastoral zone will take place west of the USAID project and will therefore extend from approximately the region of Tanout east to the 12° E meridian. The Bank is proposing* to undertake interventions in the zone very similar to those which AID is planning to test and evaluate in this project. The Bank's project could conceivably start as early as 1979, and is intended to be a five year effort in the Maradi and Zinder department.

33. One could reasonably expect that as the AID and IBRD projects continue to develop, the possibilities of combining forces in a major sector program approach may become evident. At the moment, however, it is clearly the GON's desire to keep the two activities separate and distinct, at least through Phase I of the AID funded project which is designed to prepare the basis for a comprehensive Phase II program in the project area envisaged to be undertaken in about three years, i.e. by 1980.

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* See Annex D for a description of the Bank proposal.

34. Pastoral Zone Office. The Government has set up a special Pastoral Zone Office with a director reporting directly to the Minister of Rural Development. In addition it has requested assistance from CILSS/Club des Amis to establish a "Cellule d'Appui", (special studies unit) which would serve to evaluate activities underway and planned in the pastoral zone, and to seek support for the modernization program.

35. As seen from the foregoing, GON planning involves implementation of the multiplication centers and S.E.D.E.S. zones of interventions accross the country from near the Mali border to near Lake Chad. It includes the "USAID project" in the central cattle country. It includes the prospect of a World Bank project from the area extending from Tanout to as far east as the 12° E meridian. These programs, particularly the latter three, start from the premise that animal productivity in the pastoral zone can be increased; that increased productivity can result in greater offtake from smaller herds; and that use of the range must be better controlled to maintain its productivity over the long-term. Each activity has somewhat different priorities and approaches, with the USAID project being much more experimental than the other two. The outcome of these interventions is that as a group they will provide the experience and data base from which to formulate a comprehensive strategy for livestock development in the pastoral zone.

36. GON planning also includes a Lake Chad Basin Commission activity to develop Kuri cattle production on the borders of the Lake. In addition, an expansion of animal health coverage, and of training in livestock personnel is planned, both within the framework of specific projects and as supplemental activities.

37. As noted earlier, the Government is undertaking, beginning in 1977 and extending through 1978, the preparation of five year development plan. Because the situation of the livestock sector has changed so much in recent years, the basic data for the sector which were largely compiled in the 1960's and early 1970's are out of date. In addition to the studies and analysis being provided under the AID project, the Ministry of Plan is considering undertaking special sample surveys of livestock throughout the country during the next twelve months.

38. The basis for a comprehensive program for the pastoral zone is thus being laid, and should be concretised over the next few years. We see the USAID project as an important element in the effort to develop and test out the interventions and systems which will be needed to make rational use of the rangeland and stock raising potential of this area.

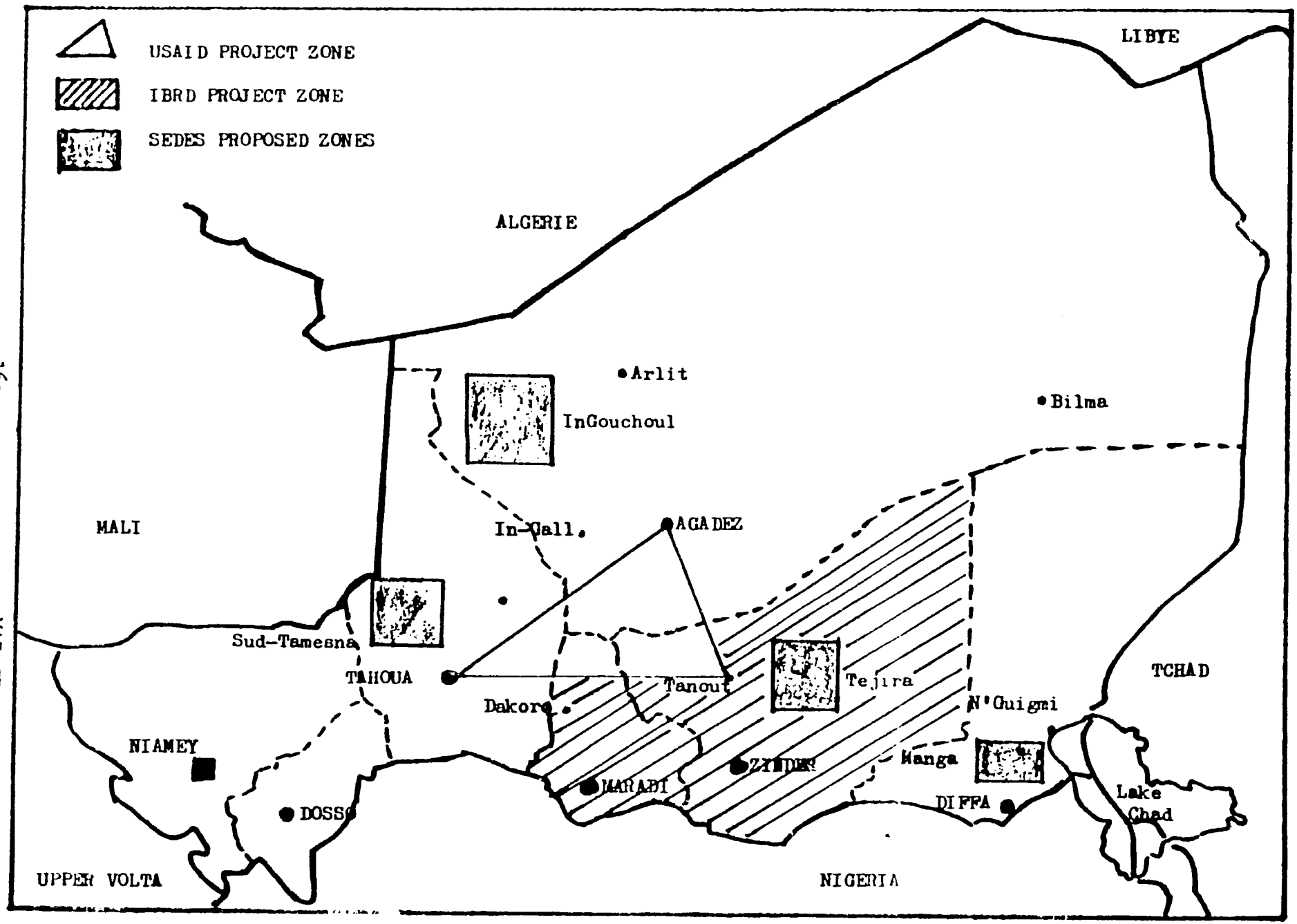
However, it must be stressed that the farming area to the south has much greater feed availability, at least potentially, and that there are basic linkages between the two zones. The alternating grazing of a large percentage of the national herd in the pastoral zone during the wet season, and then in the farm zone during the dry season, is one main characteristic of these linkages. A second is the marketing of animals from the pastoral zone in the south; the ability to market the surplus production of the pastoral zone also relates to the strategy of developing growing-out facilities (ranches?) and farmer cattle fattening programs in the south. While, the USAID project and the World Bank project are considered to be complementary, the USAID project concentrates on the problems peculiar to the pastoral zone. We note however that increased livestock production in Niger cannot be limited to either the pastoral or the agricultural zone. consequently, any follow-up to this project will have to be coordinated with development of livestock production in the agricultural zone to the south. (the Map on page 16a shows the locations of various interventions planned in the pastoral zone.)

III. Project Description

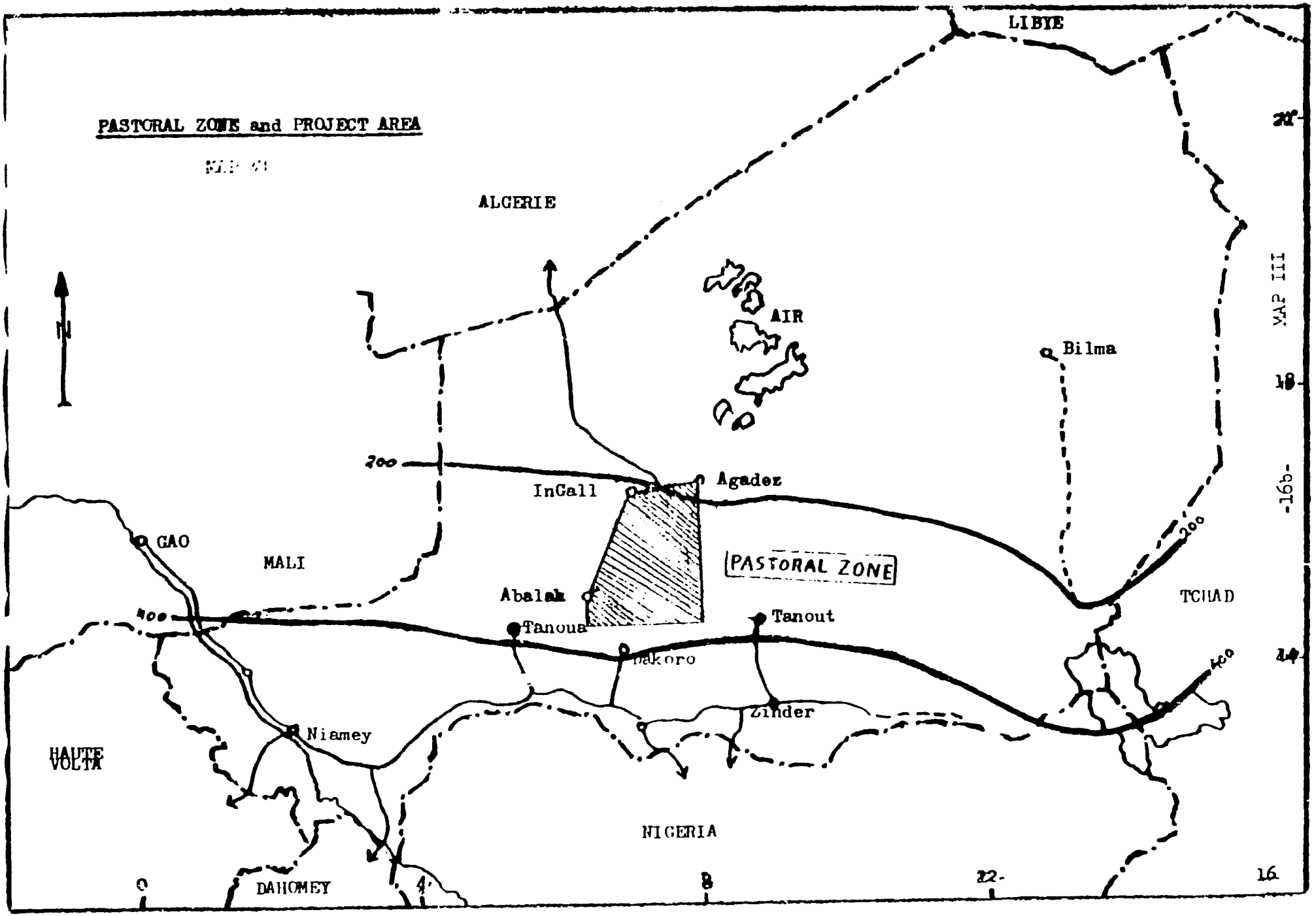
A. Sector Goal and Project Purpose

39. The goal to which this project contributes is the development of a system of Range Management in the pastoral zone for the preservation and improvement of this resource and the increased income and well-being of traditional herders in the pastoral zone of Niger. (See Map 1, page 16b, for the boundaries of the pastoral zone.) In the short run increased income of herders could be achieved through various animal health and disease control interventions which would result in an increase in animal numbers. Because of the fragile nature and the limited resources of the pastoral zone, future use dictates that some method of range management be introduced that will be based on preservation and improvement of this natural resource to allow for higher productivity of individual animals and increased rates of offtake from smaller herds.

40. Effective national program in both of these areas - livestock production and range management - in the pastoral zone will not be easy to achieve. The area is remote, the people and animals are widely dispersed and the concept of rigid control over the use of natural resources is foreign to the traditional herders of the area. Further, the data do not exist at this time to design effective range management and livestock extension programs which the GON can afford and which are certain to be appropriate for the area.


USAID PROJECT ZONE
IBRD PROJECT ZONE
SEDES PROPOSED ZONES
LIBYE
ALGERIE
Arlit
InGouchoul
Bilma
MALI
In-Gall.
AGADEZ
Sud-Tamesna
TAHOUA
Tanout
Tejira
Dakoro
N'Guigmi
TCHAD
NIAMEY
Manga
ZINDER
MARADI
DIFFA
DOSSO
Lake Chad
UPPER VOLTA
NIGERIA

MAP II

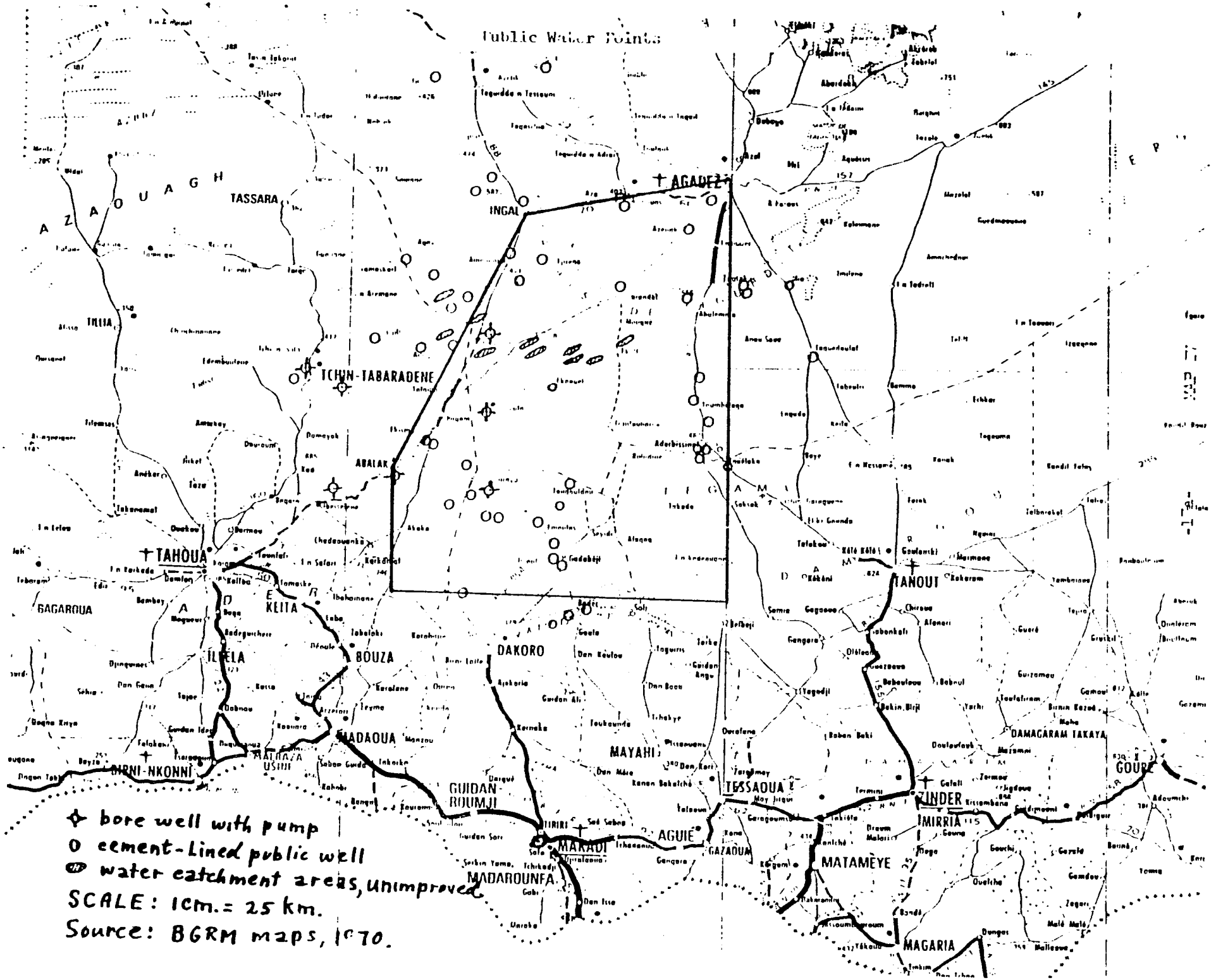

PASTORAL ZONE and PROJECT AREA
MAP III
LIBYE
ALGERIE
AIR
Bilma
InGall
Agadez
GAO
MALI
PASTORAL ZONE
Abalak
Tanoua
Tanout
Dakoro
Zinder
Niamey
HAUTE VOLTA
TCHAD
NIGERIA
DAHOMEY
200
400
20
18
14
16
0
4
8
12

41. The purpose of this Phase I project is pilot testing and demonstration of range management animal productivity interventions, the preparation of a comprehensive range management plan and livestock extension program to optimize animal production in the pastoral zone and the development of national institutional capacity to carry out recommended interventions. First, a thorough understanding of the existing systems of livestock production and resource utilization in the pastoral zone will be developed from both technical and economic standpoints; next, the identification of interventions that are technically, economically and socially feasible for implementation in a Phase II activity. At the end of this project, the GON will have all the basic information it needs to begin large-scale programs to increase animal productivity and control range use in the pastoral zone, specifically, it will have: (1) data on the costs and benefits of various interventions on productivity, and (2) a range management plan specifying kinds and levels of use based on the physical and biological characteristics of the land and how controls can best be instituted. The purpose of the Phase II activity that is expected to commence immediately upon completion of this project will be the implementation of a National Range Management Program in the pastoral zone of Niger in conjunction with a livestock extension program that will enable traditional nomadic or semi-nomadic herders in this area to maximize animal productivity without overgrazing.

AID financing will be requested for a Phase II proposal which will be developed as part of this project. The first stage of Phase II will be to implement the interventions, tested and proven in Phase I, in the entire area that is bounded by the towns of Taboua, Tanout and Agadez and eventually to expand program coverage in cooperation with other donors to the entire pastoral zone of Niger. It is envisioned that this program will be implemented by the Office for the Modernization of the Pastoral Zone in coordination with the Livestock Service and Water and Forest Service, all of which are under the Ministry of Rural Development.

It is envisioned that herder associations will be organized along traditional tribal and social organizations existent in the project zone. Through these associations, improved range management practices will be developed and enforced. The GON services in the Ministry of Rural Development will develop the capacity to monitor range conditions, and provide necessary assistance to the herder association in the implementation of recommended range management practices. The GON Services will also work through these associations to provide needed animal health services and animal husbandry extension assistance to aid herders in maximizing productivity from the limited range resources. These associations are expected eventually to be formed into cooperatives to aid herder in marketing their animals, securing production inputs, and securing consumer goods more efficiently.

42. It needs to be emphasized that even if the project purpose is achieved the accomplishment of the sector goal is far from assured. There is absolutely no doubt that, whatever the specific findings of this project any comprehensive livestock production/range management program


Public Water Points
AZAOUAGH
TASSARA
INGAL
AGADEZ
TILLIA
TCHIN-TABARADENE
ABALAK
TAHOUA
GAGAROUA
KELITA
ILLELA
BOUZA
DAKORO
MADAOUA
MALBAZA
USTIN
BIRNI-NKONNI
GUIDAN-ROUMJI
MAYAHI
TIRIRI
MAKADI
MADAROUNFA
AGUIE
GAZAOUA
TESSAOUA
TANOUT
ZINDER
IMIRRIA
MATAMEYE
MAGARIA
DAMAGARAM TAKAYA
GOURE
bore well with pump
cement-lined public well
water catchment areas, unimproved
SCALE: 1cm. = 25 km.
Source: BGRM maps, 1970.

will be difficult to implement. It will be necessary to address the major financial and manpower requirements related to such a program. More importantly, a truly effective range management program will require basic policy and organizational changes at the national level. The major assumption then in going from project purpose to goal are that the GON has sufficient commitment to the latter to make the necessary policy and program decisions and that the GON will be able to secure sufficient funds to implement the required program.

B. Summary Description of the Project Area * (See Map)

43. The area is in the central cattle raising portion of the countr, bounded by Agadez on the north, Tahoua on the south and west and Tanout on the east. The southern edge is just north of the Tarka Valley. It is a semi arid area of limited rainfall, and of grazing lands covering some four million hectares of surface.

44. The area constitutes portions of four arrondissements, Tchin-Tabaradene, Agadez, Dakoro and Tanout. Currently, the population can only be roughly estimated, about 50,000 persons, about evenly divided among Tuaregs and Fulanis. Virtually all these people are dependent on stock raising. They range the grasslands, moving northwards in the wet season and southward, often into the farming belt, in the dry season.

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* See Annex E for a fuller description of the project area; also see the project analysis in Part IV.

Per capita incomes are low, about $50 to 60 per person per year. Illiteracy is very high, and facilities for schooling, health care and other social services are nearly non existent.

45. The animal population has been roughly estimated on the basis of the rule of the thumb in the area that one tropical bovine animal unit requires 30 hectares of land. This leads to an estimated herd population of 150,000 TBUs, which accords reasonably well with the Livestock Service estimates for the total animal population in the four arrondissements. It must be recognized, however, that the numbers of animals, and the numbers of herders varies considerably between a high in the wet season and a low in the dry.

46. As the case throughout the pastoral zone, roads are few, access is difficult and costs of distribution are very high. Water is a major problem.* Ten boreholes and pumping stations (which can water up to 5,000 head of cattle per day and often do) are located in the western limits of the zone. OFEDES, the Government's water agency, has installed some thirty cement lined wells. They average 30-60 meters in depth, cost OFEDES some $250 per meter to dig, and can water up to 1,000 animals per day. The boreholes and OFEDES wells are maintained by the Government and are open to all pretty much on a first come first serve basis. Overgrazing about these watering points has been particularly severe. A large number of traditional wells are owned and operated by herdsmen. These wells are inexpensive to build ($175 per well) and seem to offer the best possibility for extending water supplies in a rational system of controlled range management and improved stock raising. However, improvements in the design and construction are considered necessary to extend their life and reduce pollution. The project area also has six areas where shallow wells called puisards are an important source of water during the wet and into the dry season (November-March). Temporary ponds and lakes exist and suggest more could be provided artificially.

47. Herd offtake and animal productivity is low because of the severe stresses on the animals. The principal stress is malnutrition, both the lack of enough feed and the lack of essential minerals in the diet. This nutritional stress is particularly severe during the last months of the dry season. Lack of sufficient water is another major stress factor during the dry season. Heat and physical stress arising from the energy spent in walking to and from the watering points are also significant factors in low animal productivity. Disease in the area, both epidemic, nutritional and parasitic is another factor.

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* See Annex E, Appendix 1.

48. The area has been surveyed carefully by a Site Inventory Team and by a sociologist.* It is clear that grassland resources have been deteriorating, and that measures must be taken to introduce controlled grazing, rotation and other techniques of range management. The need for this is generally recognized by the leaders of herder groups (of which there may be 1500-2000 in the area). But is also recognized that the task of designing effective, equitable systems of range management in the area will be very difficult and will require many years, as it did in the United States.

49. Principal markets (and towns) in the area are: Abalak and Tofamin in Tchin Tabaraden arrondissement; Agadez, InGall and Aderbissinat in Agadez arrondissement; Gandou, Belbedji, Baté and Tourboko in Tanout arrondissement; and Intouilla, Sakabal, Goula, Koudou, and Dakoro in Dakoro arrondissement. The main role of the markets is the exchange of animals for milk, butter and cheese and cereal food grains. These market towns are for the most part small, having permanent population of only several hundred persons.

50. Facilities for animal health care, extension and training for herders have been limited to small livestock in the four arrondissement centers. A description of these centers, and veterinary facilities in the project area may be found in an appendix C to Annex E. Veterinary services in the area were significantly expanded under an AID project signed in the fall of 1976 (providing a grant of 250,000 to establish mobile vaccination teams operating out of each arrondissement center, and funding the vaccination campaigns in 1976/77 and in 1977/78).

51. The Government is constructing a "multiplication center" at Khoul in the project area which will also serve as a center for extension and herder training. The USAID project includes construction of livestock extension centers at the four important points: In Gall, Abalak, Aderbissinat and Godabedji. Ten small centers for vaccination and treatment for parasites are also to be constructed in the project area. As all observers have concluded, nothing can be done until physical facilities for livestock services are established in the zone.

52. In the project analysis section which follows, it is noted that while a reasonable amount of sociological research has been undertaken in Niger in the project area, the available reports all suffer from the fact that they were written before the drought and are outdated. The situation is even worse with respect to studies of an

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* Rupp Report and Site Resource Inventory Report.

improved technological package for dissemination to herders. There has in fact been little field-level animal husbandry research in Niger, and this lack of a proven package of technological interventions has led the design team for this project to include development and testing such interventions as an essential part of the project activity. The project in fact follows the guidance of one observer (see p. 50) to the effect that successful livestock projects in Africa are based on thorough studies of land, water, and herds and herders, and on the use of indigenous structures to diffuse innovations.

53. Looking to the second phase of the project, it is clear that major administrative changes will be needed. A major function of the project in Phase I will be (see page 80) to provide advice on the content and organization of the expanded program and to train counterparts who will eventually play key roles in it.

C. Project Outputs

54. The major outputs of this project will be a comprehensive plan to increase animal productivity and conserve the natural resource of the pastoral zone and the development of a core staff to begin to implement the plan. This plan will be based on pilot efforts and studies conducted under this project and will be proposed by the project staff and submitted to USAID and the GON by July 1980. The specific outputs that will contribute to the achievement of project purpose can be divided into four categories: range resource studies, livestock production studies and interventions, sociological interventions and studies, and training.

a. Range Resource Studies

The range resource component will define and demonstrate the technically feasible ways of protecting and improving the natural resources of the project area. The specific range resource studies and related interventions during the period of the project will be as follows:

> A detailed assessment of range conditions will be conducted to determine carrying capacities and recommended grazing patterns. This will involve setting up and monitoring 30 range transects and 16 enclosures in different parts of the project area; correlating range condition with rainfall patterns and an overlay map showing changes in vegetation from year to year; and, finally, the preparation of a system of continuous range assessment that can be adopted by the GON as part of this activity, the range management advisor will carry out a complete review of agrostological and other technical data that exist on the project area.

- Aerial photography of the project area with ground verification surveys will be used for mapping and to determine major habitat types in the project area and erosion patterns. These photos will also be compared with photos taken in 1955 to assess changes in the range area in the intervening time. LANDSAT photos for the entire pastoral zone will be used in conjunction with other aerial photos to develop a comprehensive range management program.

- Re-seeding trials will be established to determine whether it is economic to speed up the process of revegetation of denuded areas rather than rely solely on secondary succession or regeneration, which in some cases will take decades. There will be four fenced-in one-hectare plots plus sixteen one-hectare plots that will be reseeded but not fenced-in.

- Three earth water catchment areas of different sizes and depth may be constructed to investigate the possibility of retaining herds in the northern extremity of the pastoral zone for longer periods in order to make more efficient use of the available forage. These catchments will be constructed in conjunction with the organization and development of herder associations participating in pilot range management efforts. This will insure that recommended grazing practices are followed in the catchment areas. Fifteen traditional hand-dug wells will be improved to increase their life, reduce contamination and facilitate the drawing of water. The major intervention in this regard will be the lining of the upper five or ten meters and the construction of concrete aprons. This should reduce deterioration and contamination. The objective is to design a better traditional well at a cost herders will be able and willing to incur.

- During the life of this project the extent of fire damage in the project area will be closely monitored by the range management advisor, and the technical and economic feasibility of reducing the damage will be explored. The exploration will include the study of a firebreak construction program now underway just south of the project area and the conducting of trial burns on small plots to measure effects on forage, rate of regrowth, and response of various species to succession after burning.

b. Livestock Production

The livestock production component of the project will carry out a major study to determine the costs and benefits of a comprehensive small herder-oriented livestock productivity program in the pastoral zone; provide support to the existing livestock program in Niger; and construct facilities required for expanding the ongoing program and for a Phase II project. The program will aim at increasing the productivity of the individual animal, thereby making it possible to increase offtake (both milk and meat) and herder incomes while at the same time reducing herd size. The specific interventions and outputs in this component are as follows:

- A comparative study will be conducted of traditional and improved livestock production systems. Although it is generally recognized that productivity can be increased, it is not yet clear that the required interventions are in fact cost-effective under existing conditions of inadequate feed supply, multiple-objective livestock raising practices and high-cost inputs. The study will be designed and supervised by a senior researcher who has experience in livestock systems research. He will produce a final report analyzing existing livestock production systems in the pastoral zones and the impact of increased inputs and improved practices. The field work will be carried out by research assistants in animal husbandry and agricultural economics. The package of improved services to be provided under the study will include: (1) complete vaccination coverage, (2) treatment for internal and external parasites, (3) mineral supplements for the whole herd, and (4) feed supplements for calves during the stress period at th end of the dry season. These inputs and services will be provided to herder families cooperating in the pilot range management efforts. A control group of herds from another but similar area of the project zone will be selected an studied for comparison purposes. An animal science research assistant will analyze changes in mortality, morbidity, weight gain, fertility, milk production and offtake. An agricultural economics research assistant will analyze the costs and benefits of the program from the standpoints of the GON and the herder.

- The existing livestock program, which consists mostly of providing vaccinations against the most common diseases for a small percentage of the herds, will be expanded in the project area for more complete vaccination coverage and control of external and internal parasites.

- The project will finance the construction of four livestock posts in the project area (see Map 2 for locations.) Each post will consist of office, laboratory,storage facility, corral, a very rudimentary abbatoir/hide drying facility, and living quarters. In addition, ten livestock handling facilities will be constructed in the area to be serviced by the livestock posts at Aderbissinat and Gadebeji. Each of these will consist of a holding pen (12 M x 12 M) and a working chute.

- A study will be conducted of all major livestock markets in the project zone to determine how the present marketing system is constituted. The efficiency of the marketing chain from primary producer to terminal market will be analyzed and recommendations will be made as to how to improve the market share for the primary producer and deal with the expected increased offtake. The livestock market study will include an analysis of projected domestic and export demand for Nigerien livestock products.

- A recurring cost study will be carried out by a macro-economist over a period of about four months to address the basic issues of the cost of improving livestock services in the pastoral zone and the means through which the Government can recover some of these costs.

The sociological component of this project will prescribe methods it finds socially feasible of implementing a range management program in the pastoral zone and, in the process, establish a two-way of communication between the herders and the GON. The specific outputs under this component will be:

- The collection of data from a sample of herding communities on resource claims and utilization, organizational structure, decision-making practices, local economic institutions, use of government services, and herders' relevant attitudes and aspirations.

- the creation of 10 pilot herder associations to consider information on their physical, animal and human resources and to develop, with the help of project technicians, a better understanding of their resources. The eventual long-term role of these associations, will be to participate in the development of a range management plan and to assist the GON in the implementation of that plan. The method by which these herder associations will be organized as described in the social analysis section of Part III and in Annex D.

In Phase I, one or two associations made up of members who graze their animals in contiguous areas and control water sights to private wells in those areas will be organized to undertake a pilot range management effort. The herders in these associations will limit grazing to the recommended carrying capacity as determined by the range management advisor and his counterpart. These will be the same herders who will receive complete vaccination coverages, treatment for internal and external parasites, mineral supplements and supplementary calf feeds. (For details on how the associations will be organized to carry out recommendations, see the sociological analysis, p. 48).

- the formation of a network of "herder community aides" (normally best herders and animal healers) chosen by the herder associations themselves. These aides will disseminate information and give advice on range management and animal production, and will report herd movement, pasture conditions, marketing problems, veterinary needs and other items of interest. The network will serve as user contacts for the government extension program.

- the production and distribution of locally adapted extension materials and techniques for use in herders' discussion groups. These materials will be, for the most part, cassette recordings developed in cooperation with the Radio Clubs of Niger and radio programs broadcast by Radio Niamey.

- the sociological data and production and marketing data will be reviewed by a joint team of project staff and UNCC cooperative officers to determine the feasibility of organizing cooperatives in the pastoral zone to serve credit savings, and marketing needs of the herders.

- three subsidary reports will be prepared by short-term consultants to provide the additional sociological data required to formulate the comprehensive range management plan:
    - a human and animal census of the project zone will be taken once during the dry season and once during the rainy season.

    - a legal/anthropological analysis will be made of the legal and traditional land tenure systems functioning in the zone and assistance provided in drafting the necessary code revisions to implement a range management plan.

    - a sociological report will be compiled on the southeastern part of the zone, about which there is insufficient information for judging the feasibility of later intervention.

The rural sociologist will prepare a final report which will include an analysis of interventions undertaken in this project, the three subsidiary reports just described, and a review of earlier sociological work undertaken in the zone. This report will be the basis for the design of a sociologically sound range management program to aid the nomadic herders in increasing productivity without excessively increasing herd size.

d. Training

This component will be oriented to building up in the GON a capacity to address the three related areas of range management, animal husbandry, and livestock extension. The staff of the present livestock service is trained primarily in veterinary medicine with training in animal husbandry only on a very rudimentary level. No training is given in range management or extension methods. To support a program to increase productivity and project the range in the pastoral zone,

the following types of traning will be undertaken:

- Ten participants will be sent to the U.S. for degree training. These participants will form the core staff to organize and manage a comprehensive livestock production and range management program. Six participants will receive degrees in range management, four with minors in animal husbandry and two with minors in agricultural engineering. Two participants will receive degrees in rural sociology with minors in agricultural extension, and two will receive degrees in agricultural economics, one with concentration in production and one in marketing.

- Nine members of the livestock service staff will be sent to the U.S. and a third country for short courses aimed specifically at meeting the manpower needs of a multifaceted range management program. These participants will serve as counterparts to the American technicians assigned to the project team.

- Six Nigerien officials from the policy making level will be sent to the U.S. and other African countries to observe on-going range management projects, facilities and equipment of land management, agencies, water development and soil conservation structures, range reseeding, and rehabilitation efforts, and educational facilities and curriculum for range management. At least 2 or 3 of these officials are expected to attend the International Range Lands Conference to be held in Denver August 1978.

In-country training for this project will consist of three parts:

(1) A short-term consultant from the U.S. in agricultural education will advise the school for livestock agents in Niamey on the expansion of their curriculum in animal husbandry and nutrition and the development of courses in range management and extension.

(2) The livestock production and range management advisors will participate in the training of livestock service personnel to staff the livestock posts.

(3) A program will be developed to train herders as extension agents. This training program will be offered by the GON at the Toukounous Animal Research Station and through the training program of the Radio Clubs. Twenty herder extension agents will be trained during this project, and the training program will be expanded in the implementation of a comprehensive range management program following this phase.

The end product of the above described outputs will be the project purpose, i.e., there are two basic assumptions underlying this linkage. First, it is assumed that a package of interventions does exist that can increase the productivity of individual animals and is cost-effective from the standpoint of both the Government and the herder. The issues related to this assumption are discussed in the livestock production and the economic sections of Part III below. Second, it is assumed that the long-term benefits of improved range management are sufficiently tangible to the herders to induce them to accept limitations on animal numbers and restrictions on range use. This second assumption is critical because although the details of a range management program can be determined by technicians from outside the herding community, the implementation and enforcement of the program will be partly the responsibility of the herders themselves. The issues related to this assumption are discussed in the range management and social analysis section of Part III.

D. Project Inputs

55. The inputs for this project are best explained by relating them to each of the proposed outputs. This is how they are presented below:

1) Range Management Interventions

a. Personnel

- 1 range management advisor	2 1/2 man-years
- 1 agricultural engineer	6 man-months
- 2 U.S. hired field assistants	5 1/2 man-years
- 5 Peace Corps Volunteers	10 man-years
- 1 senior range management consultant	4 man-months
- local staff: drivers, well diggers and laborers	

b. Construction

- Material and equipment for construction of 3 water catchments and 15 wells

- Fencing posts and seed for enclosures and reseeding trials.

- Equipment for range studies-transects, rain gauges, etc.

c. Aerial Photos for Mapping

d. Vehicles for Expatriate Staff, and POL (7 vehicles)

2) Livestock Production Study and Other Interventions

a. Personnel

- 1 livestock advisor	2 1/2 man-years
- 1 marketing economist	1 1/2 man-years
- 2 U.S. hired field assistants	5 man-years
- 2 research assistants	4 man-years
- 1 senior researcher (consultant) to design and oversee the production study	6 man-months
- 1 economic consultant to conduct a study of recurrent cost related to livestock services	4 man-months
- local staff: 15 interviewers for the study, and drivers	

b. Construction of four livestock post and 10 animal handling facilities

c. Commodities: veterinary and feed supplies for herds receiving improved services, vaccines, anthelmintics, salt/mineral blocks, and feed concentrates for calves.

d. Vehicles (11) and POL for the expatriate staff and livestock post and camel renual for the local interviewers.

e. Equipment: primarily camping gear

3) Sociology Studies

a. Personnel

- 1 social anthropologist	2 1/2 man-years
- 1 U.S. hired field assistant	3 man-years
- 1 senior sociology anthropologist consultant	2 man-months
- 1 land rights lawyer consultant	2 man-months
- 1 demographer consultant	3 man-months
- local staff: 5 interviewers, driver	

b. Vehicles (3) and POL for expatriate staff and camels for local interviewers

c. Communication Equipment: tapes recorders, cassettes.

4) Training

a. Ten participants for degree training in U.S.

- 6 in range management with minor in animal husbandry and agriculture, engineering

- 2 in rural sociology with minor in agricultue extension

- 2 in agriculture economics

b. Six participants for 3 month training programs
Three participants for 6 month training programs

c. Observation tours in the U.S. for 6 senior level officials in range management.

d. Local training: Training advisor for 6 man-months to develop local training programs.

e. Training materials

5) Inputs Charged to Overhead

a. Personnel

- Local staff in Niamey and Maradi (see notes to Annex F for details)

b. Rental and utilities for offices in Niamey and Maradi.

c. Vehicles (6) and POL

d. Office equipment

The above is a listing of AID inputs. In addition, the GON will contribute:

a. Counterparts for U.S. project staff

b. Arrondissement level personnel for disease control and animal health

c. Vaccines, vehicles and POL for the disease control program

d. Land for the livestock post and corrals

e. Training facilities and personnel for local training

f. Radio club personnel and equipment for development of herders contact/communication system.

g. National radio (Voice of Sahel) personnel and equipment for the development of scripts and broadcast of range management and livestock production information

h. UNCC personnel to evaluate economic and social data to determine the feasibility of cooperatives in the pastoral zone.

i. Salaries of participants while in training.

The assumptions that must be met if these inputs are to lead to the project outputs are listed in the outputs section of the logical framework. Most of the assumptions have to do with the timely arrival of critical commodities and equipment and the availability of properly qualified manpower, both U.S. and Nigerien. These assumptions are straightforward and need not be elaborated on here except to note that, as often as not, project failures in the Sahel are attributable to the simple unavailability of necessary inputs, especially French-speaking U.S. technicians, qualified counterparts and participant trainees. The steps that will be taken to help overcome some of these problems are discussed in Part IV, Implementation.

IV. Project Analysis

A. Livestock Production

1. The Current Situation

According to the latest Livestock Service estimates, the four arrondissements; Tchin-Tabaradene, Agadez, Dakoro and Tanout touched by the project contain in excess of 250,000 cattle, 280,000 sheep, 602,000 goats, 43,000 camels, 69,000 donkeys and 13,000 horses1/. The cattle population is estimated to have declined by 45% between 1972 and 1975, while sheep, goats, and camels declined by 2%, 11% and 51% respectively. The specific area in which Phase I project activities will be carried out covers only parts of the four arrondissements. The exact herd population within the boundaries of that area is unknown. However, using official estimates of stocking rates in the arrondissements of Tchin-Tabaraden and Tanout of 1 Tropical Bovine Unit2/ per 30 hectares equals an estimated herd population of 150,000 TBUs.

In late 1976, a team of range and livestock specialists, financed by AID, made a resource inventory of the area3/. The following information on the livestock of the area is taken from that inventory.

The principal breeds of cattle in the area are the M'Bororo, Azaouak, Nigerien Fulani and White Fulani. The M'Bororo cattle are long, lyre-horned animals, selected over many years for their hardiness and ability to walk long distances. They are large-framed, of good height with long legs. The Azaouak has much shorter horns than the M'Bororo, is smaller in frame, and the cows are said to be better milkers. The calving percentage for the M'Bororo is reported to run around 55%, it is a little higher for the Azaouak, around 60%. Calf mortality is estimated at about 26% for the M'Bororo and 30% for the Azaouak.

The sheep for the project zone are long-legged desert, ecotypes predominately of the Fulani breed. They are long-tailed, wooless, and their principal use is for mutton. Sheep are raised subsidiary to cattle or as an adjunct to subsistence agriculture. Goats have a somewhat more independent existence apart from cattle because they can thrive well as meat producers under conditions too difficult for other species.

1/ See Annex G, Table 1

2/ 1 Bovine = 0.8 TBU, 1 Camel = 1.0 TBU, 1 Sheep/Goat = 0.1 TBU (Sahelian averages)

3/ Report, Inventory and Preliminary Range Management Plan for the Niger Range and Livestock Project, 1976. (Site Resource Inventory)

They have great ability to forage and browse on many types of vegetation and can withstand extremes of climate yet they are, however, when untrolled in numbers destructive.

Availability of water and patterns of precipitation set the grazing patterns. During the rainy season, July, August, September, the herds disperse and move to the northern part of Agadez for the salt licks. On this migration animals can obtain water from surface ponds. In the salt lick region animals are said to be restored and strengthened from something in the well water and forage of the region. As the dry season approaches and surface water disappears, the animals are concentrated around the wells, being completely dependent on them as a source of water. Animal power is used for drawing water. The areas around the wells are soon grazed out and animals must then walk farther and farther for water. Cattle may be watered only every other day. Camels can get by with even less frequent watering.

Table 2 of Annex E gives the estimated composition of cattle herds in the zone in 1975. The herds tend to average close to 80 per cent females and 20 per cent males. Tables 3 and 8 are simulated models of traditional herds based on the composition estimate presented in Table 2. According to this model, if growth in numbers is held close to zero percent, the annual offtake of sale animals would hardly ever exceed 10 percent for cattle or 18% for sheep. If herdsmen are striving to increase the numbers herds, as has been the case in the two years after the drought, the offtake will be less.

2. Causes for Low Productivity

The stresses and hazard to health which animals must undergo in the Sahel are extreme. These stresses may be considered under seven different although not unrelated headings.

a. Nutrition. Since the entire feed supply must come from the rangelands, the total intake of nutrients is closely correlated to the condition and output of the range. According to the Resource Inventory, there are seasons of the year when the total daily intake of digestible nutrients and protein is less than enough to maintain weight and productivity. Perhaps as much as 10 months out of the year phosphorus is deficient for lactating females which have a higher requirement for the mineral than other animals. Weakness, loss of weight, low breeding efficiency, and depraved appetite (eating bones or soil) are the common symptoms of nutritive deficiencies, some of these symptoms were noted in the project area by the Resource Inventory team. Night blindness, muscular incoordination, convulsive seizures, which are characteristic symptoms of Vitamin A deficiency, were particularly observed.

Salt, which under normal and recommended practice, should be constantly available to herbivorous animals, is another problem for the area. What is available is for poor quality and it has to be carried on pack animals for long distances. Consequently, it is given very sparingly, and at infrequent intervals.

b. Water. A stress produced by lack of water develops during the dry season, when due to the distance between grazing ground and the well, the herdsmen resort to watering only every other day or longer. This does not provide enough water for cattle and equines.

c. Physical Stress. Proportionately too much time spent in going to and from water works against the animal in two ways. It reduces time available for grazing at the very season when the animal needs to spend more time grazing, due to declining availability of grass. Secondly, the walking uses up energy that should be conserved because the animal's energy intake is less than maintenance requirement. This physical stress is most severe toward the end of the dry season, and the last few months of gestation.

d. Climatic Stress. A study carried out in 1963, by S.E.D.E.S.1/ reported that 204,out of 1,000 Tuareg cattle deathes were due to heat stroke. For a similar 1,000 sample of Peul cattle 374 died of heat stroke, which was the leading cause of death. In a situation where animals are in a weakened state nutritionally, are suffering from lack of water and are being forced to walk considerable distances in temperatures well above 100°F, the combination of stresses can be overwhelming.

e. Diseases. Epidemic diseases, nutritional deficiency diseases, and internal and external parasites were also discussed in the site resource inventory.

For cattle, black leg is the most serious epidemic disease and it is more common in the wet season. Rinderpest, Contagious Bovine Pleuro-pneumonia (CBPP), and hemorrhagic septicemia are all present. Botulism was a serious problem during the recent drought, occurring when animals ate the bones of carcasses for the mineral content. Anthrax occurs in the area sporadically.

1/ Etude Demographique et Economique en Milieu Nomade - Elevage. S.E.D.E.S. 1966.

According to the Resource Inventory, internal parasites of cattle (roundworms, tapeworms, flukes) are considered to be of high incidence. It was suggested that cocodiosis may be prevalent. Ticks can be found on cattle any time of the year, being most numerous during the rainy season. In certain seasons the bite of the Tabanid fly causes considerable annoyance to all animals and man.

f. Calfhood Stress. This occurs because herders have to milk cows to obtain food for family use. Male calves, particularly, are allowed insufficient milk to make normal growth. The competition between the humans' needs and the calf's needs results in a high rate of calf mortality from 25 to 30 percent. If weaning occurs just before or during the dry season, it is an extremely difficult time for calves. High mortality under such conditions of stress and low nutritient intake is not surprising.

3. Potential for Productivity Increase

Productivity could increase and greater offtake could occur if certain "stress relievers" such as more phosphorus, better calf nutrition, improved pasture management, and more complete disease and parasite control could be applied. The productivity changes that appear possible for cattle in the project zone include: age of first calving, down from 4 to 3 years; calving rates up from 50% to 65% calf mortality down from 20% over all to 10% over all, and immature mortality down, from 5% to 3%. Table 5 in Annex J simulates the results of increased productivity with the use of inputs to relieve stress. A comparison of Table 3 with Table 5 shows that offtake will increase from 10% to 18%. The conomic benefits are indicated in Table 6. There is a strong indication here that the proposed project interventions to relieve some of the stresses, and morality hazard can be rather profitable. Tables 8 to 11 show similar results for sheep flocks.

4. Means of Productivity Increases

The challenge to a development assistance project is how to correct or alleviate in a significant degree some of the stresses and hazards described above, so that productivity can improve. In review of these one by one, certain interventions suggest themselves as follows:

a. Nutrition

(1) Improved range management and reduction of animal competition for feed.

(2) Supplementary hay or concentrates during the dry season.

(3) Year round phosphorus/salt/trace mineral supplementation.

b. Water

(1) Improvements in wells.

(2) Better distribution of wells.

(3) More surface tanks.

c. Physical Stress

Reduce by improving availability of grass and water.

d. Climatic Stress

Reduce by improving animal health, nutrition and water supplies.

e. Diseases

Develop more complete program of vaccinations and parasite control.

f. Calf Stress

Supplementary concentrate feeding during high stress seasons.

The stresses and hazards are interrelated. Corrections in one can lead to improvements in others. Better nutrition leads to better resistance to climatic stress and disease hazards; strong animals suffer less from walking long distances, and so forth.

Some of the stress-hazard interventions are clearly long-term in nature and impracticable on a short-term basis. Supplementary feed (hay and concentrates) for the dry season would require a tremendous effort in organization. Even if they were available in sufficient quantity, the distribution would be at great cost and effort. Interventions regarding the basic range grass supply are long-term and are being treated under the range management analysis section. Likewise water supplies and distribution are discussed in the range management analysis. Elimination of those interventions which are impracticable for the time being, or belong to longer term range management program, leaves as possibilities for near-term the following interventions:

- More complete program of disease and parasite control

- Year-round phosphorus/salt/trace mineral supplementation

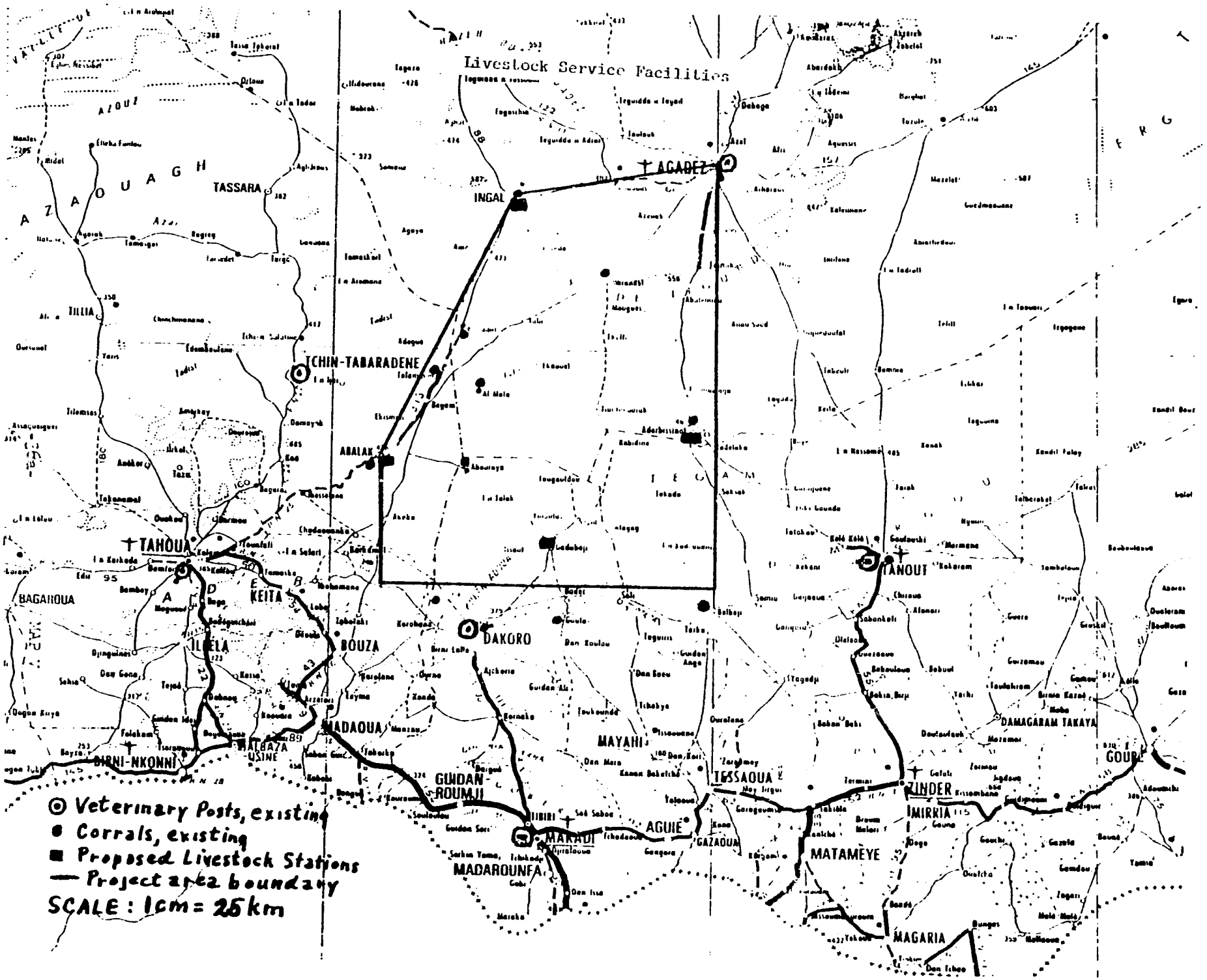
- Supplementary concentrate feeding to calves during high stress season

B. Range Management Analysis

1. Attitude, Policy and Projects

a. Development History

GON and outside donor interventions in the Sahel in the pre-drought past have concentrated largely on two objectives: water development and disease control.


Livestock Service Facilities
AZOUAGH
TASSARA
TILLIA
TCHIN-TABARADENE
INGAL
AGADEZ
ABALAK
TAHOUA
BAGAROUA
KEITA
ILLELA
BOUZA
DAKORO
MADAOUA
MALBAZA USINE
DIRNI-NKONNI
GUIDAN-ROUMJI
MAKARDI
MADAROUNFA
MAYAHI
AGUIE
GAZAOUA
TESSAOUA
TANOUT
ZINDER
IMIRRIA
MATAMEYE
MAGARIA
DAMAGARAM TAKAYA
GOURE
Veterinary Posts, existing
Corrals, existing
Proposed Livestock Stations
Project area boundary
SCALE : 1cm = 25 km

Colonial disease control measures were begun as early as the turn of the century and have achieved considerable success over the intervening time. This was appropriate at the time because the resource was probably under-utilized and it was desirable to increase the livestock survival rate. Reliable water sources were scarce, rendering large tracts of land unusable during the most critical time of year. Water development, too, was desirable if the resource was to be effectively utilized. The resource itself presented no obvious cause for concern, because the early signs of damage were difficult to discern. But time marched on and conditions changed, while attitude and policy and entrenched bureaucracy tended to become fixed and inflexible. Where a fragile resource is concerned, there is a thin line between what has been regarded as underdevelopment and what may actually be over-development.

b. Drought

In addition to the climatic reversal in itself, the ravages of the recent great drought were magnified by a series of earlier lush years (from about 1954 to 1968) which encouraged herd expansion, reduced morbidity and mortality from disease, and expanded water development without accompanying grazing controls. Unfortunately a prolonged drought or climatic reversals had not been taken into account in the projects that led to increased animal population in the pastoral zone.

From the disaster of the drought two benefits have emerged. There has been a reassessment of development policy for the pastoral zone with a realization that droughts will happen again, and the livestock population may have been fortuitously reduced to a level where it, if stabilized, may be indefinitely sustainable.

c. Recent Project Philosophy

The reduction since the drought in animal products available for domestic consumption and export has been cause for GON concern. The need for animal products has tended to maintain post-drought GON development emphasis in the same areas that were emphasized before the drought. Under pressure to aid herders whose only form of livelihood was destroyed by the drought, the GON has embarked on a reconstitution program, or a deliberate attempt to hasten the rebuilding

of cattle numbers. The help to survive which has, in a sense, helped the decline of the very means of survival continues. There is, however, evidence of an emerging realization that the decline in animal products is a reflection of a long-term decline in a basic resource capacity, and a new office is being created and charged with the modernization of the pastoral zone.

Because of a long life cycle in cattle and a generation interval in Niger of 7.5 years cattle population is not expected to dramatically increase in the next three years. The SEDES report estimates that ten years will be required for cattle herds to recover to pre-drought size. There is, in fact, nothing that can be done to change this situation in the near future.

The early post-drought thinking of AID and other international donors have tended to focus on specific interventions on a specific tract of land, to the extent of actually constructing fences in some cases. This is the standard approach of assuming that modern, closely managed, more sedentary approaches to livestock raising will somehow resolve problems of a broad climatic and cultural nature. In this category can be included the Site Resource Inventory "preliminary management plan" suggestion and drawing of a standard rotational grazing program. These approaches are generally too drastic and ill-suited to the environmental setting. They involve essentially unmodified transplant of foreign technology, and attempt to solve social-cultural-political-climatic problems with technology.

The absence of success for previous development projection in the pastoral zone can be summarized in the following manner: preoccupation with animal numbers, absence of resource orientation in national policy, physical structure emphasis, sudden and drastic social upset, too much reliance on naive demonstration and extension, unrealistic short-term approach to long-term problems an absence of linkage between dispersed projects and the broad needs of the Sahelian zone, emergency pressure, and excessive technology which cannot be aborbed or applied.

2. Indigeneous Assets - Problem Areas

There is present in the indigeneous population, as well as in government, a broad base of land and animal heritage and knowledge offering a foundation on which to structure a productive livestock economy. The full extent of this is not known, nor do we fully understand the nature of the liabilities, but some of the prominent assets can be stated. The herder possesses an innate love for his animals and a deep respect for the land and water, passed on to him by previous generations. His intimate life with his animals rewards him with an

exceptional skill in control of them by simple word and gesture. He understands both the bounty and the hazards of his homeland, and has inherited a life style and grazing system comparible with the environment. He has strong social ties and obligations to the rights and needs of others in addition to obedience toward elders and tribal authority. The chain of respect and authority offers attractive potential for coordination of affairs from a higher and broader authority.

Some apparent liabilities are also present. The strength of his local social attachments raise the question of the extent of his interest in and allegiance to a distant and higher chieftain. His attitude and mentality toward outsiders is in keeping with his independent life style: his contacts with the world beyond his area of circulation are few. His planning is localized and short range. He is not sufficiently informed to understand what is happening to his homeland but his elders tell him of a more comfortable life in the past. Because of the disaster risks of small herds and the low individual productivity, he is oriented toward larger herds. His social organizational level is fractional and divisive from the viewpoint of the central government. He is unaccustomed to control being exercised over use of the land by the Government.

3. Conceptual Basis for the Range Management Interventions

Unlike predecessor projects in Niger and other countries across the Sahel, Phase I of this project does not contemplate a physical approach to a specific tract of land. The site requirements are simply representative of a north-south reach that will encompass the migratory routes of the inhabitants. Phase I is a time of information gathering, pilot intervention, and encouragement to conceptual acceptance of resource conservation and management. The knowledge and experience necessary to ultimate compatibility and merger of modern resource management technology with indigenous affairs will be acquired through the studies conducted in this project and the pilot range management effort that will be undertaken. The project views the migratory system with some respect and proposed to investigate it in depth before hastily recommending a change in the grazing system.

It accepts the long-term nature of land and livestock affairs and anticipates maximum benefits which can be realized only in this time frame. It aims at a complete program of resource-oriented policy from the local to central government level, and an authoritative institutional vehicle through which necessary changes can be firmly implemented. It does not and cannot result in early or highly visible and tangible benefits.

What this project strives for is the following:

a. The adoption of a central government concept and policy of resource conservation and management.

b. A master range management plan that is: (1) compatible with migratory tradition and based on the indigeneous social power structure; (2) based on a strategy for resource stability and conservation, in balance with maximum utilization and sustained yield; (3) tested in pilot range management activity with an association of herders who will voluntarily participate and follow grazing recommendations of the project staff; and (4)aimed at improved quantity and quality of native forages which will enable improved animal nutrition and greater individual productivity.

c. The development of the institutional capacity to begin to implement the Range Management Plan.

As discussed above, there is a direct conflict in the short-run between increased livestock production and effective range management. For this reason it is important that the organization charged with implementing the type of program described in the preceding paragraph be primarily responsible for preservation of the range and not subject to excess pressures from private and public livestock interests. A major objective of the Phase I project will be to demonstrate the need for and begin to develop such an organization.

The activities that will lead to these objectives are described in Part III of this paper and Annex H but may be summarized: research of all information available; aerial photography and mapping; studies of range condition and trend; vegetation trials; water development studies; orientation tours for GON officials in range management; training; and the development of a range management master plan.

C. Social Analysis

The purposes of this section are three: (1) to describe the social systems of the herders; (2) to explain how the social interventions relate to the project purpose, and (3) to review these interventions from the perspective of basic social soundness criteria.

This section is brief and the reader is referred to a fuller discussion of these topics in Annex I.

The social interventions are intended to facilitate the livestock and range activities mentioned above. These activities attempt to restore and sustain a balance between forage consumption by the herd and the regenerative power of the plant in the pastoral ecosystem. This ecological balance is a delicately formed causal chain: man depends on the animal which itself depends on the plant which in turn depends on water and soil. Historically the pastoral nomads functioned effectively in this ecosystem by following the basic strategy of maximizing herd size. The accumulation of interrelated economic, social and climatic changes and pressures both within and beyond the pastoral zone, however, have dramatically upset the balance in this chain. Therefore to conserve pasturage and at the same time to increase animal productivity, the pastoral nomads must adopt a new strategy of efficient resource utilization. The pastoral nomads are the crucial link in this chain, and are the target of a set of social interventions designed to encourage them to adopt such a strategy, this contributing to the restoration of the balance in the pastoral ecosystem. The following sections deal with the herd structure, the social interventions, and the social soundness criteria.

1. The Herd

A significant factor contributing to the success of any development project is the concordance between indigenous structures and project innovations. Therefore some knowledge of these structures is necessary in order to relate the project effectively to the lifestyles of the beneficiaries. What follows is a brief description of the herds, comprised in varying degrees of cattle, camels, goats and sheep, and the herders who are nomadic Tuareg and Fulani. While both groups operate within the project zone they have distinct cultures with different traditions, structures and lifestyles.

Traditionally the Tuareg and Fulani herded animals more for their product (milk, cheese and butter) than for meat consumption or for sale on the market. The Tuareg raised more camels and goats than sheep and cattle, while the Fulani raised primarily cattle. However, in both cases herds have become more diversified since the drought, as some herders now realize that a diversified herd offers them greater financial security during times of drought or an epidemic, and that smaller animals are more readily purchased or exchanged for food. Herd sizes vary considerably but average between 50-100 head of several types of animals, mainly ruminates.

The basic social unit which manages the herd is the family, taken in the broad sense of the term. For small herds this is likely to be the nuclear family made up of parents and children. For larger herds the family includes kinsmen. If kinsmen are not available the family may use helpers or employ drovers to manage sections of the herds, especially during the dry season when camels and goats forage in different areas from the less hardy and least adaptable cattle and sheep.

During migrations, groups of families ranging from four to twelve among the Tuareg and two to four among the Fulani travel together with their herds to form the more inclusive 'camping unit'. This cooperative unit enables the herders to assist one another in times of crisis; it also enables them to guard their animals more effectively while at the same time releasing family members for other activities such as farming millet or working as wage-laborers in the towns and cities. Usually the leader of the unit is one noted for his experience and good judgment who has been chosen by consensus among camping members. The camping unit is by no means a corporate structure with any degree of permanence, for its composition may expand and contract during the course of a migration and from one year to the next depending on amount of precipitation. Generally there is a core group of families which travel together or reassemble after temporary dispersal.

The general pattern of the transhumance in the pastoral zone is a southward movement during the hot dry season in search of water and pasturage and a return movement northward late in the rainy season in search of surface water and restored pasturage. It must be emphasized, however, that these are many variations within this general framework. The Tuareg are more likely to migrate between two relatively fixed points in a north-south direction while the Fulani will radiate out in many directions after a large annual gathering. The movement of a camping group is punctuated with delays, deviations, dispersions and reassemblies depending upon changes in the climate. Discussions within and between camping groups at wells and along transhumant routes, forming a sort of "desert telegraph", determining whether a group will maintain or change the direction of its movement. Within a general migratory pattern, there are multi-directional movements of numerous small and relatively autonomous groups who respond knowledgeably to the rhythm of changes in the pastoral zone.

For both groups the herd has a social and an economic value. Beyond meeting daily needs of subsistence, parents want to have surplus animals to allow their children to have their own herds. A surplus is desirable so that one can give animals to a poorer kinsman or to one whose herd has been decimated by disease. This incentive functions as

a leveling mechanism whereby those with larger herds give to those with smaller herds. Not only does the donor obtain prestige, but his gift solidifies kinship ties beyond the camping unit. Thus, as a response to both economic and social values the herders have traditionally attempted to maximize herd size. This is especially true for the Fulani who seems to have a closer attachment to their animals.

While these values may have been functional in the past to cope with the harsh ecological realities of the Sahel, they are not so now in an area with shrinking pasturage and a growing population. Clearly the desire to maximize herd size for social and economic reasons must give way to a more utilitarian view of selling excess animals so as to maintain a balance between herd size and available forage. Field interviews suggest that as a result of the recent drought and market incentives, this trend is taking place, especially among the Tuareg. The conflict between current ecological exigencies and language traditional values is recognized as a problem first to be studied under this project, and later as an obstacle to be overcome.

There are differences in the large social units and their interrelationships among Tuareg and Fulani which suggest that the social interventions of the project may have to be adapted to each. Generally the Tuareg society is more differentiated than that of the Fulani for it is stratified into three distinct classes which function as status groups. The Tuareg society is more integrated in that it is politically hierarchical. Beyond the camping units an individual belongs to a more inclusive "fraction" led by a subchief. The "fractions" make up a confederation, led by a drum chief. The Fulani on the other hand are basically egalitarian with considerably less class differentiation. The next inclusive Fulani group beyond the camping unit is also a fraction which is led by an ardo or chief whose authority is limited. He leads more by example and guidance than by control. Beyond this, Fulani social units tend to be more symbolic than corporate. Thus the more flexible social structure of the Fulani enables them to disperse more widely than the Tuareg. Another factor in the Fulani migrations is their more recent arrival in the project zone, resulting in their having less access to water and the market outlets than the Tuareg.

In terms of project interventions, then the Fulani will be more difficult to reach than the Tuareg whose migration routes and points of residence are more fixed and predictable. The more structured organization of the Tuareg, beyond the camping unit, might enable them to link up more easily with organizational units in the Livestock Service. In general, the Fulani have been more removed from modernizing forces than the Tuareg, and they are likely to be more suspicious and unreceptive to the services, amenities and institutions of urban life.

As target groups for the interventions of this project the Tuareg and Fulani share some basic similarities as herders. However they are different peoples who have adapted to their pastoral way of life accoring to their own traditions, social organization, beliefs and values, and position in the national social structure. Among other things the success of this project will depend upon being sensitive to these basic differences and adapting the interventions appropriately to the perceptions, values and lifestyles of these groups.

2. Rationale for Social Interventions

The project will operate within a zone that has been exploited by pastoral nomadic communities for centuries. In the past, however, pressure on the resources of the zone was much lighter than it is today, for several reasons. Tuareg pastoralism was an integral and specialized part of a wider economy of trans-Saharan trade, and it fluctuated much more readily than it can do today by withdrawing southward during times of ecological stress. Fulani have been in the zone for only the past sixty years arriving as expansion of agricultural population pushed them out of their previous territories, and because the construction of public wells in the project zone attracted them. The coincidence of factors including the barrier to migration imposed by the border with Nigeria, the radical decline of the Saharan economy, and the weakening of Tuareg casts relationships, has squeezed the pastoralist population into a greater reliance on their herds. Finally after years of above-average rainfall which had encouraged an increase in the human and animal population, drought struck in the early 1970's with greater devastation than ever before in living memory.

The magnitude of the destruction is well known. Human responses in the project zone were multiple: some people retreated southward early enough to save nearly all their animals; others congregated around the wells until there was neither strength nor a lifeline of grass to make the trip south; some sold animals earlier and went to the cities; others sold nearly-dead cattle for less than a dollar a head and wound up in refugee camps or in agricultural villages haveing to beg for work and sustenance.

Now herders are rebuilding their herds and their livelihoods. Field discussions held with herders by project design team members have found that in some cases physically active family members have returned to the camps, leaving aged and infirm members in Agadez to return once

the herds can support them. In one valley a single Fulani returned from the south in 1975, signalling others to return a year later. Elsewhere people live on much less food than they are accustomed to eating; or share milk in smaller herds which they co-manage; or remain by roadsides in the south to sell firewood; work a small field or sell their labor. In herd rebuilding there is a temporary reliance on goats, which are the cheapest to buy, the quickest to multiply and the easiest to turn into a small amount of cash or food as necessary. Sheep have many of the same characteristics, but are harder to manage and they suffered from an epidemic in early 1976 that makes people wary of investing in them.

The restoration of the pastoral economy is thus proceeding. People and animals are again filling the range, though it is not known how close to the carrying capacity the zone now is. Well owners whose herds are much diminished have the obvious incentive to sell water rights to kinsmen for an animal or cash payment which has the effect of increasing the complexity of range management in their area. The situation may, therefore, be one in which the same pressures toward the degradation of range resources are building up again.

Against this grim possibility are some lessons that the herders appear to have had reinforced severely by the drought. The rains of 1976, much less adequate than those of 1975, have reminded them of how easily demands can outstrip range resources. It is now possible to discuss with both Fulani and Tuareg, the basic issue of the finiteness and fragility of the regions resources. Herdsmen readily recognize that their individual goals of herd increases are competitive with every other herders identical goals, and must soon surpass the limit the pasturage can sustain. Many chiefs have an especially keen perception of this situation at the wider level of tribal fractions and/or administrative units.

Well owners (or owning groups) can theoretically deny watering rights to outsiders, or where there are no outsiders a well owning group might agree internally on maximal charge on that well and therefore on the surrounding range. But the structure of authority is not such as to allow any internal initiative toward such a goal. Herders cannot tell the poor (in animals) among them who own wells, for example, not to sell their water rights for the cash this brings. Nor can a number of regular users of an area around a well tell an "intruding" herder to move off the range near their well even if he is far from the place where he has water rights (in fact it is not "their" range nor is he deemed an intruder), because the rainfall

pattern a few months later may necessitate their going far afield to pasture their animals. Herders state that the problem is one of who can take the first steps toward building a more limited land use system, and they suggest explicitly that the initiative must come from the outside.

The project itself is therefore in a unique position to act as an honest broker to such discussions. No system of land use however can be imposed at this time. There is neither the knowledge available to design a workable system nor the political weight to impose any system. Rather, the project staff can work with the herders themselves (a) to develop a level of shared information herd population, animal and human needs, and available resources, and (b) to generate and structure discussions among herders and between herders and project technicians as to what joint decisions might be taken on the basis of this and all other knowledge available. To attempt a pilot range management effort, enforced by ther herders themselves, that will limit grazing by the members of a given association to the established carrying capacity. The practice of sharing information and recommendations for action should guarantee maximum participation of the potential beneficiaries in the far reaching Phase II project planning.

The social interventions to be carried out in the current project are:

a. Research for Action. Cooperating herders or herding communities will be chosen by the Project Herder Sociology Unit for long-term, close observation from early 1978 through the end of 1979. These herders will be the same as the ones covered by the livestock production study. (See Annex F)

b. Communications for Participation. A network will be formed of herder community aides for veterinary and social monitoring, for the reporting of problems, and for downward communication of extension efforts. This is a long-run, low-cost method of involving herders in the sharing of information and acquisition of new skills. This pilot network of community aides will enable the Herder Sociology Unit (and other technical staff) to assess the viability of a wider network in the total zone during Phase II.

c.. Extension for Improved Living Standards. The sector goal to which this project contributes is the improvement of income and well-being of herders in the pastoral zone. The establishment of additional livestock stations and the development and testing of

technical packages for animal productivity will provide the basis for such improvements. The spreading of such gains over a wide area will come by effective extension work among herders. Most importantly, insuring that better animal health and productivity do not merely hasten overstocking and range degradation requires effective extension and increased marketing.

The herder Sociology Unit will be charged, again in conjunction with other technical staff, with finding substantive means of effective extension education. The use of cassette recorders in now widespread in the project zone, for example, and lively taped extension programs in local language should find a ready audience. Government services at InGall during the salt cure, which extend marketing and herd migration information by temporary radio facilities will be coordinated with other project activities to expand their educational functions. Taped interviews with "expert" herders or market leaders, health workers, local musicians, and representative of other indigenous institutions can be tapped for contributions to increased understanding of the region's economic resources and limitations.

d. Herders' Associations for Long-Term Conservation. To go beyond the improvement of individual herds and the increase of individuals' incomes, and to reach a point where herders themselves understand and deal with the problems of total range and economic resources, it will be necessary to construct new organizational forms in the pastoral zone. Whereas decisions on range use are now taken by families, means must be found to link families, camping units, combinations of camping units, or more inclusive groups into associations for the purposes of education, discussion, and neighbor-to-neighbor agreements on herd and range management. These associations can facilitate:

1) discussion and implementation of program regarding livestock productivity, range management and marketing activities;

2) sharing of information with project personnel and government services;

3) organization of herds to cope with the problem of balancing limited resources with increased productivity.

It is not known how best to form such groupings. They might be based on existing kin or administrative units, on entire ethnic "fractions", or on the set of kin, friends, and strangers who have rights to a given well, or on a microregion demarcated by natural boundaries. The Herder Sociology Unit will be spending

the first 6 months of the project gathering data on the existing social groupings and will be in a position then, on further collaboration with other project technicians, to suggest how such organizational innovations might be constructed in particular cases. By establishing approximately ten herder associations, using different formative principles to test their effectiveness, the Sociology Unit will be able, by the end of the Phase I Project, (1) to recommend principles by which herding communities' wishes and needs can be built into a long-range management plan for the zone's resources, (2) to report on marketing associations and/or cooperatives that might be formed on the basis of emerging herder collaboration, and (3) to suggest, with the herders, additional services and needs which can be examined for inclusion in the Phase II project.

By the end of the first six month of project implementation, the herder sociology unit in cooperation with the Range Management and Animal Husbandry advisor will select me or two groups of herders who through their association will voluntarily cooperate in implementing a pilot range effort in the area that they collectively graze. For voluntarily participating in the range management effort this group will benefit by also participating in pilot efforts to increase animal productivity which will include complete vaccination coverage, treatment for parasites, mineral supplements for the whole herd, and feeds supplements for calves during the stress period. Encroachment into the area grazed by the pilot range management association can be prevented to same extent by the control over watering points by members of the association. It will also require informing other herders of the importance of the pilot effort and potential benefits that they can expect to receive in the future and enlisting their voluntary cooperation. These herders can expect to receive some benefits during the first phase through better animal health services and possibly improvements to their traditional wells.

The formation of the herders' associations will not be easy, nor will one year's operation be long enough to be more than suggestive. It is also recognized from the outset that the associations are not likely to produce a total "public-interested" range management plan even for the small geographical areas they might control. Nonetheless, it is vital that the attempt be made to introduce such innovations, for at least three reasons: (1) The herders themselves see the possibility that outside initiative could engender resource management collaboration; (2) The increased information, services, and interventions planned for the herder communities will evoke a variety of reactions from them as groups in any case, and to structure these groupings for the articulation of their fears and suggestions will make the total system of innovation and response more open and effective; and (3)Since in reality no system of range management or any other intervention can succeed without the fullest cooperation of the people it affects, we must start early to encourage and earn that cooperation or risk not having their support as plans for the zone develop.

The herder community innovations are important interventions in social life. Since they involve human beings, they are more difficult to predict or control than are animal husbandry or water resource intervention. Only a staff that has maximum rapport with and respect for herder communities can hope to achieve them. Far from guarding the communities from change, the Sociology Unit will start from the premise that profound change

is well under way and will seek to harness the forces of change for the benefit of people.

3. Criteria for Effective Intervention

The social soundness of a project is most dependent on its socio-cultural feasibility, that is, its compatability with existing social and cultural institutions. Clearly the differing cultural constraints and directives among the Tuareg and Fulani must be kept in mind when carrying out the social interventions. Especially important are the relatively more traditional attitudes of the Fulani who may be suspicious, even skeptical, of these interventions. A crucial point for the success of the project is for the herders to market their animals regularly to insure increasing rates of offtake. It has been noted above that traditionally the herders have attempted to maximize herd size as a response to social and economic values which conflict with market incentives. Clearly, the project staff must study how the herders perceive market systems and how market incentives can be made more relevant to them. In addition extension agents must explain carefully to the herders the need to sell animals and to pursuade them to do so.

Cultural constraints will also influence the formation of the herders associations and the selection of field staff. As noted above the criteria for establishing these associations will be identified early in Phase I and will probably vary according to cultural, geographic and regional differences. In any event, the herders associations will relate as closely as possible to indigenous structures. Project staff (research assistants, extension workers, etc.) will be selected on the basis of the ability to function effectively among the Tuareg and Fulani herders and to adapt to the logistical difficulties in the project zone, which would require following herding groups on the more and covering the large distances between groups.

A second criterion in implementing a sound project is selecting participants who are likely to spread new ideas, techniques, etc. to segments of the population not directly reached by the project. The selection of the 120 herding units in Phase I will be a representative as possible of the project zone in order to insure the spread of the project outputs. Relevant sampling criteria such as ethnicity, herd composition and family size, and regional differences will all be considered when choosing these units. Another factor which should contribute to the spread of the project outputs during Phase II is the migrant behavior of the herders themselves. Wells and transhumant routes serve as foci and channels of communication which form a "desert telegraph." Hence the herders themselves are likely to inform one another of the project innovations and services available as they migrate in the project zone.

Project beneficiaries of Phase I will be, in the first instance, the sixty families/herds/communities in which intensive interventions in health, nutrition, and marketing strategy will be carried out. Such as simple statement, however, belies the purpose of the Project and of those intensive interventions themselves, because (a) other families and

communities will be organized in terms of the social interventions (aide network, extension education, etc.); (b) yet other areas will gain from the experimental water catchments, range reseeding trials, and construction and equipping of the four livestock posts, and (c) the knowledge of benefits which can be achieved in the area will immediately be serviceable for the Phase II extension covering a much larger area of the pastoral zone. In a larger sense the beneficiaries will be all the pastoralists of the Project Zone and those of their descendants who choose to remain in a pastoral economy made more viably by the resource conservation generated by Project success.

In Summary, then, the social interventions are integral to the livestock and range management plan. They link the participant herders in a communicative network in an attempt to provide them with knowledge, skills and improved services and on a broader level to integrate them in the market economy. All the interventions are intended to increase animal productivity, increase offtake through market sales, control herd sizes to conform to the "carrying capacity" of the land, and thus contribute to an ecological balance in the pastoral zone while at the same time improving the herder income and welfare.

One observer of pastoral projects in East Africa noted that the success of a project can be attributed to at least two factors: 1) a thorough study of the herds, land and water resources, and the cultural system of the herders prior to project intervention, 2) the use of indigenous structures and institutions to diffuse the innovations of the project (Baker in Monod, ed., Pastoralism and Development in Africa, Oxford, 1975)

Clearly this project follows these two criteria.

D. Economic Analysis

Introduction

The project is essentially the research precursor to a much larger second phase action project anticipated to begin in 1980. As such, the first phase project is directed toward range resource studies and the necessary field testing of selected animal husbandry and sociological interventions among the Fulani and Tuareg herders of Niger and the construction of certain minimal field infrastructure in the project zone. This project therefore does not lend itself to standard economic cost/benefit analysis. It is the consensus of the design team however that the selection and phasing of activities represents the most cost effective approach to the economic development of the pastoral zone and attainment of the Project Goal.

The first of the various approaches that one might consider with regard to the development of the pastoral zone is to provide no interventions and to allow current forces to shape its development. This in all probability would lead to a further degradation of the range resources, a decline in quality of life for the people inhabiting this zone, and increase dependence on the donor community for emergency food aid in the future to prevent unacceptable levels of human suffering. This approach has already been rejected by the GON in its policies for increased agricultural production and development and preservation of the range resource and by AID in its policy decisions for assistance in the Sahel.

Having decided that some form of intervention is required a second alternative is to design a program at this time that would provide for immediate and direct intervention in the area in the way of a range management system and animal husbandry practices.

It is further the explicit consensus among the members of the design team that the information on the project zone that now exists is insufficient in both quantity and quality to permit the design of a large action program. Any such program in Niger is likely to be a very long-term and costly affair with a high attendant element of risk. It is therefore essential that project design be based on thorough technical, economic and social analyses that enumerate the positive and negative effects of large scale project interventions in as much detail as is possible. Since these analyses cannot be conducted at this time due to the lack of field level data, this project has been designed to provide the additional data required, prepare an action plan, and begin to develop the institutional infrastructure that will be required to implement such a plan. The remainder of this section enumerates the types of information that are necessary for any action program and briefly describes the studies that have been designed to obtain the missing data.

The needed information can be grouped under four main categories:

(1) Herder level data on animal productivity under traditional and improved management systems;

(2) Microeconomic data on the interrelationships between the herder family and their animals under traditional and improved management systems;

(3) The actual costs for project delivery of improved livestock and resource management services in the project zone; and

(4) The impact of project interventions on the national economy through increased production and marketing, and on government operation through possible increased revenues.

1. Data on Animal Productivity Under Traditional and Improved Management Systems

While there exist in Niger in published form several excellent sociological studies of herder groups and their animals, they all now suffer from two basic faults. First, they are badly outdated having been written before the recent drought - e.g. the best study from an economist's viewpoint is the Etude Demographique et Economique en Milieu Nomade which was published in Paris in 1966 based on data collected in 1963-1964. Second, they are generally qualitative in the nature of their analyses. A complete review of all materials available to the design team in French and English has failed to turn up one document on herd management under traditional conditions based on actual extended herd observations in the post-drought period that is quantitative in its analysis. What this situation means in an economic sense is that there is no adequate base of information upon which one can construct a detailed economic analysis for a large action program. To do so at this time would be to descend to the realm of rank speculation.

If the above is the case with traditional herds, the situation is even worse with regard to improved technological packages. There has been little field-level animal husbandry research in Niger that sought to disseminate a specific package of technological interventions among a carefully chosen sample of herders and monitor the results. In short, the country is notably deficient in any sort of livestock systems research that has as its goal the development of a herd-tested technological package for improvement of animal productivity within the constraint of limited carrying capacity of rangeland.

In the absence of an existing proven package of technological interventions for immediate project use, the design team was led to the inevitable conclusion that the first phase of the project would have to concern itself with the development and field testing of a certain minimum package of improved livestock practices that could readily be extended to herders in the pastoral zone. The result is the livestock production systems study described in Part III above and in Annex F. The animal science part of that study will focus on the technical aspects of existing herding practices and on the productivity increases that can come from improved services and practices.

2. Microeconomic Data on the Interrelationships Between the Family and Their Animals Under Traditional and Improved Management Systems

In the final analysis, the central figure of concern to this project has to be the Nigerien livestock herder/manager - be he Peul or Tuareg. The reactions of this individual in accepting or rejecting the new elements that will be interjected by the project into his current herding system will be the critical determinants of project success or failure. It is therefore essential that the major output of the first phase of the project be the thorough understanding by project personnel of (1) the herder-level economics that underlie the present livestock herding system in the project zone and (2) how the system may be changed to generate greater livestock productivity in a manner compatible with natural resources constraints and the needs and value systems of the herders.

An important part of understanding any productive system is gaining a comprehension of the economic relationships between the system's components. In this case, the herder and his animals is the core relationship to study. What the project personnel must determine is how herders react economically when presented with a new system that increase productivity of the individual animals within their herds. In short, will herders simply absorb the additional animals of higher productivity into their existing herds as capital growth and expand their herds indefinitely against a finite feed constraint, or will they begin to sell off higher percentages of their herds and manage the rest only within the constraint of the available annual feed supply. It is also important to understand how increased animal productivity translates into economic benefits for the herder. This involves an analysis of the net benefits of improved practices and of the accompanying risks.

The agricultural economics research assistant on the livestock production study team, with the assistance of the project sociologist, will conduct herder family surveys and in-depth interview to answer the above questions. Annex B describes in greater detail the various types of information the economist will attempt to obtain.

3. The Actual Costs for Delivery of Improved Animal Husbandry and Range Management Services in the Project Zone

This category is self-explanatory. Since no other agency has attempted to bring such an intensive level of animal husbandry and range management services to herders in the pastoral zone, no one has

any experience on the real delivery costs of such a system in Niger. If the interventions proposed at the herd level for animal husbandry and the zone level for range management prove to be successful in technical terms, the next question to be asked is are they extendable to the entire zone and at what real cost. It is, therefore, incumbent upon the agricultural economist in close collaboration with the AID project manager, to keep continuous and detailed records of the actual costs of delivering improved and intensified services to the herders. This information will be essential to the development of a reliable economic analysis for the larger second phase project. The system by which detailed cost records for the project will be kept is set out in the project manager's implementation plan for the first project.

4. The Impact of Project Interventions on the National Economy Through Increased Marketing and on Government Operations Through Increased Costs and Revenues

It is anticipated that any program for the expansion of services to herders will have multiple repercussions for the Government's operations in the area and for the national economy. This will occur primarily through livestock marketing and changes in the recurrent costs and possible revenues stemming from programs the Government will assume at the termination of AID program involvement. The project will provide expatriate personnel to assist the GON in analyzing both problem areas. The personnel will be a livestock marketing economist for the duration of the first phase project and a macro-economist with extensive experience with national accounts and budget analysis for a short-term consultancy late in phase one. The marketing economist will be charged with conducting comprehensive livestock marketing studies for all major markets in the project zone to determine how the present marketing system is constituted. Factors to be evaluated will include temporal and spatial price arbitrage between markets in the zone, estimates of the volume of livestock presentations and actual sales by market and within each market by livestock class, age, sex and weight; analysis of efficiency in the marketing chain from primary sales to terminal markets; and an estimation of necessary actions that could be taken by government and/or herders to improve marketing shares for the primary producers. The marketing economist will also have the mission of working with government on such revisions in official livestock marketing policies as are needed to deal with the anticipated higher level of livestock offtake in the future.

The recurrent cost problem is a major factor in the consideration of any large scale project in the Sahelian Zone of West Africa. The implementation of a Range Management plan with expanded livestock services will unquestionably require increased expenditure

to cover recurrent cost and aggravate the GON's budgetary problems unless careful consideration is given to the means by which real cost of the services can be recovered. Based on a cursory analysis of expenditures and revenues it would appear that the expanded GON investment in the pastoral zone could be at least partially self financed. Equitable and reasonable price structures for service rendered must be designed in collaboration with the Government and the herders to allow government recovery of part of the cost of providing services. One method of doing this may be charges for various services as outlined in Annex F. Another portion of the cost can expect to be recovered from increased export tax revenues from increased productivity. Although the design team was unable to obtain recent figures on export duties earned from livestock, it is possible to arrive at an estimate for 1975 by using official export figures and export tariffs. These estimates are shown below:

Table IV: Livestock Exports and Export Tariffs

	No. Exported	Export Duty (CFA)	Total Export Tax (000 CFA)
Cattle	50,708	1,000	50,708
Sheep	36,713	400	14,685
Goats	50,206	100	5,020
Camels	1,805	2,000	3,600
			74,023

These revenues can be expected to triple with no increase in tax rate once the herd sizes are stabilized if the increases in productivity hoped for can be achieved.

The greatest source revenue from the livestock sector has traditionally been the head tax on animals. This tax was discontinued during the drought but if it were to be reinstituted GON revenues from the livestock sector would increase dramatically. Assuming a herd population of 3,000,000 cattle and 600,000 horses and donkeys, and 230,000 camels, a 200 CFA per head tax would yield annual revenues of 760 million CFA. This would permit a substantial increase in a GON livestock program, especially if significant portions of the expanded program could be financed through user fees.

In order to more adequately answer the recurring cost issue in any major undertaking by the GON at the conclusion of this project, the project will supply a short term consultant to study the recurrent

cost issue in depth. His task will be to review the present recurrent cost recovery structure of the Livestock Service, evaluate from data generated in the field, study the implications and costs of the improved service program for livestock herders, and begin a dialogue with senior government officials on necessary policies and policy changes that will permit a sustained government effort with herders.

Preliminary Projections of Possible Benefits from Livestock Interventions. Tables 1-12 Annex I present some preliminary quantification of the type that will be necessary in any economic analysis of the second phase of this project. The tables give some idea of the possible level of benefits to be derived from increased livestock service to herders.

The similation tables show that it is possible to increase the offtake rate of cattle from present estimated 10% under traditional management procedures to 16% with improved management.

The tables further indicate that with improved attention to management of sheep, herders can double their gains from 18% to 37% offtake.

Costing out the increased productivity using 1977 prices would indicate potential net economic returns to the project of approximately $3,000,000 per year for cattle, and $1,000,000 for sheep.

E. Financial Anslysis

The table on the following page presents a summary of costs to be incurred under this project. Back-up tables and explanatory notes are to be found in the Financial Analysis (Annex J).

TABLE V: PROJECT FUNDING

USAID	FY 77	FY 78	FY 79	FY 80	TOTAL
Personnel	55.1	1421.4	296.9	318.7	2092.1
Training	-	193.0	163.0	110.0	466.0
Other Operation Cost	1.9	383.1	198.5	114.7	698.2
Construction	60.4	88.9	169.7	-	319.1
Other Capital Cost	329.0	193.1	16.8	-	538.9
Inflation & Contingency	53.6	567.2	319.0	275.2	1215.0
TOTAL	500.0	2846.8	1163.9	818.6	5329.3
GON					
Personnel	16.0	63.8	63.8	47.8	191.4
Other Operating Cost	-	33.1	33.1	-	66.2
Capital Cost		31.0	31.0	-	62.0
Inflation & Contingency	1.9	31.8	48.3	24.2	120.8
TOTAL	17.9	159.7	176.2	72.0	440.8

TABLE VI- PROJECT COSTS - Summary Table
($ thousands)

	Range Mgmt. Experiments	Lvstk. Prod. Study and Interventions	Socio-Logical Studies	Human Resources Devel.	General Overhead	Total	Local Cost	U.S. Purchase
A. Personnel								
1. U.S.	469.8	788.3	468.2	60		2,116.3	277.1	1,815
-Long-term	(425.0)	(650)	(325)		(150)	(1,550.0)		(1,550.0)
-Consultants	(40.0)	(100)	(65)	(60)		(265.0)		(265.0)
2. Local	(4.8)	(38.3)	(78.2)		(155.8)	(277.1)	(277.1)	
B. Training				466		466.0	26.0	440.0
Long-term U.S.				350	-			(440.0)
Short-term				90			-	(90.0)
Local				26			(26.0)	
C. Commodities	7.6	192			-	261.6	105.6	156.0
D. Other Operational Costs (POL)	120	126	38		152.6	436.6	416.6	20.0
E. Capital Costs	408.8	320.5	65.2		63.5	585.0	327.6	530.4
1. Construction	(102.8)	(216.3)	-		-	(319.1)	(299.1)	(20)
2. Vehicles	(81)	(88)	(24)		(47)	(240)		(240)
3. Equipment	(25)	(16.2)	(41.2)		(16.5)	(98.9)	(28.5)	(70.4)
4. Aerial Photo	(200)	-	-		-	(200)		(200)
Subtotal	1,006.2	1,488.8	571.4	526	521.9	4114.3	1,176.9	2,937.4
Inflation & Contingency	297.5	439.8	168.9	155.5	153.1	1215.0	347.9	867.1
GRAND TOTAL	1,303.7	1,928.6	740.3	681.5	675.0	5329.3	1524.8	3804.5
Percent	(24.5)	(36.2)	(13.9)	(12.8)	(12.6)			

TABLE VII: GON INPUTS ($000)

Personnel	Life of Project
Project Coordinator and Assistant	26.4
4 Counterparts	38.4
Animal Health Personnels	54.0
Participants	63.4
Radio Club Services	9.6
Operating Cost	
Radio Broadcast Time	20.0
Vaccines	30.0
Training Facilities	4.2
POL	12.0
Capital Cost	
Land for Post and Enclosures	14.0
Vehicles	48.0
Subtotal	320.0
Inflation	73.6
Subtotal	393.6
Contingency	47.2
GRAND TOTAL	440.8

V. Implementation

A. Administrative Arrangements

1. Government of Niger

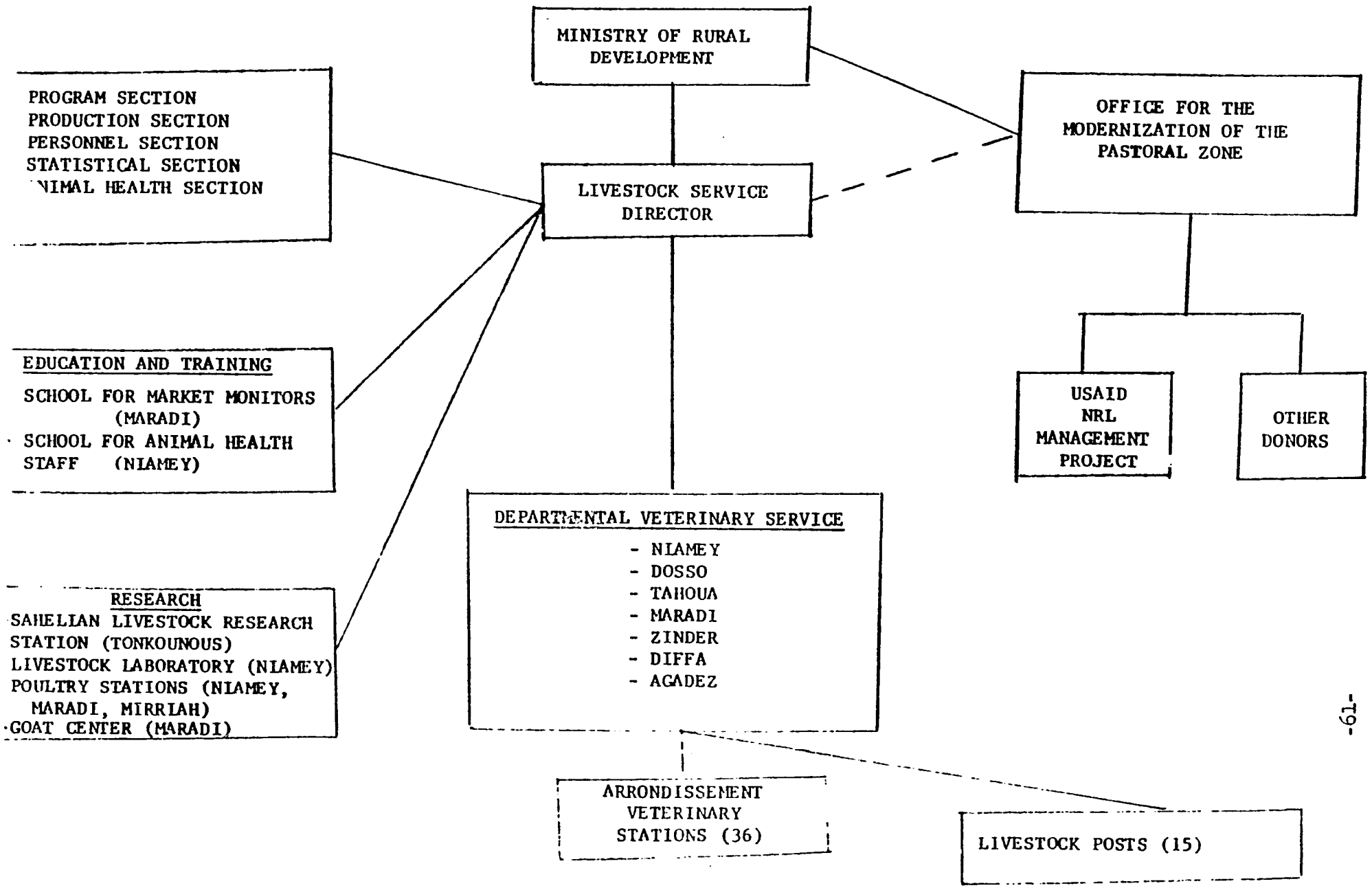
As described in the section on GON policy and programs, this project constitutes one part of a larger program to modernize the pastoral zone. An office was recently established in the Ministry of Rural Development called the office for the Modernization of the Pastoral Zone (PZM). The chart on the next page shows the relationship of the office to the Livestock Service in the Ministry for Rural Development. Although the office has thus far been charged primarily with the "Multiplication Centers" other interventions in the pastoral zone will fall within its purview. The head of that office therefore will have overall responsibility for this project on the GON side, and will be the main counterpart to the AID project manager. The PZM office will also be responsible for coordination between this project and other donor-financed projects in the pastoral zone.

Since the project consists mainly of studies and pilot interventions and the PZM office does not yet have sufficient staff, the project team with the assistance of locally hired staff will have the primary responsibility for implementing most parts of the project. There will be some activities, however, that will require coordination with and support from various GON agencies. The contacts with these agencies will be handled by the PZM office. The specific administrative arrangements required on the GON side for the implementation of this project are as follows:

a. Field activities need to be coordinated at the Department and Arrondissement levels. This involves dealings between the Livestock Service in Niamey and the local government administrative chiefs (Prefets and Sous-Prefets) in the field, and will be done with the assistance of the Livestock Service staff located at field posts throughout the country. As these lines of communication already exist no special arrangements will be required for the purposes of implementing this project.

b. Some of the activities to be carried out under the project will require the involvement and approval of government organizations, some of which are part of the Livestock

ORGANIZATION OF LIVESTOCK SERVICE



Service, and some of which are in other ministries. These include:

- in-country training of staff for Phase II project which will require the participation of the livestock training school in Niamey; and Maradi and the livestock experimental station at Tonkounous;

- The construction of veterinary posts which will require the approval of the Rural Works Department (Genic Rural);

- surface water development and well improvement which will need to be coordinated with the Water and Forestry Department, and the Office of Subterranean Water (OFEDES) respectively;

- marketing studies will involve the participation of the national agricultural research institute (INRAN); and coordination with the Cooperatives and Credit Agency (UNCC);

- census activity which will be carried out under the auspices of the Ministry of Plan;

- development of educational tape cassetts will involve the participation of the Radio Clubs.

The Minister for Rural Development acting through the Director of the PZM office will be responsible for obtaining the necessary inputs from these GON agencies. In addition to coordination with GON agencies, agencies planning for Phase II will require regular coordination with other Donors involved in projects in the Pastoral Zone. The head of the PZM office will also be responsible for insuring coordination and cooperation among Donors and calling regular meetings of all Donors involved to coordinate planning and implementation of activities for Range management and livestock development.

Looking to the second phase of this project, it is clear that major administrative changes will be required. In addition to the Livestock Service's program for animal health in the pastoral zone there will have to be developed within the Ministry of Rural Development the capacity to implement livestock extension and range management programs. The Phase I project will

provide the information for putting together this expanded programming and administrative structure. The implementation of the program will require the training of additional manpower at all levels and assisting in the development of the PZM office and building on the existing Livestock Service staff and infrastructure. A major role of the project staff, especially the Livestock Production and Range Management Advisors, during Phase I will be to provide advice on the context and organization of the expanded program and to train counterparts who will eventually play roles in it.

2. AID

Most of the administrative arrangements for this project will be the responsibility of AID. This includes specifically: (1) the recruitment and hiring of contract personnel, (2) the procurement of most commodities, including vehicles (See the procurement plan below), (3) the sending of participant trainees to the U.S., and (4) the provision of logistic support for project staff. The reason for such heavy AID involvement in implementation is that this Phase I project consists basically of activities in areas where the GON does not currently have programs, i.e. livestock extension and range management.

The PZM office that will be backstopping this project will have a very small staff and a number of other responsibilities. This new office, while accepting the fact that the implementation of this project should be their responsibility, maintains that it is realistically not possible for them to carry out effectively and expeditiously the various contracting, procurement and logistic support activities that are involved in an AID-financed project of this kind. It is therefore the Area Development Office (ADO) intention that AID assume primary responsibility for the Phase I studies and experiments while at the same time working with the GON to undertake the organizational changes and manpower training required for a Phase II project.

During the Phase I, then, all of the studies and experiments will be carried out directly by AID-financed project personnel who will look to the ADO to provide the necessary equipment and commmodities. The needs for such support will be identified by the project staff, and the AID project manager will assist with procurement, transport and other implementation actions. The project manager will have a locally hired staff to assist him in these tasks. The project activities not directly carried out by AID-hired staff will be general support to the ongoing animal health program in the project area and the construction of livestock stations. The former involves primarily the purchase of equipment and commodities to be used by Livestock Service personnel. AID involvement in these parts of project implementation will be limited to the disbursement of funds. A monitoring system will be put in place to verify that the commodities are utilized for project-related purposes.

B. Implementation Plan

1. Schedule and Organizational Responsibilities

The schedule of critical events during the life of the project is presented in the PPT Network (Annex K). Since the ADO will be responsible for procurement and disbursement of funds, the resolution of most logistic difficulties will be within the control of AID management. One activity that is likely to pose particularly difficult implementation problems during the time frame of the Phase I project is the construction of the livestock stations. The sites for these centers are remote and there is serious shortage of construction capacity in the country. For this reason, the PPT does not show construction beginning before Year II of the project. It is hoped that this will provide sufficient time to mobilize the resources necessary to get these stations built.

While most of the activities in Phase I will be the responsibility of AID and the contractors, there are several actions required on the part of the GON, three of which are critical to the success of any Phase II project. These are:

- the selection of qualified counterparts for the U.S. technicians. These counterparts will receive training and experience during Phase I that is essential to the eventual success of national livestock extension and range management programs;

- the selection of participants for long-term training in the U.S. These individual would have no input in Phase I of the project but will form the core of the GON program in Phase II;

- the expansion of in-country training capacity in livestock production and range management. This is essential if a qualified field staff is to be available in Phase II.

These events are shown on the PPT chart as critical indicators (CPT No. 5, 8, and 27).

2. Critical Indicators of Progress

From the standpoint of achieving the project purpose of developing a feasible program to increase animal productivity and control range use in the pastoral zone, the following events will be the most important indicators of satisfactory progress:

Event		Responsibility	Critical Date
1.	Arrival of the U.S. technicians	AID/W	Jan 78
2.	Arrival of the equipment and commodities needed for the sociological and livestock production systems studies	AID/W	Feb 78
3.	Start of the sociological and livestock production studies	Contr.	Feb 78
4.	Selection of counterparts and participants	GON	Jan 78
5.	Begin construction of livestock stations	ADO/Contr.	Jan 78
6.	Expand training capacity in-country	GON	Sept 79
7.	Complete studies	Contr.	Apr 80
8.	Complete range management plan and livestock extension program for Phase II implementation	Contr.	May 80
9.	Complete construction of livestock stations	Contr.	May 80

Several actions will need to be taken prior to the signing of a Project Agreement (PROAG) to assure that critical project activities begin on schedule. These are as follows:

1. ADO will prepare an Action Memorandum requesting funds to hire two personal service contractors who will be responsible for preliminary logistic and support function to insure that the project can become operational the soonest after ProAg signing.

2. AID/W will grant a waiver permitting local procurement of equipment and commodities that cannot practically be ordered from the U.S.

3. AID/W on the basis of the descriptions of duties contained in the annexes to this project paper should begin identifying possible candidates for the project staff as soon as the Project Paper is approved.

4. After having been officially advised by the GON that it wishes ADO to undertake procurement actions on its behalf, ADO will prepare all the necessary procurement documents prior to the signing of the ProAg. This will enable requests for offers and Invitations for Bids (IFB's) to be issued within 15-30 days after the ProAg is signed.

C. Procurement Plan

1. Responsibility

Given the experimental nature of this project, it is proposed that primary responsibility for procurement be assigned to ADO/Niamey. As explained more fully below, most project commodities, will be purchased locally. The GON has indicated that it does not at present have the capacity to implement the necessary procurement actions through its own agencies, and there are no private concerns in Niger capable of undertaking the procurement in accordance with AID regulations. Therefore, the GON requests that procurement of local source, equipment and materials be conducted on its behalf by the ADO. The ADO agrees that this is in fact the most effective way to proceed. In carrying out this responsibility the ADO will request the advice and assistance of the REDSO Commodity Management Advisor as needed. The ADO will request AID/W to contract for implementation of this project.

2. Equipment and Commodities List

The detailed listing and cost estimates for the vehicles, equipment and commodities to be purchased under this project is given in the financial annex. Project needs may result in some shifts between line items but these are not expected to be major.

3. Source and Origin

The authorized source and origin for commodities financed by AID under this project is the United States. In addition, procurement in Niger is authorized in accordance with Handbook 15, Sections 11B2 and 11B4A of equipment and materials. While maximum effort will be made to buy all suitable materials and equipment in the U.S., the practicality of the project will require that many of the items shown in the equipment list, as well as the PCL products, be purchased from Code 935 source and origin. Authorized shelf item procurement is described under Section 5. Requests for waivers of Code 000 (U.S.) source and origin requirements are included under Section 6.

4. Method of Procurement

Procurement of U.S. source equipment will be conducted according to AID Handbook 11 Competitive Solicitation (IFB) procedures. Procurement of non-major equipment and materials undertaken in this project, when the estimated landed cost under a single transaction is less than $50,000 is exempt from formal IFB requirements and may be conducted on the basis of good commercial practices and reasonable, informal solicitation offers. Local or third country purchases, when authorized, will be conducted in accordance with good commercial practices and, as far as practicable, on the basis of competitive solicitation of offers.

5. Shelf Item Procurements

Authorization for local cost shelf item procurement is requested in accordance with AID Handbook 15, Sections 11B3 and 11B4, of commodities which are normally imported into the cooperating country, and kept in stock in the form in which they were imported, for sale to meet a general demand. Shelf items of Code 899 origin, but not of U.S. origin, are eligible for financing, provided the total cost of these purchases does not exceed 10 percent of the total local costs financed by AID or $10,000, whichever is higher, and the unit price of goods bought as shelf items does not exceed $2,500.

6. Waivers

a. Waiver of AID's source and origin requirement is requested, as follows:

Code 935 procurement for materials and equipment for the construction of livestock stations, stock handling facilities, wells, and surface water catchments communications equipment and POL. The total cost of locally purchased commodities and materials will be about $1 million. (See Financial Analysis, Table 3.) Justification:

b. Modifications of authorized shelt item rule is required for POL products, to raise the current limited of $2,500 to $5,000 per transaction. Source: Niger; origin:Nigeria total costs of POL will be about $450,000.

Justification:

The relatively small quantity and recurring nature of requirements makes U.S. procurement impractical and prohibitive in terms of cost.

b. Monitoring and Evaluation Plan

The major monitoring responsibility for this project will be with the project manager. In addition to numerous field trips, he will rely on semi-annual progress reports from each member of the project staff. In carrying out this monitoring function, he will work closely with his counterpart in the PZM office and the Director of the Livestock Service. Since this project is primarily studies and experimentation leading to the design of a larger project, it is felt that any evaluation other than standard Project Appraisal Report (PARs) would not be useful until after the second year of the project. The Project Paper and Project Agreement will state as precisely as possible what information must be obtained from the project activities, and an evaluation will be carried out in late 1979 focussing on whether or not the information was obtained. The evaluation need not do much more than that since very soon after it is completed there will be an in-depth analysis of the data as part of the design of the Phase II project.

VII. Draft Project Agreement (Description)

A. Project Purpose

The project covered by this agreement is the first phase of a two and possibly three phase effort to increase the income and well-being of herders in the pastoral zone

while preserving rangeland resources. Its purpose is to carry out studies on existing conditions and implement pilot range management and animal husbandry practices. Based on the pilot interventions and studies a range management and livestock extension plan will be developed for the pastoral zone of Niger. In addition, this project will begin laying the groundwaork, through training and infrastructure construction for a larger scale program to be implemented over the long term. The basic approach will be, first, to develop a thorough understanding of the existing livestock production and resource utilization systems in the pastoral zone from both a technical and socio-economic standpoint and, second, to implement pilot interventions that are technically, economically and socially feasible for expansions in a Phase II activity. At the end of this project, the GON will have: (1) information on the costs, benefits, and manpower and organization requirements for a livestock productivity program and (2) a range management plan that has been pilot tested and will specify what needs to be done to prevent deterioration of this basic resource and how controls can best be instituted.

The area selected for Phase I activities (about 4,000,000 hectares) includes both the low rainfall area in the north of the pastoral zone and higher rainfall area in the south and will enable the project staff to monitor the animal husbandry and resource use practices of selected herders at all times of the year. Although no detailed data exist on human and livestock population in the Phase I project area, statistics gathered at the arrondissement level for 1975 indicate that an average stocking rate for that part of the pastoral zone would be in the range of 25-35 hectares per TBU. This would indicate a total livestock population of about 150,000 TBU's. The human population in the project area is also unknown but, based on a post-drought ratio of 50 TBU's per herding family of 10, is probably in the range of 25,000 to 30,000 people. Only a small portion of these people and animals will be directly affected by the Phase I project.

It is expected that a larger Phase II project based on the findings of Phase I would be implemented in an area substantially larger than the 4,000,000 hectare area described above. This larger area would still be in the central part of the pastoral zone but could extend east to Tanout and west to Tahoua. This would correspond to the larger area for AID intervention that was originally discussed with the GON.

B. Project Activities

The activities to be carried out under this project can be divided into four categories: range management, livestock production, sociological studies and interventions and training,

1. Range Management

The range management component will define and demonstrate technically feasible ways of protecting and improving the natural resources of the project area. The specific range management-related interventions during the period of the project will be as follows:

a. A continual assessment of range conditions with a view to arriving at a sound technical approach for determining carrying capacities and recommended grazing patterns. This will involve setting up and monitoring range transects and enclosures in different parts of the project area; correlating range condition with rainfall patterns and preparing overlay maps showing changes in vegetation from year to year; and, finally, the preparation of a system of continuous range assessment to be adopted by the GON as part of a broadbased range management program. As part of this activity, the range management advisor will carry out a complete review of agrostological and other technical data that exist on the project area.

b. Mapping of the project area. This will involve aerial photography, comparison with photos taken in 1955, and ground surveys to complement the photographs.

c. Re-seeding experiments to determine whether it is economic to speed up the process of revegetation of denuded areas rather than rely solely on natural development which in some cases will take decades.

d. In-country training in range management. The range management advisor with the assistance of a short-term consultant will put together a short course in range management for use in the Livestock School in Niamey.

e. Experimentation with various methods of surface water development and traditional well improvement. Experiments with surface water will be aimed at finding ways of enabling herds to remain in the northern part of the pastoral zone for a longer period of time after the rainy season, thereby reducing grazing pressure on the dry season pastures to the south. The project provides funds to construct as many as three catchment areas of different size and depth. The project agricultural engineer will design the catchment areas and supervise their construction. The range management advisor will monitor their use and measure seepage, evaporation, water consumption and effects on herd movements and range

condition in the vicinity of the catchment area. The well improvement program will explore ways of increasing the life of traditional hand-dug wells, reduce contamination and facilitate the drawing of water. The major intervention in this regard will be the lining of the upper 5 or 10 meters of about 15 wells. The objective is to design a better traditional well at a cost herders will be able and willing to incur.

f. Experimentation with various methods of fire control. The extent of fire damage in the project area will be closely monitored by the range management advisor and the technical and economic feasibility of reducing the damage will be explored. This will include the study of the costs and results of a firebreak construction program now underway just south of the project area.

2. Livestock Production

The livestock production component of the project will carry out a major study to determine the costs and benefits of a comprehensive small herder-oriented livestock productivity program in the pastoral zone; provide support to the existing livestock program (mostly animal health) in Niger; and construct facilities requiref for expanding the ongoing program and for a Phase II project. The specific activities in this component are as follows:

A package of inputs to increase livestock production will be tested in conjunction with range management trials with a group of herders and compared to traditional production systems to determine the cost and benefits of a comprehensive government program to increase animal productivity in the pastoral zone.

a. Although it is generally recognized that productivity can be increased, it is not yet clear that the required interventions are in fact cost-effective under existing conditions of inadequate feed supply, multiple-objective livestock raising practices and high cost inputs. The study will be designed and supervised by a senior researcher with experience in livestock systems research. He

will produce a final report that will describe and analyze existing livestock production systems in the pastoral zone and the impact of increased inputs and improved practices. The field work will be carried out by research assistants in animal husbandry and agricultural economics. The package of improved services to be provided under the study will include: (1) complete vaccination coverage, (2) internal and external parasite treatment, (3) mineral supplements and (4) feed supplements for calves during the stress period at the end of dry season. These inputs and services will be provided to sample herds participating in the pilot range management activity and an additional sample of traditional herds will be monitored for comparison purposes. The animal science research assistant will obtain data with respect to mortality, weight gain, fertility, disease incidence, milk production, etc., and the agricultural economics research assistant will analyze the costs and benefits of the program from the standpoint of the GON and the herder.

b. A study of the recurring cost implications of the project interventions. This study will be carried out by a macroeconomist over a period of about 4 months and address the basic issues of what it costs to provide improved livestock services in the pastoral zone and what are the means through which the Government can recover some of these costs.

c. Support for the existing livestock program in the project area. At present the animal health program consists mostly or providing vaccinations against rinderpest and contagious bovine pleuropneumonia (CBP). Coverage, however, is far from complete and many other diseases are not receiving adequate attention. Under this project the Livestock Service will improve its vaccination program in the project area and initiate internal parasite control on a significant scale.

d. Construction of facilities required for the animal health and livestock extension program. Specifically, the project will finance the construction of livestock posts at Aderbissinat, Gadabeji, InGall and Abalak. Each post will consist of office, laboratory, storage facility, corral, a very rudimentary abattoir/hide drying facility, and living quarters for one family. In addition, 10 livestock handling facilities will be constructed in the areas to be serviced by the livestock posts at Aderbissinat and Gadebeji. Each of these will consist of a holding pen (12 M x 12 M) and a working chute.

e. The design of a livestock extension program for the pastoral zone. During the course of his two years in Niger the livestock production advisor will work with the Livestock Service in developing an extension program to be implemented in the project area in Phase II. This will be based on his observations of current husbandry practices and conditions of animals and on the results of the livestock production study. As part of this effort the livestock advisor will identify additional training that will need to be provided in-country for the agents who will provide the extension services.

3. Herder Community Innovations

A critical purpose of the Phase I project in the development of a resource conservation plan for the pastoral zone. A herder sociology unit will address this project purpose and other important needs of the herders in the project area through the following six activities:

a. The collection of data from a sample of herding communities on current population, resource utilization, organizational structures, regional economic institutions, and development situations.

b. The formation of a network of "herder community aides: chosen by the sample herding communities themselves, whose tasks will be to monitor and report veterinary and other needs, pasture conditions and marketing problems, and to animate extension efforts in a larger Phase II project.

c. The creation of locally-adapted extension and communication materials and techniques through the use of cassette recordings in local languages for information sharing, herder discussion and seminars, and other animation, educational, and interest articulation techniques.

d. Most importantly, the creation of a pilot herders' associations, based on criteria of indigenous social organization, microecological zone, and existing administrative units. The eventual long-term role of these associations will be to receive and discuss information on the physical, animal and human resources of relevant geographical areas, develop with project technicians a long-term understanding of their resources, and work toward developing a sound resource management plan for their own areas.

In phase I, one or two associations made up of members who graze their animals in contiguous areas will be organized to undertake a pilot range management effort. The herders in these associations will limit grazing to the recommended carrying capacity as determined by the range management advisor and his counterpart. These will be the same herders who will receive complete vaccination coverage, treatment for internal and external parasites, mineral supplements and supplementary calf feeds.

e. The creation of a permanent herder sociology capability within the Livestock Service to carry out applied studies among the herder population and to design and implement studies among the herder population and to design and implement innovations on their behalf.

f. The completion of three subsidiary studies by outside consultants temporarily attached to the unit:

(1) A human and animal census or sample census of the Phase II project zone at two points in 1979.

(2) A legal/anthropological analysis of the relations between national legislation and the traditional land tenure system in the zone and assistance provided in drafting the necessary land tenure code revisions to implement a range management plan.

(3) A sociological report on the southern-eastern part of the Phase II project zone, an area where little information has been developed for judging the feasibility of later interventions.

4. Training

This component will be oriented to building up in the GON a capacity to address the three related areas of animal health, livestock extension and range management and will consist of:

a. Training of high-level staff to organize and manage a comprehensive livestock production program and a range management program at the national level. During Phase I it is intended

that ten participants be sent abroad for degree training. Six in Range Management, four with minors in Animal Husbandry and two with minors in Agricultural Engineering. Two participants will receive degrees in Rural Sociology, and two will receive degrees in Agriculture Economics. Nine additional staff members of the Livestock Service will be sent to the U.S. and third country for short courses aimed specifically at meeting the manpower needs of a multifaceted range management program.

b. Basic training of the regular livestock service staff in animal husbandry and range management. This is intermediate level training that should most appropriately be done in-country. The necessary first step is an expansion of the curriculum in the school for livestock agents on the curriculum necessary to meet the training needs of a much broadened livestock program. In addition, the livestock production and range management experts will advise and possibly participate in the in-country training of Livestock Service staff.

c. Training of basic extension agents at the herder level. This is training of members of herding families and can be done in the field. The livestock production advisor and livestock service staff with the assistant of the social anthropologist will develop an approach to

training herders in animal husbandry and range management that will be implemented during the Phase II project.

The end product of the above described activities will be the project purpose, i.e., a comprehensive implementable program to increase animal productivity and conserve the natural resources of the pastoral zone. This program will be prepared by the project technicians based on the findings of the studies and experiments to be carried out under the project. A report covering all relevant aspects of livestock production and range management in the pastoral zone will be presented to the GON by July 1980. Assuming that all of the major feasibility issues to be addressed in Phase I are successfully resolved, the report of the project team will form the basis for a Phase II action program in the project area.

As described in greater detail in Section _____ of the grant agreement, the inputs required to carry out the above activities consist of personnel, commodities, construction and training. The personnel component consists of the following full-time experts: range management advisor and his counterpart, livestock extension advisor and his counterpart, agricultural engineer, social anthropologist and his counterpart, marketing economist, two research assistants, and six field workers under personal services contracts. In addition, 27 man-months of short-term consultants will be required. The commodities and equipment component consists largely of vehicles and other items required to carry out the studies and experiments. The construction component is mainly the livestock stations, and training consists of ten degree programs and 36 man-months of non-degree programs.

C. Implementation

The activities described above are to be implemented over a period of about three years according to the schedule given below. For each activity the action agent is shown as wellas the scheduled date of beginning or completion. The dates are meant to be approximations but should be considered as fairly firm because: 1) some of the dates are keyed to the rainy and dry seasons and 2) many of the activities are interrelated and delays in individual events have ramifications throughout the project. The dates are shown in months and are related to the month when the great agreement is signed (assumed here to be July 1977).

Schedule of Activities

Activity	Action Agent	Date (month)
1. Aerial photography of project area	Contractor	0 / 4
2. Arrival of project staff and assignment of counterparts	AID/GON	0 / 6
3. Arrival of commodities and equipment	AID	0 / 7

	Activity	Action Agent	Date (month)
4.	Selection and processing of participant trainees	GON/AID	0 + 7
5.	Livestosck production, sociology, range management and marketing studies begin	GON/AID/Contr.	0 + 7
6.	Construction of first catchment area begins	GON/Contr.	0 + 7
7.	Construction of first catchment area compl.	Contr.	0 + 10
8.	Academic trainees leave for U.S.	AID	0 + 11
9.	Construction of livestock posts begins	GON/Contr.	0 + 11
10.	First interim report by each project advisor	Contr.	0 + 17
11.	First census of population and livestock	GON/Con	0 + 20
12.	Construction of second and third catchment areas complete	Contr.	0 + 20
13.	First evaluation	AID/GON	0 + 20
14.	Recurring cost study	Contr.	0 + 24
15.	Second census	GON/Contr.	0 + 24
16.	In-country training of staff for Phase II begins	GON/Contr.	0 + 25
17.	Socio-legal study of land tenure	Contr.	0 + 26
18.	Livestock production, sociology, range management and marketing studies complete	Contr.	0 + 33
19.	Construction and staffing of livestock posts complete	GON/Contr.	0 + 34
20.	Final report on range management and livestock extension programs complete	Contr/GON/AID	0 + 36

VI. LOGICAL FRAMEWORK

Project Title and Number: Niger Range and Livestock 683-0202

Life of Project:
From FY 77 to FY 80
Total U.S. Funding $5,280
Date Prepared: May 1977

Narrative Summary	Objectively Verifiable Indicators	Means of Vertification	Important Assumptions
Program or Sector Goal: The broader objective to which this project contributes: 1. Implementation of a system of range management in the pastoral zone for the preservation and improvement of this resource. Increased income and well ..ng of the traditional herders in the pastoral zone.	Measures of Goal Achievement 1. a. % of ground cover will increase as will population of bushes and small trees. b. % of more palatable and nutritious plants will increase relative to less nutritious grasses in the zone. 2. a. Increased marketing of animals in the zone. b. Increased family consumption above current levels.	1. Visual surveys and the reading of permanent range indicators regularly by GON range management personnel will be compared with baseline data obtained in this project. 2. a. Review of statistical date on market presentation. b. Consumption levels will be able to be measured and compared with survey data from the project.	Assumptions for achieving goal targets 1. That the project will be able to show that the current pattern of use of rangelands conflict with the GON goals of increased livestock production, and that the GON will implement policy to optimize the productivity of this resource. 2. That the potential production increases identified will be sufficient to warrant an organization to provide increased services to herders and control use of the range. 3. That the potential increase in income and financial security will be sufficient to insure cooperation of the herders. 4. That the GON will be able to secure funding sufficient to implement the required programs.
Project Purpose: 1. The preparation of a comprehensive, feasible range management plan and livestock extension to optimize animal production in the pastoral zone. 2. The development of GON institutional capacity to begin to carry these interventions.	Conditions that will indicate purpose has been achieved: End of project status. 1. a. A range management plan and livestock extension program for the pastoral zone will be submitted at the end of this project. b. The herders involved in the pilot interventions of this Phase I project will demonstrate acceptance of the range management and livestock productivity recommendations. 2. a. A permanent office will be established in the GON administrative structure that will be responsible for management of the range and given legal authority to control animal population in the zone. b. Core staff of at least 20 persons will have been trained and training capability developed for local training of field level personnel.	Submission of the paper by project staff. 1. Acceptance by the GON and U.S.AID. 2. This office will begin to implement the proposed program.	Assumptions for achieving purpose: 1. a. The project area is sufficiently representative of the pastoral zone for project findings and results to be replicated. b. The package of improve range management and livestock production practices will be sufficiently remunerative and sufficiently consistent with the social and cultural systems for the herders to adopt it on a permanent basis. 2. a. That the GON will be able to initially staff and support this office and identify candidates for training.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: 1. Range resource studies: a. Carrying capacity of the range will be determined and a system of continous range assessment developed for the control of grazing patterns. b. The changes in the range between 1955 and 1977 will be determined by aerial photo analysis. Also erosion patterns and major habitat types will be determined and mapped through the use of aerial photos. c. The feasibility of reseeding will be determine based on reseeding trials in 20 locations. d. The feasibility of improving the traditional private well and the construction of water catchments will be determined. e. The extent of fire damage will be monitored (and the feasibility of reducing damage will be explored). 2. Livestock production: a. A package of interventions will be tested to produce a cost effective packages of interventions that can be used to increase productivity. b. The animal health programs will be expanded for more complete vaccination coverage and parasite control. c. Four livestock post and 10 livestock handling facilities will be constructed for more complete disease control and health program in Phase II. d. A marketing study will be conducted to determine to identify the necessary intervention that will be	Magnitude of Outputs: 1. a. Sixteen enclosures and range indicators spaced strategically throughout the project zone will be monitored to determine range carrying capacity and natural vegetation growth rates. b. Aerial photos survey of the project area will be done and 1977 photos will be compared with 1955 photos to determine changes in range condition. c. Sixteen unfenced and 4 fenced hectare plots will be reseeded to determine feasibility of reseeding to hasten the regeneration of better grasses and browse plants. d. Fifteen private wells will be improved and 3 water catchments of different types will be constructed. e. Number of hectares burned and speed and type of revegetation will be closely monitored. 2. a. Cost to the GON and herder will be compared to productivity increases. (Benefit/cost ratio of 2 or better is expected). b. Sixty pilot herds will receive complete vaccination and parasite control. c. Facilities will be adequate to each at least all of animals in project area in Phase II. d. Number of markets, number of animals marketed, price differences between markets, margins between herds price and retail or export price. e. Table cost of project implementations over 10 years with increasing % of local personnel will be completed and increase services from livestock sector will be estimated.	1. a. Range manager will determine carrying capacity and supervise range studies to be carried out by Peace Corps Volunteers. b. Project records. c. Range manager will supervise and report on reseeding trials to be done by PCVs. d. Project records. e. Project records and GON records. on cost of livestock construction. 2. a. Research assistants will evaluate data and submit reports. b. Project records. c. Survey of sites livestock service records. d. Project records and livestock service records. e. Project records. 3. a. Evaluation reports by Project Sociology Unit. b. Project records. c. Project records. d. GON cooperative office (UNCC) official policy. e. Project records. f. Project records. 4. a. GON organization and budget data and project records. b. Project records and Livestock School course list.	Assumptions for achieving outputs: 1. Rainfall during project period will be near normal and commodities and personnel arrive on time. 2. a. Productivity interventions will be successful and herders will not object to being monitored on their herding and financial activities. b. Construction capacity can be mobilized on schedule. 3. a. That herders will be able to add or incorporate this type of association into their existing social structure. b. Volunteer community "aides" will be able to be identified. c. Sensitive field workers will be able to be identified and they will be able to establish confidence among the herders so that studies can proceed with accuracy.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: (Continued) required to insure increased off-take and maximum returns to the herders. e. A recurring cost study will be conducted to determine the cost of implementing a comprehensive range management/livestock production program. . Sociological interventions and studies. a. Twenty pilot herder associations will be formed. b. A network of "herder community aides" will be formed to serve as basic level extension agents and provide a communication link between the GON and herders. c. Locally adopted extension material and techniques will be developed based on the GON Radio Club program and the use of cassette recording. d. The need for and feasibility of organizing cooperatives will be studied. e. Subsidiary reports will be produced on 1) national law and traditional land tenure, 2) the south-east sector of the project zone, 3) a census of the project zone. f. Detailed recommendations on methods and incentives for organizing and motivating herders to participate in a range management program based primarily on control of animal numbers per unit of land.	Magnitude of Outputs: (Continued) 3. a. The number of associations and members will easily be counted but the degree to which associations facilitate range management will be qualitative analysis. b. Twenty herder aides will be trained and functioning and training design for future training completed. c. At least 10 half-hour recorded programs will be developed, reproduced, and in the hands of "herder aides" and associations each year. d. A decision will be reached on if and how to proceed with cooperative organization in the pastoral zone. e. Three reports will be submitted to project office. f. A plan will be submitted. 4. a. An office will be legally established and have necessary administrative and technical, personnel to begin to implement a comprehensive program. b. Twenty herders aides and 30 livestock personnel will be trained, and the Livestock School in Niamey will offer 4 additional courses in range management and 3 additional coursed in Animal Husbandry.		

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: (Continued) 4. Training/Institutional development. a. An office for the Modernization of the Pastoral Zone (PZM) will be established. b. Ten persons will receive degrees training to serve as the technical staff of PZM office. c. At least 4 persons will receive short term U.S. or third country training and will serve as operations level staff for PZM office. d. Local training capability in Animal Husbandry and range management will be developed at the livestock school in Niamey and field training of livestock personnel will be conducted.	Magnitude of Outputs: (Continued)		
Inputs: AID 1. Personnel (expatriate) a. Long-term Range Management Adv. 2 1/2 MYR Animal Husbandry Adv. 2 1/2 MYR Social Anthropologist 2 1/2 MYR Marketing Economist 1 1/2 MYR 2 Research Assistants 4 MYR 8 Staff Assistants 21 MYR 5 Peace Corps Vols 10 MYR (U.S.-non-AID) Short-term Senior Researcher 6 MM Economist to Study Recurrent Cost 4 MM Land Tenure Consultant 2 MM Range Mgmt. 4 MM Demographer 3 MM Ag. Aducation Advisor 6 MM Anthropoligist 2 MM	Implementation Target (Type and Quantity)		Assumptions for providing inputs;

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs: (Continued) Personnel Local 14 Drivers and mechanics 10 Office staff 21 Research assistants Well diggers and laborers Commodities and Supplies Office supplies "'neral and feed supplements terial for water development Veterinary supplies POL Capital Cost 1. Construction of 4 livestock stations and 10 stock handling facilities. 2. Project Equipment: Soil kits, soil augers, microscopes, rain guages for range study studies. Tape recorders, cassettes, and printed material for training and extension work. Animal health equipment. Office equipment <u>GON Inputs</u> 1. Counterparts for U.S. project staff. Arrondissement level personnel r disease control and animal health. 3. Vaccines, vehicles and POL for the disease control program. 4. Land for the livestock post and corrales. 5. Training facilities and personnel for local training. 6. Radio club personnel and equipment for development of herders contact/communication system.			

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs: (Continued) 7. National radio (Voice of Sahel) personnel and equipment for the development of scripts and broadcast of range management and livestock production information. 8. UNCC personnel to evaluate economic and social data to determine the feasibility of cooperatives in the pastoral zone. . Salaries of participants while in training.			

VI. Important References

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ANNEX A

USAID Funded Cattle Trails Project In Niger
(Entente Livestock I)

The objective of the project was to redirect the flow of animals exiting the pastoral zone, with an increased proportion of these animals passing to Niamey and the Entente States. The project was designed to increase the supply of animals arriving at the Niamey slaughterhouse which would in turn provide more meat for the Niamey market and the possibility of exporting meat to other Entente countries.

Traditionally, most of the animals sold out of the pastoral zone are exported to Nigeria because of its proximity and ethnic affilations (Hausa). Because of Nigeria's predominate position on the market, it has been able to effect import policies to its own advantage and, at times, to the detriment of Niger's livestock industry. Thus Niger was anxious to develop other marketing possibilities where it had a more advantageous position.

To redirect this flow of animals, the project sought to physicially improve livestock market on the fringe of the pastoral zone and ameliorate the drive-trails linking these pastoral markets with Niamey. The project designers realized that the distance between the pastoral markets was greater than these same markets and Nigeria. Thus the project designers hoped to install facilities along these drive trails toward Niamey that would give traders a definite incentive to use these routes rather than unimproved routes going to Nigeria.

The drive routes are constructed to serve three areas and channel animals produced or marketed in these areas to Niamey. The first area is along the River Niger. The collection markets along this drive-trail are Ayorou and Gothèye. The drive trail follows the river, thus watering points were not necessary. The second area is directly north of Niamey and Ouallam. The collection markets of this zone are Magaizé and Banibangou. The third area is the zone between Tahoua and Abalak. Three important collection markets of this area (Kao, Barmou, and Chadawanka) were improved. This last area was the one of critical importance because the project hoped to pull animals out of this zone toward the Ekrafane ranch* and Niamey. Watering facilities and wells were installed along the proposed drive-trail linking the markets and the ranch. The second section of the drive-trail linked the ranch and Niamey following the Dallol Bosso to Balleyara and then following the road to Niamey.

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* Although the project dossier does not specifically mention the reorientation of cattle from this area toward the Ekrafane ranch, as an objective of the project, it was well known that a major problem with the ranch was its inability to procure a sufficient number of young animals locally.

To facilitate the exportation of live animals to neighboring Entente States, two exit trails were improved. The first exiting cattle trail connects Niamey and the Upper Volta border at Makalondi (Torodi). The second exit trail follows the Dallol Bosso from Birni N'Gaouré to Koulou situated on the Niger-Benin border.

Description of Project Inputs

The project inputs furnished by this project were (a) market corrals with accessory equipment and control buildings, (b) wells, and markers along cattle drive trails, (c) veterinary posts and lodgings, (d) holding pens for cattle awaiting slaughter at Niamey packing plant.

(a) Market corrals: Traditional livestock markets are characterized only by a service of stakes driven in the ground to which animals awaiting sale are tied. The market corrals constructed by this project have a large open area of 5-7,000 m^2 where animal sales are conducted. Encircling this open area are individual pens (600 m^2) for animals awaiting sale or held after being sold until a trader begins to drive them to another market. Part of the corral fence is built to serve as a vaccination corridor and has a portable set of scales for weighing the animals. The outside corral has an opening on one side of about 10 m and in the middle of this opening there is a small building. This building will be used by the livestock service to control animal movements in and out of the market.

The original plan called for the corrals to be constructed out of "I" beams set in concrete with plank railing. The cost of the planks was found to be prohibitive and split ronier rails were substituted.

Nine such market installations were constructed.

Niamey Department		Tahoma Department
1. Ayourou	4. Mangaize	1. Kao
2. Gothéye	5. Abala	2. Barmou
3. Niamey	6. Filingue	3. Chadawanka

(b) Improvements for the cattle drive trails consist of installing wells along the drive trails at distances approximating one day's walk (30-40 kms). The wells are hand-dug, cement-lined wells constructed by OFEDES. The project constructed 15 such wells.

In areas where there is considerable crop cultivation, the drive trail is marked with stakes. Farmers are not to cultivate in the area set aside for the drive trails and herders are responsible for animals straying off the trail and damaging farmers' crops. Approximately 150 km

of drive trail were marked. One section of the marked trail is between Filingue and Baleyara and the second section is between Birni N'Gaouré and Koulou.

(c) Veterinary posts: The project built 7 veterinary posts in locations where there was a likely movement of animals across national borders. These veterinary posts would reinforce sanitary and statistical control of these animals. Four installations were constructed in the area north of Niamey (Ayorou, Mangaize, Bani Bangou and Abala) to control animals entering Niger from Mali. Two veterinary posts were built south of Niamey to control animals leaving Niger for Benin (Koulou) and Upper Volta (Torodi).

For the most part, these veterinary posts are located in isolated areas which have not been receiving regular assistance from the Livestock Service. The veterinary posts include ample lodging for the Livestock Service personnel stationed at the post, a small office, storage space and an elementary laboratory.

(d) Holding pens at Niamey slaughter house: Animals arriving at the Niamey slaughter house are often showing stress and must wait several days before slaughter. The project constructed a holding corral where these animals can be held, fed and properly watered for several days to a week before slaughter. The holding corral is comprised of three pens, each approximately 1500 m^2, located near the river just south of Niamey. Straw from the neighboring rice fields will provide fooder for the animals. The corrals are constructed by creosote soaked split ronier rails attached to "I" beam posts set in concrete.

All the project inputs are in place and several are in use. The drive trails are being used as are several of the veterinary posts. All the market facilities and holding pens at Niamey slaughter house have been completed but none are being used until they are formally turned over to the local administrative cadres.

ANNEX B

Description of the FED-Funded "Multiplication Center at Ibesseténe"

As part of its interim three year program for drought recovery and rehabilitation in the livestock sector, the GON has undertaken to establish livestock "multiplication" centers in the pastoral zone, one per Department. In the long run these centers are meant to be a source of quality animals for the herdsmen of the zone. They are also expected to serve as extension services for demonstrations, training and information. And there is some expectation that they may serve as centers for the distribution, and possibly the production, of supplementary feed and mineral licks. FAC has agreed to do the center in Dosso Department (131,700,000 CFA). Saudi Arabia has undertaken to finance the centers in Maradi, Zinder, Diffa and Agadez. The European Economic Community has agreed to install the center near Ibesseténe in Tahoua Department (231,200,000 CFA or $900,000 equivalent). This center lies within the area of the USAID Range Management and Livestock Project.*

As of April 28, 1977, construction of the Ibesseténe Center was nearly completed (80%) with expenditures totalling 151 million CFA and payments in process of 73 million. The center is located in Tchintabareden Arrondissement, north of the Tahoua-Agadez road between Ibesseténe, Kao and Akibénou, about 80 mks northeast of Tahoua. The center comprises about 80,000 hectares of grazing land. It has been completely fenced (100 kilometers of fencing) and is being stocked with cattle on some 78,000 hectares and with goats and sheep on some 2,000 hectares. The project paper envisaged stocking the center with approximately 1000 young (4-5 year olds) cows.

There is virtually no surface water in this area and ground warter is at such depths that herders were not able to install traditional wells. As a result the pasture lands at the center have been very little used. FED has constructed two bore holes to provide necessary water. The depth of the first bore hole completed was at 550 meters. It has been equipped with pumping station, and water reservoir (200 m^3). The second bore hole reached water at a depth of 500 meters and has been similarly equipped.

According to the project paper, the Center's functions will include:

1° purchase of female animals for selection, reproduction and distribution to herdsmen;

2° production of steers for fattening**;

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* A second center is being established in Dakoro arrondissement (Maradi) near In Twila and a third one is being established just north of Belbedji in the arrondissement of Tanout (Zinder).

** The herd of 1,000 cows is expected to produce an annual crop of 315 young steers. These steers would be sold to farmers in Keita Valley and in the agriculture zone of Madaoua for animal traction and on-farm fattening.

3° logistical support for extension programs with herders.

The project paper also envisages fodder production on nine hectares of land using rainfall and supplemental irrigation. The analysis of cost benefits of this fodder production could prove helpful in determing the potential for additional local production in other areas of the zone to meet supplementary feeding requirements during the 2-3 months at the end of the dry season. However, the local FED advisor believes that production without supplementary irrigation should be possible. Initial fodder production is expected to start in June-September 1977.

The Center is equipped with facilities for vaccination and treatment for parasites, located near each of the pumping stations.

The extension program to be carried out from the Center, according to the project paper, includes the following themes:

1. treatment for parasites internal and external, as well as annual vaccinations against contagious endemic disease;

2. supplemental feeding of calves, the loss of calves at the end of the dry season can be reduced from as high as 50% to under 10% by providing 5 1/2 kilogram of supplemental feed during the month of June;

3. supplemental nutrition for cows, herders will be shown the impact of mineral licks rich in phosphorous in increasing fertility rates, and earlier calving among cows;

4. education and training of herders in techniques for reducing grassland fires, the need to preserve trees and bushes, and the need to protect grasslands from overgrazing.

5. Cooperative organization, the extension services of the Center will attempt to organize a cooperative among herders of the area with the following functions:

   (a) sale of steers

   (b) supply of millet by stocking supplies at the end of the harvest period

   (c) purchase of supplemental food and medicines

   (d) participation in committees for distribution of animals to needy families

The extension personnel, as of April 77, had not yet been recruited or trained. The expectation is that this phase of the operation will begin in 1978. It is expected that the extension and research program of the Center will be integrated into the USAID project.

A program of range management is to be established at the Center. This is to include an annual set aside of 20% of the grazing area for rest and recuperation, and as a reserve in years of poor rainfall. A system of pasture rotation will be worked out, based on an annual assessment of carrying capacity. A system of fire breaks around the boreholes and around stock ponds is also to be established. The cultivation of millet in firebreak zones on a trial basis is envisaged in the project paper. And in order to regenerate bush and tree growth, some stock ponds are to be set aside for several years running and usual fodder trees and bush (acacia albida, Balanite) are to be introduced and protected.

According to the project paper, the project was to have been managed by the livestock service in close liaison with the Departmental Development Committee (COTEDEP) and the Arrondissement Development (Committee (COTEAR), with the Service d'Animation of the Ministry of Plan and with the UNCC (for credit and cooperation work). The Livestock Laboratory in Niamey was to be made responsible for the design of the animal selection, improvement and husbandry, for animal health programs and for the range management program.

Subsequently, however, the Minister of Rural Development has established a special office reporting to him (Dr. Laouli), and managing all activities for development in the pastoral zone.

The Center is scheduled to be staffed with:

- two technical field agents
- one vaccinator
- a driver mechanic
- a driver
- two pump men
- ten shepherds
- five workers

The Center is being directed currently by the Head of the Livestock Service in Tahoua. The FED project does not call for technical assistance personnel.

Reference: Projet de Création du Centre de Multiplication de Bovins d' Ibesseténe dans le Department de Tahoua, Direction du Service de l'Elevage et des Industries Animales, Ministere d'Economie Rurale et du Climat, Republique du Niger, Juillet 1975.

ANNEX C

Description of the Proposed
World Bank Livestock Project
For the Central Region of Niger
(This is A.R. Baron's memo of conversation
with Mr. LeVif in April 1977)

DEPARTMENT OF STATE

AGENCY FOR INTERNATIONAL DEVELOPMENT
Area Development Office, Niamey

DATE OF CONVERSATION: April 29, 1977

SUBJECT: IBRD Livestock Project for Niger

PARTICIPANTS: Mr. Jean LeVif, IBRD Livestock
Mr. Albert R. Baron, RDO
Mr. Jay P. Johnson, D/RDO
Mr. Walter Sherwin, ADO/PROG

COPIES TO: Ambassador
Jay P. Johnson, D/RDO
Walter Sherwin, ADO/PROG
Paul Daly, ADO/NRL
Roger Poulin, REDSO
John Ericksen, REDSO
Gordon MacArthur, AFR/SFWA
Kevin Burke, AFR/SFWA
Howard Helman, Paris

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1. Mr. LeVif is leaving Niger after a two month sejour to design a World Bank livestock project for Niger. We provided him with a copy of the first draft of our project paper or Niger Range Management and Livestock. In turn he outlined the basic notions of the project proposal which he will be completing in the next few weeks.

2. According to LeVif, the IBRD project is to be a major undertaking, involving World Bank funding roughly estimated at about 4 billion cfa ($16.0 million) over a five year period. Project implementation would start, if all goes well, by the end of CY 78. The project will be restricted to the Departments of Maradi and Zinder and will cover both the pastoral zone in the north and the agricultural areas in the South. The GON has apparently provided that the pastoral zone covered by the project will not overlap with the USAID range and livestock project.

3. The project will therefore include components for the pastoral zone and for the agricultural zone, and provide a basis for assuring the necessary linkages between the two. It will include actions to develop markets and cattle trails.

4. Within the pastoral zone, the project will aim to develop an extension organization to work with the herders. The principal instrument for extension is to be the livestock center (Center d'Elevage), which will be established within a sort of grazing district (unités pastorale). Each district would be defined so as to encompass a grazing area with about 25 to 30,000 cattle.

5. In all, a dozen livestock centers are envisaged. Each center is to be staffed with:

(a) A zonal service Chief, who ideally would be agricultural engineer level (A2 level in the Niger civil service system). Practically the job will have to be filled by livestock monitors (B level).

(b) Three to four locally recruited and trained field agents (encadreurs). These men would be at the primary school certificate level, able to read and write, and equivalent in salary and status to the aide-encadreurs (assistant field agents) being used in the agricultural areas.

(c) Model herders (éleveurs-pilotes). These would be unpaid men selected from the different groups and provided some training. They would serve as liaison men and perform functions analegous to the farmer-demonstrators in the farming areas. LeVif notes that he took the notion of model herders from an AID livestock project in Chad.

6. Activities in the pastoral zone in the first years of the project will have to include collection and inventorying basic data on the numbers of people and animals, animal grazing patterns and practice, carrying capacity and water conditions. In LeVif's view, it will not be possible to institute systems of range management at the beginning. First it will be necessary to gain the confidence and cooperation of the herders, and to get a much more detailed knowledge of the zone.

7. The notion therefore is to begin by establishing an organization for helping and advising the herders in the zone, for collecting the detailed information needed, and eventually for organizing herders into associations and for helping herders establish mutually agreed upon range management systems which the herders themselves would enforce. Initially, help to the herders would be in the form of comprehensive animal health coverage, literacy training, mineral licks and supplemental feeding for young animals in the stress period, and the organization of food supply for the herders.

8. Mr. LeVif notes that devising a system(s) of effective range management is going to be a very complex undertaking indeed, and that the Peuls are going to be the problem in developing such systems. He notes that the Touareg groups have much more regular grazing patterns than the Peuls. The Peuls is the area tend to be much more individualistic, to herd in smaller groups, and to range over much wider areas (from within Nigeria to the

northern reaches of the pastoral zone in Niger). He also observes that of the two ethnics, the Peuls are by far the better animal husbandry men. More over they have a very good understanding of the problems of over-grazing and specific notions on the what is required for range management.

9. Mr. LeVif noted that during his visit to the pastoral zone in northern Maradi and Zinder he was struck by the poor condition of the pastures (the rains in 1976 in the pastoral zone were generally much less faborable than in 1975). He agreed with the Mission's observation that the animals do look good this year, but suggested that their condition will deteriorate as the dry season progresses.

10. LeVif also remarked that the objective of having herders sell their male animals at an early age seems to have been achieved, perhaps too much so. He noted that the predominant age of animals presented at sale at all with markets he visited was 2 years or under. ("There were very few animals with their adult teeth.") Apparently the herders are forced to sell the young males to buy the grains they need. The sale of young animals is part of the long-term policy of the GON which is to use the pastoral zone for reproduction, and to use the better watered southern zone for finishing and fattening. But as LeVif remarks, the facilities and channels for finishing and fattening in Niger are not yet in place. He assumes the young animals are being marketed in Nigeria. (Comment: This suggests that the Departmental Productivity Programs need to focus more on the developing livestock production in the farming areas they cover.)

11. A discussion then took place on incomes of herder families. Mr. LeVif noted that the size of family herds seems to range from none (the family lost all during the drought) up to perhaps 80 head of cattle (or T.U.B.). Per capita income of nomad herding families in the Maradi and Zinder area would range, he estimated, up to $120 per year with the average close to $50-60 dollars. There is, however, a difference in income distribution as compared to the southern farming zone; that is there are today a significant percentage of very poor herder families. In the farming area Mr. LeVif felt you would not find as many families so completely destitute.

Comment: It is not clear to what extent this IBRD project has yet been endorsed by the GON. Mr. LeVif has been working mainly with the head of the Livestock Department and the Livestock advisor in the Ministry of Planning (Mr. LeClerc). Thus the Secretary of State of Rural Development informed the reporter last week that the World Bank project would be concentrated mainly in the southern farming zone, and that other funding (Arab) was being sought for the SEDES projects at Tamesna, Ingouchal, Tegera and Manga. LeVif confirms that the Tejera project which is in the Maradi-Zinder area will not be included per se in the Bank project. And LeClerc advises that the policy makers do expect the project to extend into the pastoral zone. On Verra.

DRAFTING OFFICER: Albert R. Baron, RDO

DATE OF PREPARATION: April 29, 1977

ANNEX D
(With Appendices)

Description of Project Area

The project zone lies within an area bounded by Agadez on the north, Tahoua on the west, and Tanout on the east (See Map 1). The southern edge of the project area is just north of the Tarka Valley. In the north, just south of Agadez lies the Tiguidit Fault. The major portion of the area lies within Tadress Plateau. This area is about 4,000,000 hectares in size and includes parts of four arrondissements, Tchin-Tabaradene Agadez, Dakoro and Tanout. This is within the Sahelian or pastoral zone of Niger, a vast semi-arid region extending southward from the rim of the Sahara to roughly the 14th degree north longitude or to the Sudan region. Sahel and Sudan are both Arabic words. Sahel means shore or coast. Sudan means black, and presumably referred to the lands south of the Sahara where black people lived.

1. Physical Characteristics

The area is characterized by an arid to semi-arid climate where limited rainfall is the environmental constraint. The preciptitation tends to be in the form of high intensity storms of short duration over a relatively small area or strip as frontal systems move about the Sahel. The precipitation is low in total amount, about 200 to 400 mm (8 to 16 inches), and the annual distribution is poor due to concentration in a short season, between July and October. Moreover, the rainfall received is in a few major storms of great violence but of brief duration. Under such circumstances the intensity can be erosive on unprotected soil. Furthermore, the rains are extremely spotty and scattered, resulting in a continually shifting vegetative pattern from year to year. Surface water is limited to shallow depressions where it collects for varying durations during the rainy period.

The geological formation of the zone dates from the oldest precambrianera. It is a vast platform consisting of peneplained ranges. The terrain in the project area is gently rolling with meandering drainage. The soils are of a sand and clay nature and highly susceptible to erosion. Daytime temperature is warm to hot all year long, accompanied by intense tropical solaration and a high evaporation rate. The harmattan, a high, searing wind that blows down from the Sahara during the long dry season, further erodes the soil.

The typical vegetative type is open natural grassland consisting of a sparse cover of annual grasses and woody shrubs that are the sources of feed for the indigenous breeds of cattle, camels, sheep and goats. (The climate, soils, temperature variations and wind velocity are described at length in the Site Resource Inventory.) The climatic setting can be viewed as inhospitable to any but the hardiest people and animals who uniquely have learned to adjust and adapt to its harshness and unpredictability.

2. Population

The human population of the project zone is comprised of the Tuareg and Fulani, the pastoral nomads of Niger and the intended beneficiaries of this project. The population numbers about 50,000 and is equally divided between the two groups. Both groups have adapted their lives around their herds and follow the religion of Islam. But there the similarity stops for they co-exist as two separate cultures, each with its own set of customes, traditions and social organization. In addition their languages are unrelated; the Tuareg speak Tamashek, a derivitive of Arabic while the Fulani speak Fulfulde, a West African language. The problem of language difference is overcome by the use of Hausa, the lingua franca of the area, and the language of commerce for the zone.

The Tuareg are hierarchically organized with the largest unit being a confederation of tribes led by a Supreme Chief. This is broken down into separate tribes, subtribes or fractions, camping units and individual families, each with its appropriate leader. There are numerous Tuareg tribes in the project zone, and each ranges in population from a few hundred to a few thousand. The largest and most significant are the Illabakan, the Kel Feday and the Kel Ferwan. As will be indicated in the social analysis, section, however, the political cohisiveness of the Tuareg as a whole has weakened since the beginning of French Colonial rule, and the subgroups, especially the camping or well owning unit, will be the most important ones for the project.

The Fulani, who recently migrated into the project zone, appear to have a similar type of hierarchical structure with numerous tribes, broken down into lineages, sublineages or fractions, camping units and families. Beyond the fractions, however, the groups are more symbolic than corporate for Fulani geneologies extend for only a few generations. The major tribes in the project zone are the Alijam, the Dege, and the Degerji. Again, like the Tuareg the most important units for project purposes are the camping units as well as the family.

3. Commerce

Commerce is everywhere evident as the mechanism for the distribution of goods and the redistribution of local surpluses.

Commerce can be seen in the form of camel caravans transporting goods into the zone and can be seen in the invasion of truck caravans which increase with the improvement of the major roads on the zone's perimeter.

Most of the major cattle markets lies just south of the project zone, except for Abalak. Markets are classified by the number of daily presentations and type of other trading. For example the four major markets of In-Twila, Abalak, Goula and Sakabal have from 50 to 100

head of cattle presented daily. The lesser markets of Belbegi, Gourboubou, and Agadez average from 40 to 60 head of cattle and considerable trading in grain. The markets of Aderbissinat and InGall deal mainly in dairy products for grain.

4. Government Services

Government services in the form of administration, education and health are available down to the village (canton) level, where a school and a dispensary can always be found. While the services now delivered are far from adequate for the people's needs, the GON is aware of the inadequacy and of the probable needs of the people. In 1973 in response to the economic pressures caused by the drought, the Government removed the head tax on livestock. In further responded to a real need of the time through emergency food distribution to destitute herders. Due to the increased level of Government responsiveness to the needs of the area, the herders may be expected to cooperate with the Government in the development of a range management plan. The Livestock Service in the zone is presently far from adequate. The Departments of Tahaua, Agadez and Zinder provide what permanent staff that is available for animal health, disease control and meat inspection. There is no permanent staff in the area except for the northeast corner of Agadez.

Each Department has a staff of eight personnel headed by a graduate veterinarian. The Districts of Tanout and Dakoro have livestock posts staffed by two people each, a livestock assistant and a nurse. To backstop the disease control efforts of the Livestock Service in the zone the U.S. supported the development of seven Mobile Veterinary Teams consisting of five personnel each. In the zone itself there now exists eight corrals for vaccination of herds. Each mobile team has an advance man who rides ahead of the main working group team to inform and collect the herders at certain paints or corrals. There are four OFEDES drilled wells in the area. These wells vary from 300 m to 700 m. Additionally there are 35 concrete lined public wells averaging 100 m in depth. It is further estimated by OFEDES that there are about 500 privately owned traditional wells. The depths of these wells are extremely variable, ranging from 10 m up to 100 m. The well improvement intervention proposed in the project involves work with this traditional class.

5. Historical Utilization

History records that in earlier times the seasonally green Sahel was grazed by large herds of wild game. These herds migrated north with the appearance of green forage and surface water, and then migrated back south, en masses, as the forage was consumed and the water dried up. They withdrew to permanent water, in the form of ponds and rivers, far to the more humid south. By and large the consuming population remained in balance with the production resource, and abided by its rigid seasonality. The game population waxed and waned according to the amount

of rainfall over a series of years and in response to the pressures of human competition for the resource.

As man and his domestic animals gradually usurped the ecological niche of the wild animals, a new era of reduced migration was begun. Men dug shallow wells in natural depressions to find more reliable water, and later dug deeper to find more permanent water. They devised a system of shorter migrations to the seasonal surface water and green grass in the north and then back to the well, perhaps half the distance previously traveled by game. Migration practices continued, to utilize the sparse and short duration green forage of the northern Sahel.

Grazing pressure increased as more wells were dug and human and animal population increased until the more desirable perennial grasses began to disappear and be replaced by less nutritious, short-lived and low yielding annuals. The land surrounding the public walls has deteriorated to a barren ground surface varied only by occasional inedible weeds and trees. The pressence of a well is thus announced well in advance of reaching it. The fragile resources of the Sahel have been severely abused.

6. Current Conditions

While the climatic setting is unique, the signs and evidence of extreme abuse are little different from those presented in other neglected world grazing regions. Such is the result of the inevitable clash between private ownership of livestock and free and undirected use of a public* resource. Further pressure on the declining resource results from the encroachment of agriculture from the south, which squeezes more herders into the diminishing pastoral zone. There is little incentive for the individual herder to leave unused forage for the reserve he knows he will need, only to find it taken by someone else.

Weakened by malnutrition and starvation stresses of the latter half of the dry season, the animals fall easy prey to a high mortality rate from disease and parasites. This is additional incentive to attempt to increase herd size. Even a controlled movement of animals throughout the area in search of water and grass destroys much forage by trampling the soil base to erosion. The increased presence of man has brought a wider incidence of accidental grass fire which also competes for the available dry forage. The annual consumption of forages and the mechanical damage is out of balance with the capacity of the resource to recover. In some cases material amounts of topsoil itself are being carried away by wind and water erosion. These areas will not support a stand of grass in our lifetime or in many lifetimes to come. Between the cutting of

* The term "public" land is used here with the realization that its meaning in Niger is somewhat different from that in the United States. The project addresses itself to determining the disparity of meaning.

trees for human needs and occasionally for emergency animal forage, and the eating of new seedlings by goats, even the sparse arboreal vegetation is in a state of decline. Desertification shrinks the width of the Sahel from the north while unstable farming encroaches from the south. The Sahel of Niger, at least, exhibits every indication of approaching ecological disaster.

7. Migratory Patterns

The long history of seasonal-migratory harvesting of the forages of the Sahel, and its continuation today, suggests the presence of a system well adapted to the ecology of the climatic zone which has withstood the test of time. The independent nature of the nomad is an indication of inherent confidence in his system, which in turn explains his resistance to sedentary life. An understanding of the ever-present risk of local or broadscale drought is deeply embedded in his heritage. His social structure is in small and elastic units so that they can unite or disperse according to the availability of forage and water. His primary food, milk, is always with him and available for daily nourishment. His wealth and social status are symbolized by the number of animals he owns, as well as his capacity to survive the worst possible disaster. He lives in his unique environment by adapting to it.

There is more than random nomadism to the migratory pattern. The nomad understands better than many of his advisors from distant lands and different climates that the resource bases is not strong enough to sustain him year-long in one place. To surrender his northward trek is to lose the only opportunity to utilize a short-lived forage growth in that penurious region. The nomadic system in the Sahel is described at length in the social analysis section of this paper. Basically, movements by the different herder groups follow traditional patterns with some flexibility to adapt to changes in range conditions from one year to the next. In effect, the migrations are a form of rotation, rest, and deferred grazing, occasioned by the same needs that have led to the seasonal grazing rotations practiced in the American west. The danger point at which the nomad has arrived is more a result of his own internal demographic pressures, misguided external aid which encourages this, the absence of centralized coordination and direction, the spatial shrinkage as well as the decline of his resource, and the absence of a national concept and policy of resource conservation, rather than a failure of his tried and proven system.

ANNEX D - Appendix A

Water Resources of NRL Project Area

Surface and sub-surface water resources available to livestock herds in the target pastoral zone are largely determinative of seasonal herd movements, exploitation of surrounding grasslands and localization of growing sedentary agglomerations, markets and planned animal multiplication centers. Water resources are so essential in this semi-arid region that they acquire an important sphere of influence in herd and range management. The capacity of a water point to water a given number of animals per day at certain seasons, or at all times during the year, is a major factor in attracting herders and animals to a particular area within the zone.

Despite the many differences in watering systems, two generalizations apply in nearly every case. First, a herd is watered every other day; second, a herd grazes within a radial zone up to 12 kilometers from the watering points. The only exceptions occur when a watering point dries up and a shift has to be made, or during therainy season when herds are able to water themselves from easily obtainable surface water.

Deep-drilled wells: In the past twenty years, five small-bore wells have been drilled in the western limits of the target zone (El Mota, Tofaminir, In Waggeur, Abourhaya, Abalak.) Five additional wells are located directly adjacent to the zone: Ichin Tabaraden, Chin Salatin, Kao-Kao, Ibessetene, Ekisman. The well points are between 400 to 600 meters deep and draw on fossil water within the primary acquifer. As many as 5,000 head can (and often are) watered at these points per day, depending on seasonal migration patterns. The Niger Government operates a diesel pump at each site and water is generally available to all herds present during the dry season.

Each station is also equipped with a concrete cistern of approximately 50,000 liters capacity which can be used to water animals in the event of pump breakdowns and to water small adjacent garden plots of some supplementary foodstuffs such as cassava, squash, tomatoes and okra. Animals are watered from long, low metal troughs. One easily recognizable outgrowth of these pumping stations is the denuded and degraded surrounding countryside. Government policy is to install more such systems, not less, under the supposition that an abundance of well points will permit a systematic rotation of herds between sites so as to lessen the impact on the environment and permit regeneration of grasses.

Hand-dug, concrete lined, wide-mouth wells: The Niger Government has also dug cement-lined wells within the pasture zone. OFEDES (the government Office des Eaux Sous-Sol) constructs these wells at an average cost of $250 per meter. OFEDES has the responsibility of maintaining the wells and periodically sends a specialized rig to clean out the rubbish which

accumulates in the well bottom. The area arrondissement is required under law to budget $400 per year for this cleaning operation. Oftentimes budget constraints or defective (or lack of) equipment jeopardizes the effectiveness of this annual cleaning. About thirty such wells exists at present and current plans project increases of between three and six new wells per year. The average depth of these wells is between 30 and 60 meters. Water volume is generally sufficient to supply the needs of approximately 500 (average) and 800 (maximum) head in any season. Each well is equipped with 3-4 pulley type water lifting devices (either in wood or the newest ones in steel) which are used by herders to draw water in leather buckets with the use of draft animals (oxen, camels, or donkeys). The wells are public and are maintained by the government. Competition amongst herders for priority in watering time during peak hot and dry periods or on particularly crowded occasions often leads to disputes, and sometimes combat. The public ownership leads to lack of control of watering and uncontrolled grazing in the area around these wells.

Hand-dug, traditional wells: The Niger grasslands are dotted with hand-dug wells, ranging in depth from 10 to 70 meters (40 meters is about average) and supplying the regular water needs of the greatest number of animals. Approximately three hundred such wells are presently in operation within the project zone. Anywhere from 100 to 600 head may be watered at these wells in a day, depending on theannual seasonal grass available in the area and the volume of water available in the well. Drawing water is performed by draft animals using the pulley system. Large leather buckets containing between 60 and 80 liters come to the surface and are discharged in basins of either a metal drum or wooden tub-like fabrication.

Construction of these wells is generally performed on contracted basis by teams of itinerant Hausa laborers. Initial costs of digging average about $175, regardless of the depth (within resonable limits) or the nature of the sub-soil. The sole factor is the attaining of water, though no promises are made by the diggers as to the volume of water. This cost also includes the supply and placement of the medium sized timbers that support the mouth of the well. It is up to the herder himself, or those within his entourage, to find and install the strong wooden forks that support the pulley system.

Up keep responsibility is usually divided among users. The wells are not reinforced, except at the mouth where an intricate network of timber elevates the opening and protects it from collapse. These timbers must be replaced every three to four years, due to rot, termites, breakage and dislodgement from their fixed position. Although wood supplies are greatly depleted, as of present, government regulations on wood cutting (licenses or fines) are not operative in the zone and thus wood costs do not figure into well construction expense.

The sandy sides of wells, and particularly the bottom cavity, are very susceptible to erosion and collapse and often must be cleaned and deepened or else abandonned if the risks prove too great. Lowering water tables in the zone and site accumulations oblige herders to yearly deepen or enlarge their wells. Unless the well is fortunately situated in an especially compacted soil with rock matter, time and wear will generally reduce a well's water output and end its usefulness (if not result in its total collapse) after approximately twelve years.

Permission to dig a well must be gained from both traditional and government administrative authorities and consideration is given to other available wells within the immediate region before construction is approved. These wells are usually privately owned by a herder, from which the well derives its name (either construction, payment or inheritance constitutes the means of ownership) and watering rights are generally closely controlled by him. His proprietorship allows him to close the well to other herders or to permit requesting parties to water their animals. Wells are generally closed at the outset of the rainy season when thorn bushes over the well mouth signal that herds have parted for northern pastures and also prevent small ruminants from accidental falls. Well use may also be limited or denied, depending on the carrying capacity of the surrounding grassland. Use of the well by parties other than the owner, generally is due to blood ties, friendships, parellel grazing patterns and/or a consideration of cash or kind.

The traditional well seems to offer the greatest possibility of introducing a system of integrated livestock and range management. Herders associate soundly managed and structurally improved wells to measurable increments in herd health, weight and value. At the same time, these improvements make an appreciable difference in ameliorating the daily life routine of the herder and his family.

Temporary wells, or "puisards": The target pasture zone has at least six areas, concentrated towards the western part of the project zone, where post rainy season water tables are generally high, usually due to the influential existence of nearby ponds (Marékini, Akadeney, Agourboudé, Kirmidila, and Gourbobo). As the ponds recede following the last rains in September, herders dig (or hire help to dig) narrow, shallow wells, usually between three and six meters in depth. These wells do not have a rapid recharge capacity and therefore a herder may have several holes dug between which he can rotate in the course of watering. The succeeding year's rains will swell the pond and flood these small wells which then have to be redug. In periods of peak utilization (November to March, starting after the water-table drops below puisard depth), these small well areas often provide water for needs up to 1000 head. Herders prefer to draw water by "bailing", rather than by the laborious and slow task of working the deeper wells with draft animals. Although puisards are individually owned the natural conditions of these areas are such that any herder can develop his own water source for approximately five dollar equivalent.

Temporary ponds and semi-permanent lakes: Surface water catchment basins are prominent features of the pasture zone. Rains from June through September create floods which result in run-off water which accumulates in clay-bottomed low-lying areas. This standing water is appreciated by herds and herders for the ease of accessibility until the mounting dry season begins to claim all but the largest of them or until the stagnant water becomes heavily infested. Their geographic location permits these lakes to serve an intermediary points between northern pastures and more southerly-situated dry-season wells. The most important of these large ponds are located in N'Waggeur, Marékini, Akadaney, Tendi, Tadeni, Tamaya, Ekaoel, Ten Taborak, Aderbissinat; one permanent lake of relatively recent existence is found at Tabalak. Each of these bodies of water has become the subject of recent interest in vegetable gardening, and the lake of Tabalak has become an important source of fish. These alternative uses of pond waters could become of increasing importance in future years once proper studies are made. The large standing body of water in Ingerwit, on the southern rim of the Irhazer Plain, west of Agadez, was created in 1965 as part of a FAO project to construct artificial ponds for the purpose of watering livestock. The dimensions of the earthern work dam are such that surface water destined to cover a large part of the plain was captured and retained, to the long-term detriment of the environment. Coincidentally, that year signalled the outset of the drought period with the consequence that seven years after construction, livestock had all but disappeared from the region and new plans were drawn up to use the waters to support irrigation projects farmed by erstwhile nomads who had lost their herds. The experience points up the need for caution that must be exercised in planning surface water management of run-off waters in the ecologically fragile project zone. Adequate studies must precede efforts to divert or capture the flood waters of the short rainy season. However, the investigation of the role of artificially created ponds is a legitimate concern in the effort to balance and control water points and grazing lands according to seasonal supply.

Herders are sensitive to varying pasture-grass conditions in the vicinity of different types of water resources. Deep bore wells and permanent ponds have the most destructive effect on the surrounding pasture-lands because they offer the greatest ease of utilization. Areas where numerous puisards exist have a similar degrading effect, but to a lesser extent. Pastures around OFEDES wells are at times heavily grazed but generally the most common complaint is that the wells were crowded. The expressed preference of herders is for individual, traditional wells where the number of animals are least concentrated.

ANNEX D - Appendix B

Marketing Within The NRL Area

The principal animal markets in the project zone are:

Arrondissement of Tchin Tabaraden:

Abalak
Tofaminir

Arrondissement of Agadez:

Agadez
In-Gall
Aderbissinat

Arrondissement of Tanout:

Gandou
Belbedji
Baté
Gourbobo

Arrondissement of Dakoro:

Intouilla
Sakabal
Goula
Koudou
Dakoro

Principal markets in the project area where herders purchase cereals:

Intouilla
Sakabal
Gandou
Koudou

Most herders partially procure their cereals at various OPVN sale points: Abalak, Dakoro, Tanout, Agadez, Aderbissinat, Marandet.

The main role of markets in this zone is the exchange of animals or milk products (milk, butter and cheese) for cereal food grains, primarily millet. As a function of its role, most of the traditional markets regularly used by herders are located on a line running east and west where the pastoral and cultivation zones meet. It appears that this line of markets has slowly advanced northward as the cropping zone has encroached into the pastoral zone during the recent drought and past drought years. Traditional regional livestock markets such as Dakoro, studied by Dupire in the early 1950s, have decreased in volume over the past two decades, while new markets are being created further north and increasing in volume.

(cattle only)	Dakoro	Intouilla	Sakabal
1950	2664	-	-
1963	1398	590	91
1966	1176	813	600
1968	432	-	607
1970	2777	905	438
1971	196	1639	428
1972	189	2150	977
1973	289	2825 (11 mos.)	1022
1974	167	-	540
1975	67	453	160

Besides these markets, herders sell a considerable number of animals to itinerant Hausa traders who periodically visit individual camps throughout the year. The animals then are driven southward where they are resold by the traders. In Bernus' study, of a total of 64 animals, 52 were sold in regular markets and 12 were sold or traded to itinerant traders. Herders are not particularly attached to one market and usually use several markets throughout the year to sell their animals.

Normally herders need cash at two distinct periods of the year. In November, December and January, herders need cash to pay taxes and repair wells (for use during the dry season), as well as to make periodic small purchases of cereals.

At this time of year cereals are usually purchased with cash generated through sales of small ruminants or milk products. The payment of normally head taxes required the sale of a large animal (cattle or camel). Now that the livestock and head tax have been removed by the government it will be interesting to see how marketing patterns may change. Currently, it appears that herders are marketing young animals of up to two years (in the case of cattle). The second period of greatest need for cash runs from April to the beginning of the June rains. This period is referred to as the soudure. The herder normally requires a larger quantity of cereals as few animals are giving milk at this time of year. The herder is also stocking up on provisions the family will need during the rainy-season migration northward. Lastly, during this period, the herder will select out and sell weak animals that probably won't withstand the rainy-season migration.

During the rainy season, marketing usually drops off as the herder is farther from the markets and milk is relatively plentiful again. On his

return from the rainy season pastures, the herder will sell a few animals again as required to satisfy his cash needs, which aren't great at this time. He may also sell animals if the pasture or water conditions are unfavorable.

In the Bernus study which covers six family herds, a total of 64 animals were sold or traded through the year as follows:

January	11 Taxes	July	2 rainy season
February	1	August	2 rainy season
March	2 soudure	September	0 return from rainy season pasture
April	25 soudure	October	2
May	1 soudure	November	12 religious holy days
June	3 rainy season	December	3

Bernus' sampling of Tuaregs conforms with the same basic marketing pattern noted earlier by Dupire among the Fulani herders. Dupire notes there is a Hausa provert which says: "Never purchase millet when a Fulani is buying his; and, never build a house when Fulanis are constructing theirs." The wisdom behind this adage originates from the fact that herders normally make their large purchases of cereals late in the dry season (soudure) when cereal prices reach the maximum, because they no longer have milk and are stocking up on cereals for the rainy season. Semi-nomadic Fulani, if they do decide to construct a semi-permanent dwelling, normally build it during the first part of the rainy season after their fields have been started and when the rains endanger the completion of the construction.

The adage could very well include, "Never sell animals when nomads are selling their animals." Demand for animals is usually lowest during the "soudure" when herders are converting animals to cash for the purchase of cereals. The demand for animals is depressed at this time by the generally poor condition of the animals and the pasture lands. Conversely, the demand for animals is normally strongest immediately following the rainy seasons when animals are in good condition and pasture is available. However, this peak demand corresponds with a period when herds are normally reluctant to sell and, as a result the supply of animals on the market is low.

The price paid for animals is usually lower in the north and increases in the south where larger concentrations of people live and the market for export to Nigeria is closer.

(CFA Francs)

1968	Heifer	Cow	Steer
Agadez	6,000	5,000	8,000
Intouilla	6,500	7,000	11,000
Belbeji	8,000	9,000	11,000
Dakoro	7,000	7,500	11,000
Zinder	8,000	8,000	13,000
Maradi	9,500	8,000	15,000

In general, the price paid for cattle and camels dropped steadily by about a third between 1963 and 1968. By 1971, prices regained their position of the early 1960s and continued to rise through 1972. By 1972, prices were normally a third or a quarter above the 1963 prices. The drought in 1973 completely disrupted normal marketing patterns and prices fell drastically. Immediately after 1973, the market doubled the 1972 price in about 6 months, and continued to rise sharply through the first half of 1976. In the last half of 1976 prices remained steady or dropped slightly.

Price Index (Agadez)	1963	1968	1972	1975
Bull calf	7,500	6,500	17,500	47,000
Heifer	7,000	5,500	9,250	37,000
Milk cow	10,000	6,000	13,500	44,000
Sheep (ram)	1,350	1,250	3,175	6,500
Goat (buck)	500	400	1,350	4,200

ANNEX D - Appendix C

AID Funded Veterinary Facilities in the NRL Project Zone

An AIP project to provide increased animal health coverage in the area of the USAID Range Management and Livestock project was signed in the Fall of 1976. A grant of $250,000 was provided for field vehicles, veterinary equipment and animal phamaceutical supplies. Twelve million CFA ($50,000 equivalent) from counterpart funds were provided for vehicle operation and maintenance.

The aim was to provide veterinary equipment and supplies to the livestock services in the four arrondissements of the AID project area: Tchin Tabaraden (Tahoua), Agadez (Agadez Department), Dakoro (Maradi), and Tanout (Zinder). Mobile veterinary teams were equipped to undertake the annual vaccination campaigns carried out in 1976-77 and 1977-78 and to participate in basic livestock and rangelands data collection and research activities and surveys in the target area. Three vehicles, two landrovers and a three-ton truck, were provided to each arrondissement along with veterinary equipment such as syringes and ice containers, vaccines and camping equipment. The counterpart contribution provides for POL for the vehicles over a two-year period plus spare parts and eight large ice chests.

The personnel at the arrondissement livestock service comprises a head of service (veterinary technician), at least two technical assistants (vaccinator and laboratory assistant), drivers-mechanics and casual laborers. Field staff of the livestock service inspect animals slaughtered in the markets, control the taking and storage of hides and monitor livestock transactions in the major markets of the arrondissement. Seasonal workers, such as vaccinator assistants and field agents, are added to the arrondissement personnel during the annual vaccination campaigns. Local "scouts," or "éclaireurs," are hired to spread the word among camping groups that vaccinations are being scheduled at certain watering spots.

The livestock service physical plant at the arrondissement level is comprised of a reasonably large administrative office, a laboratory (usually poorly equipped), warehouse, garage equipped with generator and ice-making machine, holding pens for sick animals, and a vaccination corridor and corral. In addition, a lodging is provided for the Chief of Service.

The results of the vaccination campaign which ended in April 1977 indicate that the additional vehicles and equipment supplied by this activity have enabled the veterinary service to extend its coverage significantly.

Reference: USAID Activity Implementation Letter #683-11-130-216, Mobile Veterinary Teams, September 28, 1976

ANNEX E

PRP Approval Message

UNCLAS STATE 041390

AIDAC

E.O. 11652: N/A

SUBJECT: NIGER RANGE AND LIVESTOCK PRP

REF: (A) STATE 000020 (B) BARON-SHEAR MEMO DTD 12/30/75

AA/AFR HAS CONCURRED IN RECOMMENDATIONS OF ECPR.

1. ECPR REVIEWED SUBJECT PRP JANUARY 8, 1976. ECPR APPROVED PRP FOR INCLUSION IN 1977 CONGRESSIONAL PRESENTATION AS TWO-YEAR INITIAL DESIGN PHASE TO BEGIN IN 1976. DOLS 300,000 IN CP FOR 1976 CAN BE USED FOR PHASE I PP DESIGN AND PROJECT ACTIVITIES PRIOR TO JUNE 30, 1976.

2. ECPR REVIEWED MEMORANDUM OF RDO/NAIEMY OF DECEMBER 30, 1975 ON QUESTIONS RAISED AT PRELIMINARY ECPR REPORTED REFTEL. MEMORANDUM FROM RDO/NIAMEY WAS HELPFUL TO AID/W UNDERSTANDING OF CHOICE OF PROJECT ZONE.

3. FY 1977 FUNDS OF DOLS 765,000 WILL PROVIDE FOR 2-YEAR EFFORT ON PART OF LIVESTOCK AND RANGE MANAGEMENT EXPERTS. MAIN FOCUS OF EFFORT WILL BE INVESTIGATION AND EVALUATION WORK REQUIRED FOR DESIGN OF PHASE II. HOWEVER, DOLS 200,000 HAS BEEN INCLUDED IN 1977 FUNDING REQUEST TO FINANCE PILOT OPERATIONS AND INTERVENTIONS OF A TRIAL NATURE IN PROJECT ZONE.

4. SER/ENGR HAS NOTED THAT SINCE ECOLOGY OF PROJECT AREA PREVIOUSLY STUDIED, AND INPUTS WILL FOCUS SPECIFICALLY ON INCREASING LIVESTOCK PRODUCTION AND RESTORING ECOLOGICAL BALANCE THE ONLY ENVIRONMENTAL CONCERN REMAINING TO BE ADDRESSED IN FURTHER PROJECT DESIGN IS ADEQUACY OF WATER SUPPLY AND SEWAGE DISPOSAL SYSTEMS. INGERSOLL

ANNEX F

TECHNICAL REVIEW OF PROJECT LIVESTOCK PRODUCTION[1]

by
Neil C. Fine
Livestock Consultant
Experience Incorporated
Minneapolis, Minnesota

I. Introduction

The purpose of the following discussion is to review in more depth and detail some of the technical aspects of the Niger Range and Livestock Project as they relate to the choice of interventions in livestock production and how those interventions may be implemented. It is assumed that the reader will have already seen the main body of the Project Paper, which includes the project description, an abbreviated technical analysis, a schematic implementation plan and the commodities required.

A recent resource inventory* provided considerable details on the climate, condition of the range, consequences of the recent drought, progress in recovery from the drought, and information on present overutilization which now appears to be approaching an acute stage. The major constraints, but not the only ones, were (1) diseases and parasites and (2) quantity and quality of feed supply. The interventions proposed in livestock production were suggested by these two constraints.

II. Description of Existing Programs

In the following paragraphs are some details on institutional and operational aspects of the national Livestock Service.

Personnel of the Livestock Service - March, 1975

Category	Number
Veterinarians	20**
Ingénieurs Travaux Elevage	10***
Animal Husbandry and Veterinary Assistants	49
Technical Assistants	53
Veterinary Nurses	120

1/ The Production interventions recommended in this annex were amended in PP.

* A Report, Inventory and Preliminary Plan for the Niger Range and Livestock Project. Experience Incorporated, Minneapolis, 1976.

** 11 French expatriate, 9 national.

*** No exact equivalent in English. The academic preparation is about two years of college training with emphasis on animal husbandry.

Animal Husbandry Specialist	1*
TOTAL	253

The National Veterinary Laboratory is responsible for diagnoses, production of vaccines and research. Its capacity for vaccine production is as follows on an annual basis:

VACCINES

Disease	No. of Doses
Rinderpest	2,500,000
Bovine pleuropneumonia	1,300,000
Anthrax	100,000
Blackleg	300,000
Hemorrhagic septicemia	300,000

The virology laboratory has diagnostic capacity for rinferpest, small ruminant plague, rabies and Newcastle disease. The parasitology lab does fecal analyses; the serology lab has capacity for diagnoses of brucellosis and pleuropneumonia.

A small amount of research in parasitology, animal nutrition and agrostology is underway.

The director of this laboratory believes the most important training need is in bacteriology.

The Ministry of Rural Development operates a school in Niamey for the training of "Technical Livestock Agents" and "Technical Livestock Assistants." The admission requirements for the section for Technical Livestock Agents are: (1) Nigerien nationality; (2) 16 to 19 years of age; (3) education corresponding to level 5° of secondary school (equivalent to eighth grade in the U.S.). For the Livestock Assistants the admission requirements are: (1) Nigerien nationality; (2) 17 to 20 years of age; (3) title 'Brevet d"Etudes du Premier Cycle" (B.E.P.C.) (equivalent to a high school education). The entrance requirements and the course of study for the latter section is at a somewhat higher academic level. All candidates pass additional screening tests, and upon acceptance in the school must sign an agreement to serve for a minimum of 10 years after graduation in some branch of the government. The full curriculum requires three years for each section. An academic year is 30 weeks. A portion

* Graduate of California Polytechnic with B.S. in animal husbandry.

SOURCE: Rappot Annuel 1975. Direction du Service de l'Elevage et des Industries Animales. Ministére du Développement Rural, Niamey, Niger.

of the instruction consists of French, mathematics, biology, and geography, but for both groups the instruction is heavily weighted in favor of veterinary-type subjects such as physiology, anatomy, pathology, pharmacology, parasitology, and surgery. Some instruction in animal husbandry and animal products, such as meat, milk and skins, is included, as is also meat inspection. Laboratory and practical instruction are required. Presently the school turns out 10-12 graduates per section per year.

As of April 1975 the countrywide physical facilities of the Livestock Service were as follows*

Immunization centers	36
Veterinary posts	16
Vaccination corrals (concrete construction)	153
Vaccination corrals (wood and iron construction)	28
Refrigerators	18
Ice machines	21
Freezers (cold storage)	32

Of the above listed facilities, the only ones in the Phase I project area are 10 vaccination corrals (See Map 2 for locations). Close to the boundaries of the project area are two veterinary centers, one in Dakoro and one in Agadez.

The 1975 vaccinations carried out countrywide were reported as follows**:

Black leg	75,959
Anthrax	264,006
Hemorrhagic Septicemia	41,201
Bovine Pleuropneumonia	856,986
Rinderpest	298,402
Caprine Pleuropneumonia	4,870

* Rapport Annual 1975. Direction du Service de l'Elevage et des Industries Animales. Ministére du Développement Rural. Niamey, Niger.

** Ibid.

A national health plan, as reported by Coulomb and Quesnel*, is illustrative rather than final. It has yet to be adopted by the Livestock Service. Some modifications are to be expected.

Rinderpest: Vaccinations of all susceptible animals each year for two years, then young cattle 6 to 15 months of age annually for two years. The goal is to reach 30% of the national herd annually.

Black leg: Ten percent of the susceptibles per year.

Anthrax: Ten percent of the susceptibles per year.

Hemorrhagic septicemia: Everything for two years, then 30% per year (in Agadez Department).

Internal parasites:

Nematodes: All ruminants, two treatments per year, one at beginning and one at end of dry season.

Cestodes: One treatment per year for sheep at end of dry season.

Trematodes: Two treatments per year on young cattle from one to two years and small ruminants in infested zones.

Coccidiosis: Cattle-three treatments of calves during first year of life.

Small ruminants in infested zones - treatment to be combined with anthelmintics.

External parasites:

Ticks (Hyaloma): Two treatments per week during the rainy season and according to need in other periods.

The Livestock Service is also responsible for trypanosomiasis campaigns, which involves clearing certain areas of the insect vector. There are no tsetse flies in the Niger Range and Livestock Project area.

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* Coulomb, J. and M. Quesnel. Projects D'Aménagement et D'Intervention Dans Quatre Zones de Modernisation Pastorale Du Niger. Rapport provisoire. Dossier Général, Institut D'Elevage et de Médicine Veterinaire Des Pays Tropicaux. Paris, 1975.

From discussions with officers of the Livestock Service it appears that livestock owners will be charged for parasite treatment, the fees being sufficient to cover the costs of the materials. The following schedule of charges was proposed in the report of Columbia and Quesnel*.

	FCFA per head	U.S.$ per head
Nematodes		
Calves (up to 1 year)	75	0.30
Others (over 1 year)	100	0.40
Small ruminants	100	0.40
Cestodes		
Sheep	50	0.20
Trematodes		
Cattle (1 to 2 years)	60	0.24
Small ruminants	25	0.10
External Parasites		
Cattle	200	0.80

III. Livestock Production Study

A. Proposed Interventions

As pointed out in the introduction above, the interventions proposed came about because of obvious needs in animal nutrition and disease control. Due to the lack of any body of experience in extension-type efforts with herdsmen not having a fixed base of operations, it was clear that anything in extension would be highly experimental. Disease control activities already underway revealed that herders will cooperate if they like the program. That experience provided encouragement to try some other innovations. The procedure elected is the Livestock Production Study. This study will consist of selecting about 60 herds, which typically are mixed herds of cattle, sheep, goats, camels and donkeys. Since Peuls and Touaregs are the two principal peoples, the demonstration herds will be divided in the proportion of 50% for each ethnic group. Simple innovations consisting of providing salt/mineral blocks for all livestock and feed

* Op. cit.

concentrates for calves during the stress periods will be introduced into the cooperating demonstration herds. In addition, complete vaccination and parasite control treatments will be provided. Records will be obtained on herd performance, costs, and herder response to these innovations. Sixty control herds in which no innovations are offered will be chosen for comparison. The representative herds of the zone are expected to show on the basis of head count about 30 per cent cattle, 50 per cent sheep and goats, with camels and donkeys making up the other 20 per cent. Peuls will have the higher proportion of cattle; the Touaregs will have the higher proportion of camels.

The participation and cooperation of the GON in the livestock production study is an important part of that component. The animal health interventions under the study should be administered through the ongoing Livestock Service program. This would require the presence of Livestock Service veterinarians or paramedics at the time the cooperating herds are enrolled. The GON paramedic would help record previous vaccinations and treatment history and make up a plan for the herd. Any needed treatments and vaccinations could be administered at the same time and follow-up or repeat treatments scheduled. The demonstration study proposes to remain neutral as regards GON's disease and parasite interventions in the control herds. The study will not propose that control herds be denied disease protection if the occasion arises where the herders ask for it, but will seek to keep records of what is done and what takes place thereafter.

Daily concentrate feed allowance per calf was estimated to be .5 kg. for 90 days, with a total per calf of 45 kg. Supplies for an estimated 700 calves in the demonstration herds would amount to approximately 31.5 metric tons. Salt blocks were estimated on the basis of 20 pounds per animal unit, 50 animal units in each of the 60 demonstration herds. This equates to about 5500 5-kg. blocks. Further details on feeds are give under Implementation below.

No estimates of quantities of vaccines and parasite remedies were made. As indicated on page 3, the Livestock Service has the capacity to produce vaccines, and this should be counterpart contribution. It is impossible to predict what will be needed in the demonstration herds until a record of their previous vaccinations is obtained and until the GON works out a health plan for the herd. This is to be done at the time the demonstration herd is enrolled, and records will be made of what is done thereafter.

The GON is now planning to require herdsmen to pay for parasite treatments. It would be unwise for this project to intrude into that policy with gratis treatments. Furthermore, livestock values are now reaching a level where herdsmen should be able to contribute nominal fees according to a shcedule like the one on page 111above.

B. Implementation

1. Role of the Livestock Service

The GON has a strong bias toward veterinary interventions;

Livestock Service consists mostly of veterinarians. Their natural inclination is to propose campaigns for disease control and to develop facilities with that in view. As already mentioned, the GON's Livestock Service is active with a program of vaccination against rinderpest and contagious bovine pleuropneumonia. The writer saw two vaccination field camps in the project area during a visit to the area February 15-16, 1977. There was evidence that herdsmen will cooperate with this program. They have enough understanding of its benefits that they undergo considerable inconvenience in handling their animals to permit vaccination.

Since there is an obvious need for an expansion of the GON's disease control program, there is strong justification for constructing and equipping the four livestock posts proposed under the project. At first thought disease and parasite control seem inconsistent with the obvious need to reduce grazing pressure. But herdsmen live from their animals, and disease control seems to be a meeting place of common interest for the herdsman and his government. If a cooperative working relationship develops around the disease control program perhaps it can be expanded into the development of herder cooperation in a grassland management program. Although the proposed livestock stations will be incorporated into the ongoing Livestock Service programs, from the standpoint of this project their main justification is that they will provide the infrastructure base for a multi-faceted animal health-livestock extension/range management program to be implemented under a Phase II project.

2. Feed Supply and Distribution

The sole source of feed is the plant life of the open range. Perennial grasses have early disappeared, leaving mainly annual grasses of generally lower nutritional value and certain small trees and shrubs for browse. The Resource Inventory and such other publications as Coulomb and Quesnel* provide convincing evidence that for a significant portion of the year livestock of all classes obtain a sub-maintenance supply of nutrients with deficiencies in protein, minerals and vitamin A. The Resource Inventory (pp. 124-125) stated:

> ...It is generally agreed by members of the survey team that until the Government of Niger (GON) takes whatever steps are necessary to slow and then stop the flow of people and animals that are responsible for the uncontrolled use of the grazing resources of the project area, all attempts to employ range and animal improvement practices on anything but a token scale would be futile. There can be no real improvement in the grazing resources or the animal population of the area until measures to regulate the use of recources are available. To suggest that measurable progress in improvement of the productivity of the project area is possible under present circumstances is irresponsible...

* Coulomb, J. and M. Quesnel. Projets D'Aménagement et D'Intervention Dans Quatre Zones de Modernisation Pastoral Du Niger. Rapport provisoire. Dossier Générale. Institut D'Elevage et de Médicine Veterinaire Des Pays Tropicaux. Paris, 1975.

The available feed supply* then becomes something of an issue with the extreme view being that as above quoted and a less extreme viewpoint holding that something should be attempted to alleviate husbandry constraints under present conditions. After all, range cattle in the U.S. undergo periods on sub-maintenance diets, but this has not been an excuse for not providing salt, minerals or disease and parasite controls. Yet one can understand that if the quantity of feed per animal and the quality of the feed are declining with time, interventions such as salt and minerals may be overruled by more powerful factors. It would then be difficult to determine if they had value.

A logical response to a feed deficit is to provide supplementary feed. Cottonseed cake and alfalfa hay are two common examples of supplementary feed for the U.S. western ranges. Niger has quantities of cottonseed - perhaps as much as 30,000 tons annually - why not use cottonseed as a range supplement?

Eventually, this may come to pass, although one suspects it will be in such a limited manner as to have very little impact on the livestock of the zone. Supplementary feeding is limited by lack of roads, high cost of transport, and by the nomads' own transport facilities. One cannot imagine that they would carry very large feed supplies with them when they move their camps. Cottonseed will eventually be processed, it is to be hoped, and then the cottonseed meal or cake will be available. The starting place appears to be in calf nutrition, during times of greatest stress. Small quantities of feed can better be managed under extreme limitations of transport and the pay-off should be great in terms of reduced mortality and better growth.

It can be noted that the GON purchased several tons of cottonseed and moved it to Agadez. The seed was bought for 1100 CFA per kg. bag (about $3.30 per cwt.). The freight from Maradi to Agadez was 14,000 CFA per long ton (or about $2.54 per cwt.) using government owned transportation. Commercial rates are higher. The cost of the seed in Agadez was then about $5.84 per cwt. Livestock owners were paying 400 CFA per 60 kg. bag (or about $1.21 per cwt.). This was a rather highly subsidized operation.

Salt/mineral blocks are not currently available in Niger. The nearest source seems to be Nigeria where salt/mineral block, including phosphorus and trace minerals, are produced under a Pfizer license. The price of $4.00 per 5 kg. blocks was used to calculate the cost of mineral blocks.

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* A full discussion of the complex and difficult problem of establishing some form of control of the rangelands with a view to reducing the feed constraint is presented in the Range Management Annex.

Local feeds which may be used in the formulation of a calf concentrate supplement are as follows, with prices per kilogram and per cwt. as indicated:

FEED	FCFA per Kg.	U.S.$ per cwt.
Rice bran	10	1.82
Millet bran	10	1.82
Cotton seed	19	2.45
Peanut cake	20	3.64

The rice bran (or a mixture of rice bran and rice polishings) is available in the vicinity of Niamey. Peanut cake and cottonseed are available in Maradi, and millet bran may at times be obtained in Zinder. Maradi is probably the best location for collecting the concentrates, mixing, bagging and shipping to the project area.

Without the use of the high-protein peanut oil cake, a concentrate mixture made of the other feeds will not have as high a percent protein as is desirable in a calf concentrate mixture. The peanut cake, however, should be inventigated thoroughly before it is introduced into a concentrate mixture. It may be contaminated to some degree with undersirable molds.

From Maradi feed and mineral blocks can be moved by truck to Dakoro where it should be possible to build a supply dump. From Dakoro into the project area, feed and minerals will normally have to be moved in project vehicles or by pack animal trains. The animal trains could move the supplies to more dispersed dumps from which ultimate distribution can be made. The distribution system is considered to be one of the most difficult problems with which the research team will have to contend.

The project plan calls for providing the feed (and also mineral blocks) gratis on a demonstration basis with clear understanding that in the future these, if used, will have to be purchased from other sources. Calves are to receive feed during the period of greatest stress which normally will be just prior to, during, and after weaning.

It has been suggested that herders will not cooperate completely on the calf feeding program. The temptation to give the feed to the more favored milk cow may assert itself. Only experience with the program can clarify this point, but it would be well to be alert to the problem.

3. Carrying Out the Study

The demonstration-study intervention was not chosen without considerable discussion of who could carry it out, the dimensions of the study - how many demonstration herds and how many control herds, what commodities would be needed, what the study should accomplish, etc.

In essence what is wanted from the study is the answer to some unknowns: (1) Will the nomads cooperate in demonstrations? (2) Will it be possible to obtain with any degree of precision their characteristic perception of the value of salt/mineral blocks and supplementary calf feed? Is it possible to demonstrate any benefits of the intervention with objective data? If they cooperate with the study, then the demonstration-study is a good vehicle for the beginnings of extension in the area. Personnel working alongside U.S. team members will obtain some technical training in an extension-type endeavor.

There are a number of practical problems to this kind of study. The area is large, the herds are on the move, there are no roads, etc. The amount of effort to get demonstration salt blocks and calf feed into the area and distributed to cooperators is almost staggering. It may not be so difficult to find herds initially. A visit to almost any well will permit contacts with several herds. Once these are "signed up" and baseline data are recorded the problem then is the follow-up. The herds move on to other pastures. Probably the herdsmen themselves do not know where they will be two months later. One convoy of two vehicles can't follow individual herds; it can only go in the general direction of most herd movements and set up headquarters camps. Periodically moving from one camp site to another, the headquarters can send out "enqueteurs" or data takers. These must be people who can record numbers, who can speak the language of the herders, and who can find their way from well to well and back again to the headquarters camp. To facilitate their movement they will need to travel by camel, with periodic change of mounts. This means that the headquarters will have to operate a camel remount station. At times the data taker may require one, two, or more pack animals to resupply herds with mineral blocks and calf feed. The study-demonstration plan includes visits to the herdsmen at two months intervals (more often if possible) to record such items as death losses and probable causes; animal sicknesses; additions to the heard from gifts, loan, purchases, and births; herder reactions to the interventions; condition of animals in general; and grazing conditions. There may be occasions when the "enqueteur" discovers a disease outbreak and can report it much more promptly than could the isolated herder.

It may be possible to avoid the outright purchase of camels with project funds by combining a system of hiring camels when needed by the enqueteurs and by obtaining volunteer data takers in some of the tribes. A University of Michigan researcher, Tod Eddy, who has spent some months working near the project area, suggested that the project research team could look for volunteers by first contacting tribal chiefs and explaining the problem. Some of the young men in the tribes can read and write and would probably bring the data each two months to prearranged meeting place. The headquarters camp would receive these volunteers in a hospitable manner, as is the custom in the area, with meals, over-night rest and small presents of tea, sugar and cloth. Some combination of project-funded data takers and volunteer data takers may be possible.

Based on his experiences in obtaining data through interviews, Tod Eddy believes the project research team may have difficulty in obtaining herd composition data and numbers. It appears that herdsmen react to questions on total count somewhat in the same manner as would people in the U.S. if asked the amount of their current bank balance. In the local scene, the herd numbers make up the current bank balance. On the other hand, Eddy's experience reveals that herdsmen are perfectly willing to give statistics on animals sold, deaths, births, etc. It is the total count that is a touchy subject.

The number of herds to be enrolled as cooperators is ambitious. Sixty herds located on as many farms is a very different matter from 60 roving herds. However, since considerable attrition in the data can be expected when herds disappear or when they are divided and then recombine with other herds. It is important to begin with a relatively large number of herds at the beginning so that enough will be left at the end of the study period to make valid analyses. The exact number to be chosen will need to be reviewed when the exact plan of research is prepared.

Likewise the number of control herds should be reviewed in the research plan. Obtaining control herds can be a problem. As in more effluent societies, herdsmen can ask, "What is in it for me?", especially if he learns that others are receiving certain demonstration materials. Eddy suggested that possible control herd cooperators be identified through tribal and group chiefs. Then extending camp hospitality to these individuals along with small gifts of such items as tobacco, tea and sugar, as governed by local custom, may be useful in establishing the required rapport and cooperation.

Another proposal for selecting control herds was that they be chosen from herds somewhat remote from the demonstration herds. With the "desert telegraph" being what it is purported to be, the control herders will probably know what is going on anyway, and any reluctance on their part will likely have to be overcome regardless of location.

C. Personnel Requirements

1. Senior Researcher

This study will be designed and supervised by a livestock production economist with experience in livestock systems research. He will place two research assistants in the field, one in animal science and one in agricultural economics, and will oversee their work. He will make at least three trips to the area. The first will be in late 1977 and will be primarily for the purpose of designing the study and getting the research assistants started. At the end of the field research the senior researcher will be responsible for preparing the final report on existing livestock production systems and the impact of interventions to increase productivity.

2. Research Assistants

The animal husbandry research assistant will be responsible for generating the type of hard factual data that will be necessary for the technical evaluations of program interventions to be disseminated on a larger scale during the second phase action program anticipated to begin in 1980. He will monitor the two herd samples in the project area and measure in a scientifically disciplined manner the actual differences in animal productivity between the two samples. The verifiable indicators of increased animal productivity will be changes in such herd and flock parameters as age at first calving or lambing, calving/lambing percentage, weight for age at specific age intervals, mortality by age and sex group, increased milk production in dams, increased ability to detect and cull unproductive animals, and increased dressing percentage in slaughter animals. The study will deal with all classes of ruminant animals present in the herds and flocks of the participating herders.

The agricultural economics research assistant will conduct herder family surveys and in-depth interviews to quantify the following relationships:

a. the real costs and attendant benefits to the herder family of their present and the improved systems of resource management and animal husbandry;

b. extent to which the herder family actually gains real income from its livestock system as opposed to potential productivity increases;

c. the pattern of family budget and consumption expenditures as livestock productivity is translated into family consumption of non-household produced commodities;

d. the constraints on the family's procurement of external commodities and/or sales of household products; and

e. the comparative risk burden in the present and improved systems of livestock production*.

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* John Eriksen, livestock economist member of the project team, should be credited with stating the five relationships to be quantified, and also what is expected from the animal husbandry research.

3. Interviewers

Twelve local interviewers are to be employed for assisting the two research assistants. The local interviewers will be required to meet such educational levels as will permit them to comprehend and fill out questionnaires in French. Besides fluency in French, fluency in one or the other of the two principal languages (the languages of the Peuls and Touaregs) will be necessary. The local interviewers will on some occasions be delivering salt and feed to herders with instructions for use. The interviewers are considered to be possible candidates for developing into extension agents. The ones showing aptitude for extension should then receive more training for service in Phase II of the project.

ANNEX G

Range and Resources Management Analysis

A. GRAZING MANAGEMENT AND ANIMAL PRODUCTIVITY

As explained at length earlier in the RPR, inadequate animal nutrition is the primary problem in the Sahel. This condition, serious enough in itself for productivity purposes, also renders the animal highly susceptible to the ravages of heat stress, disease, parasites, and location stress, and increases the toll of the expenditure of energy in walking between forage and water. A low level of nutrition thus leads to a number of undesirable repercussions. A major objective of sound range management is the production of animals; it is not simply the production of forage. A properly vegetated range assures optimum yield of the products sought from the rangeland. The forage plant is the basic producing unit, and the animal that eats it is the harvestery machine. Successful animal production depends upon careful handling of both and upon the greatest harmony between the two.

The situation in the Sahel is readily describable: too many under-nourished, unhealthy and unproductive animals on a fragile forage base. To quote from the Site Resource Inventory, "the stocking rates on the study area have exceeded the carrying capacity of the range for so long that a low nutritive value annual grass community has become the dominant source of food." Furthermore, the resource is declining in its capacity to support animal life. As it declines, so does the productivity of the animal, the result is a desperate struggle where in order to survive each operator seeks sheer numbers of animals. Conditions worsen in an ever-accelerating manner, but grazing damange is too slow to be readily discernible to the untrained eye until it has advanced to the point of no return: a classic example of resource devastation on a massive scale, with the soil itself eroding away (See Site Resource Inventory pp. 116-117 for erosion discussion).

At this point stabilization of the decline can only be achieved by drastic measures (which the next drought will take if man does not), and recovery is impossible except over the extremely long-term through total removal of livestock. Deliberate stabilization may be achievable by direct and unwavering numbers reduction and continuing firm management; the latter is socially and politically untenable. The recent drought may have already reduced numbers to a sustainable level, setting the stage for improvement of rhe resource of both soil and vegetation by constructive successional trends.

Potential

An example of the principles stated above is taken from an AID document (the date and author of which have been lost):

> The physiological principle of nutrient allocation makes the case for assistance in grazing management. I refer

by the rule-of-thumb that for ruminants the first half of optimal level intake goes to life maintenance, the next third or quarter promotes reproduction and stimulates "freshening" milk flow, and the final quarter goes to growth and sustained milk flow. (This principle was proven classically by the Flattop Ranch in Texas in the 1940's: they reduced their cow herd by one-half and this resulted in doubling the total weight of calves weaned.) To double the net output of ruminant livestock on the Sahelian range seems indeed technically feasible.

Properly and conservatively stocked range is more productive in terms of animal products useful to man and supports a level of benefits which can be sustained indefinitely. Instead of a steadily declining resource it becomes a "renewable resource."

The Range Management Master Plan

The preparation of a final management plan adapted to the physical and cultural environment of the project zone must of course await the achievements of Phase I. However, certain characteristics of it can be visualized on the basis of current limited knowledge. It is assumed that in Phase II a new and independent grazing management institution will have been established, partially staffed, and prepared to begin functioning.

The first assumption is that the migratory grazing pattern will be accepted. The migration routes of groups will be known and more centrally directed, according to known forage and water availability. Negotiations between herder association and the GON for planning of grazing areas and alternatives routes of migration will be essential. The carrying capacity will be established and there will be a process of gradually tightening regulation of control numbers and allow for emergency forage reserves. Initially a supported market price might be necessary to increase offtake from the land. There will be an effort toward establishing allotment and tenure. Land and water rights will be based on historical use and need rather than arbitrary allocation. Heavily damaged areas will be protected. Grazing boundaries will be groundmarked.

The economic restraints will be better understood, and credit may begin to enter the scene. Along with this and technical services in husbandry will appear the beginning of use fees or leasing, and enforcement and penalty. Migration over international borders in dry years should no longer be necessary. Investment and annual costs through outside grants that cannot be maintained in the future by internally generated income and financing will be avoided, for they will only lead to magnified problems later.

A sound range management plan does not overlook the ever-present threat of drought, and prepares for it in advance instead of being taken by surprise. The threat is locally present every year and broadly present at extended intervals. The last great drought mercilessly imposed

readjustment of an imbalance between resource capacity and utilization. The clear warning was that the effects of the next onslaught will be far worse if resource abuse is not firmly corrected.

The Case for Migration

With the possible exception of the wet tropics, year-long grazing on the same land is not prudent use of the land. It invites ever-widening denudation of the land in the vicinity of the water source and, later, too much walking to more distant forage. Ultimately the well itself becomes useless because there is no forage left within walking distance of it, even under the normal practice of watering every other day. There is no opportunity for the grass to rest and make seed. All enlightened grazing programs involve some form of rest and rotation from one area to another, with each area not necessarily being used each year.

Nearly all climatic regions present alternating winter and summer or wet and dry seasons. These have the same nutritional impact the world over, with animal condition falling off in the stress season unless supplementary feed is offered. Intentionally reserved pasturage, even though in the dry and dormant form, is the only other alternative and is reasonably effective.

In the American west, where there are many mountain ranges, there is a short distance migration from the valley winter range to the green summer range in the mountains. Migration is practical and desirable and wild game follow the same pattern, profiting from the change in elevation which presents a nearby and rapid change in pasture conditions. The herder in Niger must travel a considerable lateral distance to achieve the same results. To remain all year at his "winter" refuge, his well, would prevent him from capitalizing on seasonally available green forage in one location where there is no developed permanent water, and reserve stress season forage in another where permanent water is available. The northward migration also offers a reprieve from the disease carrying tsetse fly and other bitting insects to the south. Without the economic advantage of several water sources to work with, as many herders cannot afford to own one well exclusively, there is no possibility of rotational grazing.

Another difference in the nomadic rotational grazing pattern is that the herder spends as much or more time moving between the northern and southern extremes as he does at either extreme, thereby gaining half or more of the animal nourishment of his animals while enroute. The beginning and ending points of the trek appear to be more fixed than the route between which is determined by current rainfall. There appears to be a "home" area or traditional pattern of movement, on which the herder feels he has some established territorial rights. It is at this home point that supplemental feed inputs can be made to relieve the stress of dam and assist the young.

In the case of the project zone there appears to be few, or confused, recognized grazing rights or land tenure (See sociological study), as a

result of fifty years of gradual Fulani migration into formerly Tuareg territory. Apparently the new public wells were part of the attraction for Fulani from the south. The situation may have to be resolved by a central authority.

There are additional characteristics of the migratory system. In dryer years the overall extent of migration is shifted southward, sometimes on into northern Nigeria. Natural salts occuring in the water and forage of the northern extreme are apparently important as momentary mineral supplementation in what is known as the "salt cure." It should be recalled that previous wild game migrations and man's early migrations were begun on a much stronger forage base probably dominated by perennial grasses. (See Site Resource Inventory, pp. 107-111 on range conditions and trends.)

How does the subsequent decline of the forage base effect the validity of migration today?

Migration remains the only way to harvest the resource of the area. However, considering the decline of the forage base, the ground cover (both living vegetation and litter) and the increased soil erosion of the area, these factors all indicate the declining state of the resource. Only with management, herder and GON cooperation education and the imposition of firm controls on numbers and composition of herds grazing the area can the situation be reversed from its present retrogressive pattern. It is judged that this could be followed by secondary plant succession that would improve the state of the range above its present poor condition, and in time increase the total productivity of the zone, allowing the herders to take off more than is currently possible.

Water Development

Development of a complete water system is not planned for Phase I. On-site ground and over-flight observation indicate that there is little or no forage left unused. Those areas without permanent water are apparently intentionally utilized during the wet season. However, there is a possibility that the construction of water catchment basins in the area where there is no permanent water may enable the herders to remain in some of these areas for a longer period of time. Controlled grazing around these catchments should reduce the grazing pressure on dry season pasture without detrimentally affecting the forage in areas grazed during the wet season. A great need also exists to improve the design, construction, durability and life, sanitation and water withdrawal methods of traditional wells. The engineering for these facilities is discussed in following sector of this paper.

Even though total precipitation is low, the high intensity of local storms present the opportunity to capture excess water and to utilize surface runoff to allow longer seasonal grazing where needed, especially in the northern area. Surface runoff is the cheapest source of water but also the least reliable in time of local or general drought. Frequent light rains may be sufficient to grow grass but not to provide surface water without the construction of catchment basins. It can be anticipated that these "Charco" type (see construction detail in Site Resource

Inventory) basins will fill in about seven out of ten years. Collection, see page, evaporation, and consumption will all be closely monitored. Three sites in the northern part of the project zone will be selected for catchment construction.

A permanent range transect will be installed at each catchment sites to measure vegetation change close to the water.

Fire Control

Serious grasss fires are always accompanied by high wind, which causes the fire front to leap ahead of itself and move rapidly in the direction of the wind. Unlike forest fires, grass fires run a rapid course and go out of their own accord as a result of abatement of the wind or the reaching natural or man-made barriers such as clear drainage courses, rocky ridges, sand dunes, roads, overgrazed areas, or constructed firebreaks. Grass fires usually burn themselves out before suppression measures can be organized and appear on the site.

Grass fires can consume the forage over large areas, as well as constitute danger to people, animals, and dwellings. The extent of their fire occurrence in the project zone, however, is unknown, but it does not appear to be as serious as some people state. This conclusion is based on observations made during two ground trips and one over-flight in November of 1975, and one ground trip in February of 1977. The burns that were observed were not extensive in either area or occurrence. This could be the result of natural barriers created by herds trampling and grazing while moving south, couples with the spottiness of the present forage growth. A decrease in grazing pressure resulting in increased forage would bring an increase in fire danger.

Most fires are set by people, as the only natural cause, lightning, occurs during the wet and green season. Fire danger is probably greatest in the early half of the dry season, and in the more favorable grass years, when the grass is dry and has not yet been grazed off. Lightning sometimes accompanies the "mango rains" in late March, when the area is extremely dry. The actual extend and danger of fire damage requires investigation.

Other than measuring the area burned and determining the cause, no special fire prevention o suppression activities are planned for Phase I. Controlled burning trials will be conducted, however, and the feasibility of the design and establish of new fire breaks will be explored. After each burn, plant response will be documented in term of regrowth, rate of growth, chemical composition and seasonal variations in growth or reactions to fire. In addition to burning experimentation, old burns from previous years will be studied to determine long term successional trends following fires. Plant responses to fire over a period of time, and possible changes in soil chemical composition will be investigated. Existing methods of control such as the ground firebreaks planned for the GON's animal

multiplication center north of Dakoro also will be closely studied, so that firm recommendations may be made at the end of Phase I. Special local action may be necessary where the grass growth has been exceptional.

There are several reasons for not creating firebreaks in the plan in addition to the small amount of damage actually observed. Bladed or disked firebreaks would have to be fairly wide to prevent a raging fire from jumping them. The question immediately arises as to whether or not the grass destroyed by this method would be as great or even greater than the amount of area that would have burned without control. This is not to mention the enormous cost involved, and one that would have to be repeated each year. The cost alone of ground planning and engineering of firebreaks would be substantial, and would have to be adjusted to the terrain. There is also the question of week invasion in these disturbed areas. Furthermore, a serious dust problem already exists in the region and the bare dry from firebreaks would add to it.

There appears to be no intentional burning, as is the case in other parts of Africa, because the grasses and annuals and completely grazed off. There is no woody perennial material left from the previous year which might be advantageously burned off.

B. A REVIEW OF PUBLIC GRAZING LAND MANAGEMENT HISTORY AND ACHIEVEMENTS IN THE U.S. AND ORIENTATION TOUR BY GON OFFICIALS

This discussion of the evolution of the American public land management system is intended as an example of how one nation has successfully met the problem of public land degradation. It is not intended as a blueprint for Niger to follow because the term of "public land" does not apply equally in both nations. Defining the term for Niger will require an in-depth study of the land tenure system of Niger, tobe conducted during Phase I.

Basic resource conservation, is of special concern to countries with a semi-arid climate. Such a climate affects the western two-thirds of the United States, the "pastoral zone" of the country. As the young nation expanded westward by acquiring vast tracts of land, most of which were still unexplored, title to most of the land was held by the federal government. This land came to be known as the "Public Domain." Some tracts were held by early settlers or allocated under the original Spanish and Maxican land grants in the southwest, which were recognized by the American government and where livestock grazing had been practiced in termittently for a century.

To encourage settlement of the west the Congress passed the "Homestead Act" in 1862, permitting an individual to acquire title to 160 acres (64 hectares) for nothing more than a filing fee and stipulated future improvements. In a land where a sufficient and permanent source of water was scarce, the settler based his land selection on water. He thereby also acquired title to the water, or a legal water right, and, in effect,

the free grazing use of the many thousands of acres of Public Domain surrounding or adjacent to his homestead. This early settlement pattern was to become the foundation of the modern western land tenure system.

As settlement progressed rapidly in the late 1800's the government began to act in the public interest to withhold certain large areas from private acquisition. Scenic National Parks were proclaimed and reserved for the employment of future generations and the National Park Service was created to manage them. Large reservations were set aside for the various Indian tribes, and held in trust by the government as a very special type of reserved public land. The Indian Service, later to become the Bureau of Indian Affairs, was created to administer these tracts of land. The mountain ranges, where most of the precipitation falls and which therefore form the watersheds for the dryer valleys, were withdrawn from private entry. These became the National Forests, but seasonal (summer) grazing rights were continued under the increasingly rigid control of the newly formed Forest Service. Land was granted to the railroads as an inducement to extend their rails across the west. As the large territories were divided into states, each state was granted some land to be used to finance education. The government bought and traded land in order to separate several types of public land from the private land.

Despite these varied withdrawals from private acquisition, and the federal management and control that went with them, a large portion of the Public Domain-especially in the dryer regions-remained under the selfserving domination of private livestock interests. The cattle industry had been booming for some years and the operators' real wealth and social prestige were judged by the amount of land he controlled and the number of cattle he owned. European capital was attracted to the western cattle industry; fortunes were made and lost. Together with the development of additional water sources, each operator sought a greater share of the free public resource. The result was rampant, intense competition for use of the public land and water by private cattle operators which occasionally erupted into armed conflict.

The western American cattle industry during this early period was characterized by extensive rather than intensive operations and low productivity per individual animal. The fertility rate was low and calf mortality was high. Animals destined for market were not heavy enough until three to five years of age. There was little supplemental feeding or prudent preparation for the rigors of winter. Both economic inputs and outputs were low; the industry was largely "extractive" in nature. There was little fencing or control of animal movement. There was, however, both lateral and vertical shifting of the herds to seasonally green pasturage in the mountain ranges and to intentionally reserved dry pasture. Herds were moved on foot and by rail from as far south as Arizona and Texas to as far north as Montana and the Dakotas for grass fattening before final marketing in the midwest. Cattle were walked long distances to market or to the nearest rail loading point, and were bought and sold by

the head instead of by unit of weight, due to a simple absence of weighing equipment. Although American range cattle have never been milked for human consumption, and other species such as sheep and goats have represented a minor and decreasing proportion of the overall industry, there are clear similarities between the industry of the period just described to conditions existing in Niger today. The stress of winter in North America and that of the dry season in the dry tropics, for example, are essentially nutritional.

The inevitable outcome of too many privately owned animals competing for free public forage was a rapid degradation of a fragil resource, continuing until the land could no longer support the burden of animal life. Realizing that the limitations of the resource had been reached and passed, the general public and even the cattlemen themselves began to clamor for legislation to delineate land use rights. There was a growing awareness that the operator would have no incentive to use public land conservatively until he was granted exclusive rights on a specific tract and his future well-being became dependent on conservative use. The thing the cattlement feared most but also knew they needed most - drastic number reduction and control - was inescapable. The Taylor Grazing Act of 1934 brought the remaining Public Domain under federal management authority. Through formation of the Grazing Service, later to become the Bureau of Land Management. As the Forest Service had done with the mountain pastures, the Grazing Service imposed controls on range use. Carrying capacity was determined, stocking rates set, grazing fees charged, and fines imposed for violation. Land use rights were adjudicated on the basis of water rights, prior use, and dependency and contiguous location with respect to the operator's private base land. A cadastral survey of the Public Domain, with ground markers at each one half square mile, was completed in the early 1940's. Fixed land use rights also allowed the cattleman to borrow capital. The ranching industry had come under control and the forage harvest into balance with the yield. The work of resource recovery was left to the future.

At about this same time a "range management" curriculum was introduced in the School of Forestry at Utah Agricultural College. Several public land management agencies were already functioning, and this institute would provide professionally trained personnel to staff them. The Soil Conservation Service was also operating, but as a technical service rather than a land management agency. The Bureau of Reclamation was created to undertake the construction of large dams, irrigation systems and the generation of hydroelectric. After some twenty-five years of our grazing many areas, as evidenced by barrenness and deep soil erosion on land that old photographs prove had once supported a healthy stand of grass, all public land came under the watchful eye and heavy hand of a concerned government.

Today, most of the Public Domain is in statilized condition, some of it is improving, and a small part has been restored, at great expense, to something like original productivity. Improved husbandry and management

in all respects and the development of an intensive cattle fattening industry based on a rich agriculture, have resulted in a sustainable yield of more animal products from many fewer animals.

The grazing management agencies, the Bureau of Land Management and the Forest Service, are not entirely dictatorial in either function or attitude. The cattlemen are organized at both the state and national levels and some influence in Washington. Administration at the local level is divided into grazing districts, wherein cattlement have a voice through "district advisory boards." A portion of the grazing fees collected are returned to the district to be allocated for various land improvement and development projects on a cooperative, fifty-fifty cost basis with the private operator.

While livestock industry has always been owned by exploitative private interests, the various government land management agencies are resource and conservation oriented. The land is regarded as the resource basic to animal production. Furthermore, the grazing management agencies are not only self-supporting but revenue producing as well. The practice of veterinary medicine plays no role in land management affairs, and only a minor medical role in livestock management. It is these several elements of American land management policy and philosophy that should capture the attention and interest of the GON.

Orientation Tour

Phase I includes an orientation visit to the United States and other African countries by several Nigerien officials from the policy making level of the government. The tour will take place in mid-summer when forage growth is at a peak. It will concentrate on the State climatically similar to the Sahel and will involve observation and study of university educational facilities and curriculum (at the university where project trainees are located), seasonal grazing system, facilities and equipment of land management agencies, water development, irrigated agriculture, soil conservation structures, and range reseeding and rehabilitation projects. The objective is to impress the participants with the need for, and the results of, a sound government policy for resource management.

NOTE: One lesson of the tour may be that range management works only if sufficient attention is given to sociological and technical factors. In the United States, despite technical ability, range management agencies have been unable to maintain resources on the Indian reservations because of an inability to solve the sociological problems.

C. AERIAL PHOTOGRAPHY OF PROJECT ZONE, IN COLOR

The area to be covered by color aerial photography is approximately 137 miles from north to south and 77 miles from east to west, or 10,500 sq. miles. The northeast corner of this rectangle will be the town of Agadez and its southern boundary will reach almost to Dakoro. The

configuration of the area was selected to cover the full north-south migration route of herders in the project area. (See the accompanying map.)

The scale will be 1:24,000 (with 60% end lap and 30% side lap), allowing for sufficient detail to discern vegetation patterns, barren areas, photographic features, burned areas, wells, surface water, roads, trails and drainage. The color, in particular, will be useful in vegetative analysis. The time of year will be late October to early November, when the atmosphere is free of clouds and dust and forage has not yet been grazed off. Cost of the photography is shown in the project budget.

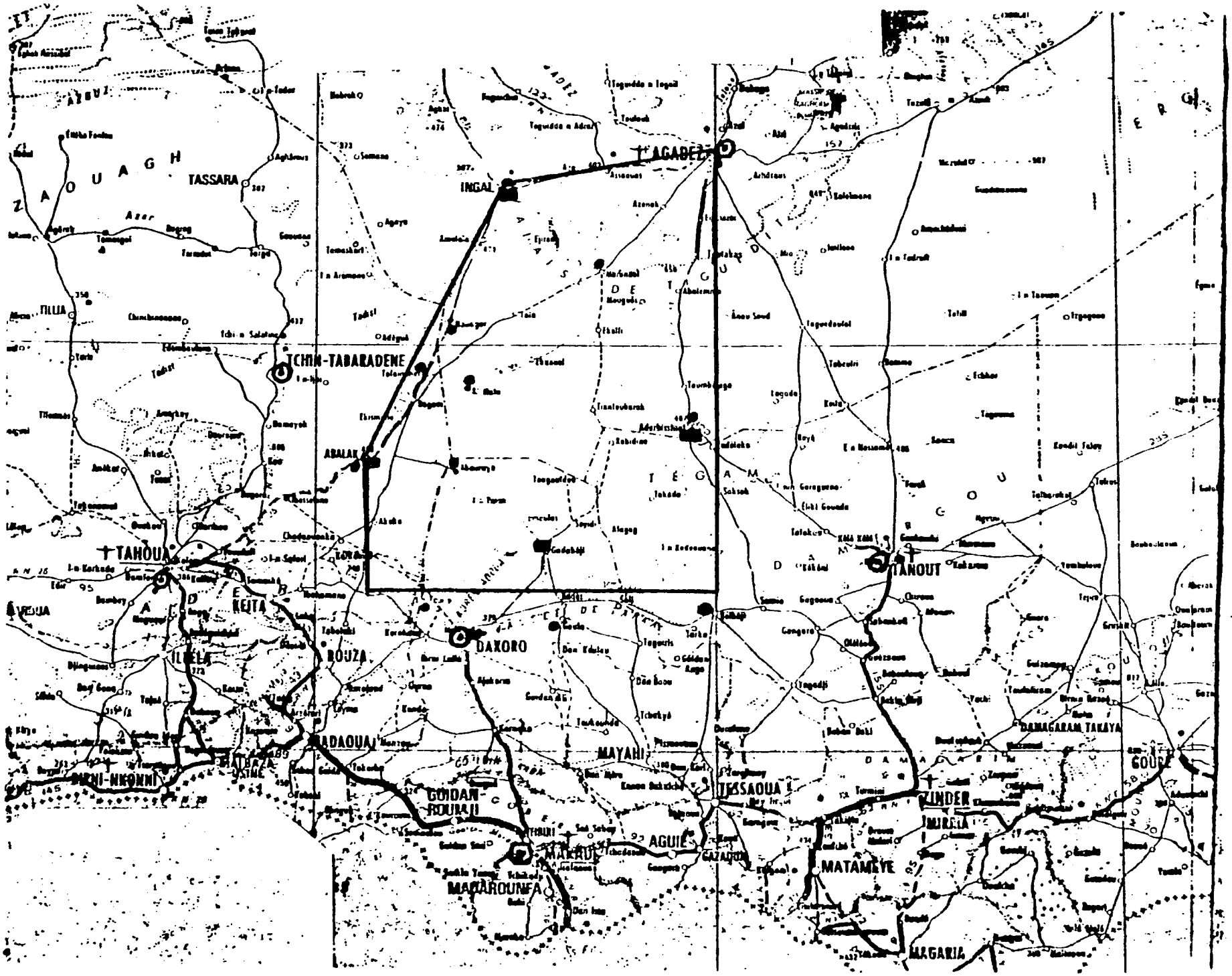
Black and white index sheets will be supplied for all color photography. Cost of the photography includes interpretation by a qualified consultant, who will compare the new photographs to black and white French photos taken in 1955 for indication of conditions and trends and compile photo-derived maps showing vegetative type and condition. This findings from a 30-day "ground truth" mission will support such comparisons and contribute to a final report summarizing methodology and findings.

The rationale for including aerial photography in the project is several-fold. First, it is a standard and valuable tool for the range manager. It is hoped that the comparison of vegetation and range quality between 1956 photos and the current set will be sharp enough to quantify the ecological change over the twenty year interim period and to compile a useful resource inventory. It is expected that considerable deterioration of the resource will be evident and that this documented information will be influential in turning GON attention to resource management. Grazing patterns can be readily discerned and a broad scale evaluation of drainage patterns and soil groups can be obtains from which reliable soil maps can be produced to allow prediction of major vegetation cover in remote areas, based on soil type alone. Careful analysis of stereo pairs of such photographs can provide estimates of many vegetative parameters on which to base sounder range management decisions. There will likewise be an opportunity to extend comparisons into the future if the photography is repeated. The area is reasonably representative of the Sahel in general and thus results could have wide application.

Since the photography will be in color and larger in scale than the earlier French photography. It will provide sharper contrasts than are possible with black and white photographs, especially when filter are used. The photographs will permit ground mapping with greater accuracy and even in the absence of ground survey markers, the actual pinpointing of ground location. All existing physical developments, particularly wells will be quite visible. The location of existing sources of water must be known in order to study the vegetative condition.

D. RANGE CONDITION AND TREND

As explained at some length in the Site Resource Inventory, range condition can be judged poor in the presence of a series of events: the


TASSARA
ZAOUAGH
INGAL
AGADEZ
TCHIN-TABARADENE
ABALAK
TAHOUA
KEITA
ROUZA
DAKORO
TANOUT
ILELA
MADAOUA
MAYAHI
TESSAOUA
GOUDAN-ROURAJI
MAKRU
AGUIE
GAZAOUA
MAGAROUNFA
MATAMEYE
MAGARIA
DAMAGARAM TAKAYA
GOURE
MIRRIA
DIFFA
BIRNI-NKONNI

disappearance of the more palatable and nutritious perennial grasses and their replacement by annual grasses, invasion of inedible weeds and shrubs; and denudation and erosion of the soil itself. The most important factor bringing about this retrogression of the range is grazing. The stages of gradual retrogression in vegetation are determined not by climate and soil but by the activity of livestock, the harvest of the resource. The present range condition of the Niger range is essentially that of dominance by annual grasses, but with areas that have fallen well below that level. The need and time for basic resource conservation has already come and passed for some areas. The only remaining option is a long and slow struggle to multiply what is left.

The first step in measuring condition and trend is a vegetation inventory, using the aerial phots along with ground truth confirmation. Detailed field investigations will be completed at four proposed study areas: Abalak, Gadabeji, Aderbissinat, InGall, and Bouza. Various environmental parameters will be obtained - soils, vegetation, climate, and influence of man - to assist in the development of a functional range management plan.

This is a beginning point, with the fortunate availability for comparison of the 1955 photographs, but the great disparity from site and year to year must also be accounted for. One difficulty is the rapidity at which the forage is grazed off as the herds move southward, and the extent to which the grass is grazed off before making seed. The state of ecological health and the trend of plant succession cannot be fully determined in Phase I but a preliminary conclusion and working information will become available.

At each study area, two 1-hectare exclosure* will be constructed, each within a different plant community or vegetation type. Two additional exclosures will be errected adjacent to heavily used wells.

Vegetational parameters for hecbaceous plants, shrubs, and trees will be obtained. For grasses, data on species, litter, bare ground, etc. will be collected from 50-meter-long transects established within and outside the fenced in plots. The transects will consist of permanent metal stakes 50 meters apart with metal nylon string stretched between each stake. Data will be obtained at each 25 cm point along the line.

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*The exclosures will be 1-hectare in size because of the low density of herbaceous vegetation, trees and shrubs in the zone.

A point-sampling technique will be employed to obtain quantitative data for trees and shrubs. Species, density, relative frequency, relative density, dominance, volumes, and importance and values will be obtained. These data will be correlated to the browse study to be discussed in a following section.

The purpose of constructing the exclosures is to gather information on natural processes of rangeland recovery under no pressure from livestock. These data will provide information valuable for a rotational grazing scheme and for determine carrying capacities at certain times of the year, if a fencing system is to be considered. The elimination of grazing will result in such changes as of vegetational dominance and percent of bare ground, which are central to determining the carrying capacity for a range.

The condition of the range together with current stocking rates as revealed by the census will permit the first effort in calculating true carrying capacity. The calculation will involve a combination of the management system, the season, intensify of use, and the TBUs supported under recorded precipitation over a period of time on a given extent of land. Forage nutrient analysis will be made. The best combination of livestock species will be taken into account. The objective will be to evolve the proper ecological balance between the resource and the consuming livestock, a balance to be adjusted as more knowledge is acquired.

4. REVEGETATION AND REFORESTATION TRIALS

Widespread abuse of the land in the zone has led to almost complete destruction of any form of vegetative cover over many hectares of land. In other sections heavy and indiscriminate grazing and other factors have so modified the natural vegetation that only low value species remain. In these areas where the vegetative cover is too light to protect it from erosion and total destruction reseeding and vegetation trials will be conducted. These trials will be done in conjunction with the range inventory and study of the growth characteristics of the more common and important grass species. Information necessary for the development of a sound management plan will be collected in conjunction during the trials; i.e. growth periods of the more important grass species, palatability and preference by species of animal, clipping to record amounts of plant material produced, chemical composition of plants will be run at various stages of growth. Knowledge of all of these factors and more are essential to proper management of the range and have an influence on the seasonal movements of the herds.

Trees and shrubs will also be inventoried. They will be studied for time of flowering, fruiting, major growth season, and animal preference. Branches will be marked to record yearly growth. This will aid in estimating the amount of browse that is produced annually and is available for domestic livestock. These revegetation plots and demonstrations are planned for Phase I. There will be four one-hectare fenced plots, one at

each livestock health station, and 16 unfenced in conjunction with range enclosures and range transects (as outlined in Range Conditions and Trends). The plots will be visible and tangible and useful for demonstration purposes. The knowledge of the most adapted species (and the availability of seed?) may be usable for more than demonstration purposes in the future. There is also the expectation that as stocking rates are reduced, thereby improving the nutrition of the individual animal, and as husbandry practices improve, there will be greater productivity per animal and hence greater economic viability in resource improvement programs.

F. HUMAN - LIVESTOCK CENSUS

The animal census will be taken in conjunction with the human census as described in the sociology section. This is necessary, since the people and animals are together at all times and the animal data will have to come directly from the owner of the herd.

Because census taking among a pastoral society situated on semiarid land where population is not dense, complicated by nomadic opportunistic grazing, poses some difficulties, the census will be designed and conducted by a professional demographer. Data collected during the census, analyzed in conjunction with data collected during other facets of the project, will determine the present stocking rate and its trend in TLUs, the time or season of use in a given area, the migration pattern, which forms of behavior can be modified, and outside influences by in or out movements.

G. LEGAL REVIEW OF LAND TENURE SYSTEM

The semi-arid grazing lands of the Sahel are not suited to cultivation or permanent settlement in one place, and thus land tenure is difficult to relate to a specific tract of land. However, some from of right of occupancy is recognized through prior or traditional use by individuals or groups. Though rather loosely defined, this is a form of land tenure and a foundation for structuring a more organized system for land allocation and use rights. The population pressures of both man and beast in modern times point to a need to recognize and establish land use rights in a formal manner and ultimately issue title accordingly. Ethnic and tribal rights can be subdivided into clan and family rights, and again this already exists in some degree. This has been done rather successfully in East Africa, but on a richer resource base.

Water is the key to right of occupancy. Dry season land use rights are rather well defined as a result of private ownership and undisputed use of permanent water sources, while wet season rights are less defined due to a broad but varying availability of water. Where water use rights are undisputed or where the government has provided the water, land use rights can be more easily adjudicated.

The tenure picture is complicated by slow group invasion of a territory historically held by another group. The original displacement of the invading group may have been political or climatic, or a simple result of population pressure elsewhere. These causes may have occurred in a different country. Farming is also encroaching upon the Sahel from the south, and the desert is encroaching from the north on the herders. The land tenure situation will become more difficult as an increasing population attempts to subsist on a shrinking resource.

The climatic characteristic of an area with a highly variable rainfall, both in time and space, serves to further cloud the opportunity to establish land tenure. What happens to the operator whose land did not get rained on? Some final authority must grant him temporary rights elsewhere, where the rains have been more generous.

Early in Phase I a thorough review of the laws on water and land rights and their enforcement will be undertaken by a land tenure expert, who must be fluent in French. "Unwritten" laws and customs of the zone's groups with respect to traditional rights will also be studied. This effort will be undertaken in cooperation with the sociological staff. This review will be necessary before a master range management plan can be approached. The land tenure consultant will suggest and draft modifications in the land tenure code found necessary to implement a range management plan.

H. ENGINEERING TECHNICAL ANALYSIS

1. Water Development

Catchment Basins

Surface water storage is planned for the first phase of the project on an experimental basis only.

The agricultural engineer will select, in cooperation with the range management specialist, a minimum of three natural catchment sites for development. The criteria for selection of these sites will be whether or not the range is properly utilized and whether the amount of water can be increased by deepening construction of dams or by construction of structures such as dikes for directing more water into a catchment area. The catchment basin will be fenced with an outlet and watering troughs on the downstream side to supply water to livestock.

Development of each area will require a topographic survey and profile for structures to be built. The Rural Works Department of the Ministry of Rural Development will do the

topographic surveys. The RPDSO agricultural engineer will design the necessary structures and supervise their construction. See Site Resource Inventory, pp. 50-63, for a detailed discussion of possible catchment area designs. In addition, based on

preliminary evaluation of the effectiveness of the three experimental sites, ten additional sites will be selected for future development. If time permits during Phase I, topography maps and designs will be made for the sites selected. The location of these will be marked on project maps for future development.

Well Improvement

The present primary source of water for livestock in the project area is from hand-dug wells. In addition there are a small number of government constructed wells. The government wells are public property and, in general, have greater degradation of the range around them. The owners of traditional wells usually water only their own livestock but there is some sale of water to other herders.

Government wells are constructed by OFEDES, the government organization formed for this purpose. Their standards of construction are excellent. The wells are completely lined from the top to the bottom and well into the water bearing aquifer. The well lining is 1.8 meters inside diameter with a 10 cm wall thickness of reinforced concrete to the aquifer and 1.4 meters inside diameter with 10 cm wall thickness from the beginning of the aquifer to the bottom of the well. Their construction costs are high ranging from 60,000 to 100,000 FCFA per meter of depth ($240 to $400). Financing for construction of wells is provided by the requesting government agency or outside donors. OFEDES also has several rotary rigs for drilling wells. Drilled wells have either 8" or 10" casing with a 6 inch well screen. Usually these have a pump and engine installed. There are two drilled wells with pumps installed in the Phase I project area and about 35 concrete lined wells. No other public wells are planned for construction during the period of this project.

Traditional wells in the project area number about 500. These wells are dug by hired Hausa well digging specialists from south of the project area. The wells are unlined except for the top 3 to 5 meters which has rocks or tree limbs interlaced in the soil to stabilize and strengthen the top portion of the well to support the animals and people during use.

Traditional wells have a short life relative to the concrete lined ones because loose material at the top of the well will eventually slough off and fill up the aquifer or water bearing strata.

Contamination is a continuing problem for traditional wells. The ropes to which are fastened skins for drawing water are dragged through the dirt and manure and then lowered into the well for drawing out water. Small animals frequently fall into the wells and are difficult or impossible to remove because of the depth.

The agricultural engineer will initiate a program to assist in improving the conditions of traditional wells and reducing contamination.

This activity will consist of assisting selected owners in lining the upper 5 to 10 meters with concrete caissons. This will only be done on new wells as they are dug, and will not be done on old wells because of the danger involved. The design will include a top well ring, concrete apron around the well to assist in eliminating contamination and a reinforced concrete anchor at the bottom to prevent the lining from dropping down into the well. The wells will be lined as far down as loose. Unconsolidated material is encountered. This will prevent loose material from sloughing off and thereby increase the life of the well.

Cooperators for this activity will be carefully selected in cooperation with the range management specialist. They will be selected on their ability to repay and their cooperativeness in limiting the number of livestock using water from the well.

Improved water drawing devices could do much to prevent contamination. New or improved devices will be designed and tested. These must be low in cost and preferably animal powered. Any human powered device must have a high mechanical advantage in order for it to be acceptable. Any device tested will have to be sturdy in design, require little or no maintenance, and be adaptable to well depths of up to 70 meters.

Methods of chemical decontamination of wells should also be considered but more important are measures to lessen or eliminate contamination as discussed above.

2. Firebreak Construction

The agricultural engineer in cooperation with the range management specialist will investigate the cost and effectiveness of firebreaks. The Livestock Service has already constructed firebreaks just south of the project area. The effectiveness of these in controlling fires will be evaluated and costs of their construction and maintenance determined.

Range Indicator and Reseeding Plots, Veterinary Station Construction, and Vehicle Maintenance Facility

The agricultural engineer will be responsible for fencing of the one-acre range indicator and reseeding plots. The fence posts must be steel because of termite problems and the fencing must be heavy guaged hog wire mesh to prevent damage or destruction by goats and sheep.

The agricultural engineer will also be responsible for monitoring the construction, by contract, of the four veterinary stations that are financed by the project. These are to be located in Aderbissinat, Abalak, InGall, and Gadabeji. Each station consists of a 110 square meter office - house combination which will be masonry construction with a reinforced concrete foundation and concrete floor. The walls will be hollow concrete block. The house and its compound will be fenced with a 40 meter by 40 meter fence of steel posts and 5-strand barbed wire. A 36 square meter

combination abattoir/hide drying facility will be constructed, which is an open shed with a concrete floor. The walls are woven wire mesh and the roof is galvanized metal.

Vehicle Maintenance Facility

A first and second echelon maintenance facility will be established at project headquarters in Maradi. It will be responsibility of the agricultural engineer to recruit the mechanical staff for this facility and to supervise its operation.

I. CONSULTING

A senior range management consultant will be brought to the project four times during Phase I, for three to five weeks each time. His first visit will be timed so that he and the photographic specialist may jointly interpret the aerial photographs, and make condition-trend comparison to the 1955 photos. This analysis may alter project planning. The two consultants and the technician and his assistants will then draw up working plans for immediately launching the project.

The consultant will return twice at six-month intervals, for shorter stays, the review a field report and the mid-course evaluation, and to assist in analysis and planning. He will also determine if the project has strayed off course or has lost some of its objectivity, at which point he will offer adjustments. He will conduct a discussion of progress with GON officials, with particular respect to activity in developing a resource management institution.

His final visit will be to assist in the preparation of the range management master plan, and suggest how it might be implemented by the new institution in Phase II.

This consultant will have extensive professional experience in foreign development. He will be a veteran of design and long-term on the spot management of similar projects and will have some experience in range resource management in the U.S. Knowledge of the French language will not be necessary, but certainly advantageous.

ANNEX H

NIGER RANGE AND LIVESTOCK PROJECT
SOCIAL SOUNDNESS ANALYSIS

by
Dan R. Aronson
Regional Social Anthropologist
REDSO/WA, Abidjan, Ivory Coast

Gratefully acknowleged are the hospitality and assistance of: Candelario Saenz, Ahmed Aharaya, the Anestafedet of Agadez, Mr. Bondow of UNDP/Agadez, and of Tuareg and Peul herders in the camps of Ibrahim and Chief Echilan Moussa at Ejiren, of Ardo Houbourc Inyaliga at Injagaran, of Dadi at Ekismane, of El Hadj Sini El Mokhtar at Chadawanka, and of a man east of Tahoua.

The Niger Range and Livestock Project addresses directly the necessity to work with and for the pastoral peoples of central Niger to achieve the goals both of increasing their incomes and standards of living and of finding a long-term ecological balance in the zone. It is a frank attempt to work within the geographic region most severely devastated by the recent drought in order to adapt and apply the best technology and techniques to the problems of a highly fragile ecosystem and a population which, if left alone, would soon outstrip its resources and fall victim to further disastrous natural retribution in the form of famine, disease, and loss of means of livelihood. It responds positively and creatively, but at the same time with necessary modesty, to the critical question of whether there is any way for the population of the true Sahelian geographical zone to manage and develop their skills and resources without destroying their environment. Project success depends on the population itself participating in identifying and working toward solving their short-term but especially their long-term, problems. While the Project thus starts with the people of the zone themselves, it does not (and cannot) conservatively leave them to preserve some traditional order. Rather, it demands that together with the Government of Niger and USAID, they find new modes of organization and decision-making that will be the basis for permanent change and self-realization.

This social soundness analysis discusses the complex social setting within which the project will operate, the basis for confidence that the Project can meet its social goals, the ways in which Project benefits and outputs can be spread to a wider population, and the differential impact of the Project on various groups in the Project zone. It is recognized throughout that the Project is an exploratory one, and that the major challenge will be for an imaginative Project staff to respond to one of the conclusions of the Site (Physical) Resource Inventory team that "sociological, cultural, and people management problems" (SRI, p. 129) are the major issues in the zone rather than forage and animal problems.

1. <u>Sociocultural Feasibility</u>

The Project will operate within a zone thatis economically, culturally, and socially far more complex than its generally sparse landscape might suggest. The Project will affect many elements of this complicated structure, and Project feasibility depends, therefore, on recognizing the varied social patterns within the zone. To do this, it is necessary first to describe relevant characteristics of the two dominant ethnic groups in the zone, Tuareg and Peul. Then a statement of the historic circumstances which have brought these two groups into present patterns of resource use and crisis provides needed context for a discussion of the sociocultural implications of Project components. Finally, a recognition of possible obstacles difficult to overcome will provide the rationale for the work of the Project Herder Sociology Unit.

I. The Social Landscape

A. The Tuareg

The entire Project zone has been dominated historically by the Tuareg people. Speaking a Berber language and using a script related to ancient Libyan for record-keeping, the Tureg are spread across the central Sahara in Algeria, Libya, Mali, and Niger.

Far from being an isolated, self-sufficient society living off in the desert, they were in fact the masters of a regional economy. For centuries, they ran the active caravan trade in and across the Sahara: the "Sahel", which means shore or edge in Arabic, was the shore of their sand ocean. They organized the internal desert economy itself, carrying salt, dates, natron and transport animals south from the desert to the markets of the savannah zone, and foodstuffs, cloth, and other necessities back to the herders, miners and transporters. They brought the subsaharan hides across to the north African markets where Europeans repurchased what they mistook to be fine "Moroccan" leather, and sold gold, ivory, feathers, pepper, and slaves as well; on the return trip went European and North African cloth, metal products, jewelry and other goods.

The diversity of the trade itself was matched by the complexity of Tureg social and political organization. First, Tuareg society was composed of hierarchical segments of nobles, vassals, subordinate castes, and slaves. Second, the economic unit of production was a small group of nobles and all their subordinates, some engaged in agriculture (especially slaves in the south), some raising livestock, some providing specialized services (weapons and equipment-making, personal services, mining), some providing labor for caravans, and the nobles managing. Third, the Tuareg economy was tightly integrated with that of its neighbors, in central Niger with that of the Hausa to the south. The large markets for desert and pastoral products, the source of cloth and grains, the zone of retreat during recurrent periods of drought, and the source of much (originally non-Tuareg) manpower lay to the south (and into present day Nigeria), with all the implications for economic cycles and political and cultural influences that implied. Fourth, it is clear from the above that Tuareg pastoral nomadism was a small part of a wider economy; the herders themselves lived both directly from animal products and from marketing them, but animal production was functionally related to and fluctuated with the demands of commerce.

The Tuareg of most of the Project Zone now live in small camps of from four to dozen tents, the family heads being related to one another usually by kinship, but sometimes only as friends. Each camp has a recognized leader, but his authority is achieved consensually - even a brother can find another camp to reside in if disagreements became strenuous. Within the camp, herds are individually owned (some by women), but may be

managed together depending on numbers and types of animals and time of year.

Several related camps have rights to a single well. Very little is understood of the details of dry season water rights: the man who invests in the construction of the well has ultimate authority over it, but where several relatives have collectively inherited it or contributed money to the construction, or where a man has it built for the welfare of (and toward increasing his influence among) his kinsmen, decisions about well use are also consensual. Animal needs define the pasture within a radius of a few kilometers from a well as "belonging" to that well, and the spacing of camps further defines usage in the area. But in fact pasture is not owned, and anyone - with or without water rights at the well - may graze in the area if he can or needs to do so. There is thus no formal system of control of grazing rights; informal agreements, however, are reached and enforced within the group and vis-á-vis outsiders in recognition of individual needs and range conditions.

Several wells in one area (though not necessarily with contiguous pastures) thus form the dry-season focus of the next level of Tuareg organization, the "fraction". In recent decades, the fraction has come to have major administrative significance as the named unit under a sub-chief through whom taxes are collected. Former vassal "tribes" and service castes (leather-workers, religious specialists) have all become more or less independent units, each under its own sub-chief.

These sub-chiefs are traditionally responsible to a drum-chief, the highest office among the Tuareg. Most of the Tuareg of the central and northern parts of our zone are either Kel Faday (with a few hundred individuals under each of fourteen sub-chiefs and a drum-chief whose normal residence is just north of InGall) or Kel Ferwan (with an undetermined number of sub-chiefs and a chief at Aderbissinat). Along the central part of the southern tier of the zone are the Kel Geres, most of whom are now sedentary herders or even cultivators. In the west and southwest are the TaGeritGerit (an older term was Kel Dennek), in general the Tuareg of Tahoua, but among them there has been no overall chief since 1917. Most of the latter tribe graze and migrate west of the Project zone, but some fractions inhabit the zone for much of the year. In the southeast, little is known or written about the Tuareg of Tanout arondissement. Finally, small Tuareg fractions either claiming total independence from the large groups named above, or living quite far from the majority of their kinsmen, live interspersed throughout the zone. In short, a very generalized map could show the wells and grazing areas of major groupings but might be misleading or simplistic if it implied either that groups "owned" their traditional grazing grounds in a Western sense or that a great many small groups with various claims to wells and grazing rights were not also to be found within those major areas.

Tuareg transhumance patterns are relatively straight-forward. The patterns of water and land use described above apply to the greater portion of the year from October or November to May or even later. During the

major part of the long dry season, that is, most Tuareg are to be found at their private wells. At the end of the dry season, if pasturage is insufficient, at least part of the herds may be driven south - or in any direction where both water and pasture may exist (the constant topic of discussion with passing travellers is the details of range conditions). At the beginning of the rains, people disperse to wherever flowing or standing water can be found amid new growth.

In September, most of the animals are taken north and west of InGall for the cure salée, for the water and grasses without which, Tuareg of the zone say, their animals would not grow fat and thrive. During the salt cure, larger groups camp together for reunion and celebration. Some herders claim that not to go on the salt cure would be as if you were dead, so important is the socializing; others say that if the salts were available at the dry season wells - with enough grass - they would never move, and could build permanent houses!

Tuareg herding practices themselves have been studied in some detail by Nicolas, Nicolaisen, and Bernus among others, and will not be summarized here. In this post-drought period in the Project zone, Tuareg herd camels and goats, with some sheep, donkeys for transportaion, and occasionally a few cattle. Camels are sold as the prestige product of the area; Air camels are valued all over the central Sudan as excellent pack and riding animals. Goats are sold for all kinds of cash needs, and sheep and goats are both sold in numbers at Muslim festival periods (especially Tabaski) for the Libyan and Algerian markets as well as the Nigerien. Tuareg that were interviewed would prefer to have more sheep relative to the number of goats since sheep multiply as rapidly and fetch at least twice as much at market. Sheep, however, were decimated in a 1976 epidemic, and herders are now reluctant to build up their investments again. At the same time, herders are cautious of buying cattle or camels because theft, which is not uncommon, can wipe out a large investment. For the moment, then, goats are substantially overrepresented in Tuareg total herds, not just in terms of their destructiveness to rangelands but even relative to herders' own wishes as to herd composition.

With their income, Tuareg buy a large variety of market goods. Millet from the south is the staple grain nearly all year, increasing as a proportion of the diet relative to the declining milk yield toward the end of the dry season. Periodic major purchases include clothing, reed mats, beds, camel saddles and bags, and cassette player/radios (which are quite common). Frequent needs are for cassettes and batteries, tea, sugar, tobacco, salt, cosmetics, soap and other small items. Almost every Tuareg fraction has some children in school, with the costs that that incurs.

The general picture that can be drawn of Tuareg at this time, in summary, is of (a) small, politically independent groups of herders, (b) heavily involved in the market and increasingly with outside agencies, (c) depending for their income on their current efforts to rebuild their goat and camel herds, (d) which are relatively sedentary for much of the

year, but transhume along a northwest/southeast route for the salt cure, (c) but who, despite the relative permanence of camps, continue to manage rangeland through informal mechanisms, emanating from control of water, that the herders themselves recognize as insufficient for long-term conservation.

B. The Peul

Peul are members of the geographically most widely dispersed ethnic group in Africa. Speaking a language most closely related to Serer in western Senegal, Peul have spread over the last few hundred years across the West African savannah and may now be found eastward to Chad and the Central African Empire. The primary mechanism of that dispersion has been a self-sufficient and highly flexible social structure. With shallow kinship groupings and autonomous decision-making capacities, single household can find a niche in a local ecological system, depend almost fully on their own herds for food, if necessary, and trade with neighbours for grain and cloth, virtually their only external necessities.

While Peul in many areas have partly or fully sedentarized, and in some places have even become politically dominant, the Peul of our Project zone are fully pastoral. They have entered the Zone only in the last half century or so, tracing their origins southwestward. They recognize the Tuareg as dominant in, but not as owners of, the zone, and try to gain influence by increasing their numbers; while Tuareg will sell water rights to Peul for example, a Peul well-owner claimed that the reverse would not happen - a Peul will invite more Peul to the area.

The Peul are an interstitial population, located in three different kinds of niches in the geographical and social organization of the zone. The construction of public wells from the early 1950's drew large numbers of Peul into the zone with no controls at all, with the inevitable result that the areas surrounding those sites became badly overgrazed. Second, Peul have become associated with Tuareg herders, who may sell shares of their own watering rights for cash. (The Tuareg may have only a small herd of his own and need the cash and Peul products; the Peul is at least interested in securing a temporary watering point, and may want to be closer to a market.) In this case, Peul camp farther away from the well than the Tureg owners, and have more orduous work to do to water their animals. (Their more spartan life style and the willingness to live far from water and perhaps from other Peul gives rise to a mutually held stereotype of Peul as loving their animals and as rugged but also as rustic if not uncivilized in Tuareg eyes.) Third, a Peul may succeed in buying a well from Tuareg, in which case, surrounding himself with other Peul, he uses the well and pasturage like Tuareg at their own wells. A full range and water use map would thus probably show Peul: (a) at over-charged public wells in previously under-watered range, some of which lie between Tuareg tribal territories and some in areas with a deep water table; (b) at peripheries of pastures around privately-owned Tuareg wells; and (c) concentrated at a few wells of their own, generally purchased from Tuareg.

Part and parcel of the flexibility of the Peul which has enabled them to filter into the zone as they have is the lack of deep kinship groups and hierarchalized authority among them. Camp groups themselves are small, consisting of from one to four households. There are no politically organized tribes or subtribes as among Tuareg. There are named groups who recognize distant kinship, but the effective social grouping is a shallow lineage (among southern Peul, Dupire found populations of from 25 to 218 in 1951) under the guidance, not authoritative control, of the ardo or chief. Several such lineages compose a unit with a name and common origin but no common organization, and the administration has appointed superior "chiefs" over several such units (the Peul chief at Abalak, for example, has seven units and some forty lineages under him). The ardo himself has limited influence among other heads of camps around him, arising from his skill and wisdom and extending only as far as he works with others. Two striking examples of the limitations on authority were given us by one ardo in the zone, who said (a) that if he were to send a child to school others around him would flee the area, fearing that he had become a "government" man, and (b) that he was about to leave for better grazing farther south, despite the fact that he owns a well and is the ardo, because to drive other people from his well would be to demolish his authority among them and to invite their retaliation whenever he has need of grazing and water elsewhere. Because of the greater fractionalization of Peul communities, kin groups, and political authority, gaining access to Peul communities for census, mapping, and extension purposes will be a lengthy, patience-demanding task.

The Peul are cattle herders above all else, and dairymen not meat producers. In herds observed recently, goats were about as numerous as cattle, but Peul have an active distaste for the milk of goats and sheep. A few donkeys and camels are also kept by Peul in the Project zone for water drawing and transport. While the man do sell goats and occasionally cattle (especially surplus males at about four years of age) for cash needs, much more regular income is from women selling butter and curdled milk. (Peul in the south sell fresh milk, but distances, the fact that markets are only weekly, and perhaps the milking capacities of cows in our zone favor curdling and accumulation of milk in skin bags for the market.)

Peul needs to the same degree as the Tuaregs in the market are few. They do not use the tea, sugar, and tobacco of the Tuareg; they wear more skins and less cloth; their habitations are from locally-gathered materials (though a few Peul have adopted Tuareg beds); their diets and riding gear are less complex; in and around the Peul camps where our discussions took place, no children were in school.

As late-arriving outsiders in the Project zone, the Peul are less regular in their transhumance patterns than the Tuareg. Some make the annual September salt cure northward, where the worso - the great assembling of all the camps of a fraction for a few days of celebrations and marriages may take place. Others make much shorter and opportunistic movements

from public well to standing pond to a well where they buy rights and back again as the seasons change. Whereas Tuareg migration charts take the generalized form of long north-south lines with minor movements at each end, a chart of Peul transhumance resembles an octopus with arms of different lengths, centered on a public or private well and activating one "arm" or another as herders move first in one direction, then in another.

II. Forces of Change

Unravelling the complex interweaving of Peul and Tuareg in the Project zone helps to orient the Project to radical differences between the two populations that have impact on every aspect of Project implementation. Different types of range and water use rights, different herd sturctures, different management goals (animal versus dairy production), different market demands, different authority and communication structures, and different orientations to schools and other outside influence are just a few of the distinctions that must be understood preparatory to seeking the cooperation necessary from both populations in any long-range system of resource conservation.

But more than just the dominant social characteristics are important. Political and economic forces have created a dynamic of change that the project will have to work with. Only the redirection of these influences will break the current crisis of resource depletion. Briefly stated, these forces include:

A. The destruction of the traditional Tuareg political economy.

Tuareg pastoralism has become a self-dependent, marginal economy in the face of the collapse of traditional political economic patterns. First, the Saharan trade declined radically as cheaper imports via the coast replaced the salt, cloth, and metal trade. Next, Tuareg political autonomy, at the end manifest in the revolt of 1916-17, was broken by the French with the massacre of chiefs at Aderbissinat. Afterward, the Tuareg were Nigeriens like others, and so could not exert their own will, for example, to keep the Peul - also Nigeriens - out of their area. Third, the freeing of slaves broke up the old organization of Tuareg commerce. In one camp where we stayed, Tuareg sold most of their animals to pay their former slaves in cash to work their crop lands, and thus capitalized the more profitable sector of their activities, but broke their ties to pastoralism and themselves sedentarized. With authority patterns and the commercial network thus broken, herding became a way of life more unto itself than ever before, and hearding communities more self-directing. Vitally relevant to our Project, an old system of range management by the use of natural boundaries and even stone walls fell into disuse.

B. The intensification of agriculture.

The freeing of former Tuareg slaves created a labor force intent on its own pursuits, which expanded agricultural production all over

southern Niger including the southern tier of our zone. Much more importantly, the introduction of cotton and groundnuts and the colonial stress on their production diminished the grazing lands in the south that were open to Peul, who were thus pushed into new areas such as the Project zone. Although there is a legislated northern limit to agriculture at the 15° latitude, in fact cultivation has spread in the valley bottom north of there; if such agriculture is marginal, pastoralism is still on the retreat, to the margins of the margins.

C. The strengthening of national boundaries.

The creation of the boundary with Nigeria helped to constrain Tuareg trade to the towns like Kano, Bichi, and Katsina where they had formerly maintained extensive residential quarters. Much more recently, periodic attempts to control the movement of people and cattle have created hindrances to nomadic movements. More important is the existence of two different national policies on meat and livestock - with duplication of tanneries, the expectable favoring of self-sufficiency in Nigeria, the complications in road and marketing facilities. Thus, while Nigeria draws upon Niger livestock production in good times, Nigeria is less ready than before to receive drought refugees or surplus animals in hard times. In the next few years, the strengthening of border surveillance and Nigeria's meat policies are likely to cause even greater hardship to the Nigerien livestock sector.

D. The deterioration of terms of trade.

Well documented in West Africa is the "price scissors" which has forced primary producers to raise even more of their crops to pay for the same amount of manufactured goods from world markets. This phenomenon operates not just in the abstract or at the national level. Every farmer's pocket is affected, and a great proportion of increased crop production has gone just to stand still with regard to imports. The price of food on domestic markets has also increased in response, reflecting both stagnant production as efforts are spent on cash crops, and the farmer's own price hikes to try to stay afloat. Jacques Bugnicourt of the UNEP argues that terms of trade have doubly declined for herders in Niger, as more and more animal production is necessary to purchase a given unit of grain. If the Project market studies confirm this historic trend, we should not wonder at the headlong attempt to build up herd numbers in the Project zone. Rather, efforts at the national level may have to be considered to rectify the trade imbalances between agricultural and pastoral zones.

E. National social policy.

Efforts late in the colonial period and after Nigerien independence to serve the nation have had unanticipated negative effects. As noted above, the building or public wells drew Peul who were being crowded out of lands further south. Improvements in human and animal health also contributed to population buildup. The imperative to treat all Nigeriens

as fellow "citizens" has led away from recognition of indigenous systems of control in the zone toward an implicit policy of the range being free for all. And the general limitations on Nigerien resources, which led to a concentration of economic policy on production factors in the south, has meant neglect of issues farther north. This interest of the GON in this Project represents a new-found capacity and willingness to focus upon and deal with the problems of the pastoral zone that is most opportune, and which must not be fumbled.

F. The Sahelian Drought.

The entire dynamic of central Niger was to build up intolerable pressures on range and water resources in the pastoral zone: it is no wonder that right now Peul go armed with lance, sword, and dagger to water their herds at the public wells. Despite the generally peaceful mingling of people and their herds and the local accommodations that were made, something had to give. The 1960's, it now appears, were years of unusually abundant rainfall (Lake Chad was higher in 1968 than at any other time in this century), which postponed the reckoning even while specific areas began to decline in quality from overgrazing. Then, in 1968, the rains began to diminish, and in 1972 and 1973, there was nearly no rainfall at all. The Sahelian drought was the most severe in memory, but the consequences for the human population and their livestock were magnified enormously by all the "man-made" political and economic circumstances outlined above.

The magnitude of the destruction is well known. Herd losses in our zone are estimated at about 40% overall. Human responses - as the drought deepened - were multiple: some people retreated southward early enough to save nearly all their animals; others congregated around the wells until there was neither the strength nor a lifeline of grass remaining to make the trip south possible - one of the herders interviewed then lost 40 cattle within two weeks; some sold animals in good enough time to finance a trip to a city or an agricultural village to find work; others sold nearly dead animals for less than a dollar a head (to butchers who dried the meat for shipment) and wound up in refugee camps (at Agadez, Niamey, or elsewhere) or in farming villages having to beg for work and sustenance.

III. Project Social Interventions in Herder Communities: Constraints and Implications.

Section I above describes the continuing patterns of land use and economic strategy among the Peul and Tuareg pastoralists of the Project zone. Subsection C of the Technical Analysis Section of the Project Paper, the Social Analysis and Rationale for Herder Community Innovations (to which the reader is now referred) outlines the reasons we have for believing that this is a crucial and opportune time to move beyond general studies to concrete work with herders toward resolution of the issues that confront them. Simply stated, work can and must begin now, because pressures on resources are again building steadily, and because herders fortunately recognize those pressures and want to contain them.

What is recommended for the Phase I Project is a set of innovations in herder social organization: animation and discussion using herder community representatives; increased information flow to, from, and between herder communities; applied research to build directly toward decision-making; and the creation of herders' associations the goals for which will be to develop resource conservation measures and self-imposed controls on range use. These innovations, described in greater length in the Technical Analysis above, will be the tasks of the Project Herder Sociology Unit. Terms of reference, personnel and duties, and a timetable of projected activities for the Unit are appended to this Social Soundness Analysis.

The tasks of the Herder Sociology Unit will not be easy to carry out, since they ask human communities to create new levels of responsibility and to take new types of decisions that they have not done before, even if they do now recognize the need. The innovations are designed to integrate as smoothly as possible into existing social patterns in the zone, after careful analysis is completed (in the first year of the Project), of the best way to contextualize those innovations. Is the individual well, the tribal fraction, the tribe, or an area with natural boundaries the right unit in a given area to work with? Is the best community aide a young person who may be literate, or a more experienced herdsman? Can Peul and Tuareg who share a valley be encouraged to make joint and equitable decisions? Answers to a multitude of such questions will come from the Phase I Project, and will be vital to the planning for long-term resource conservation in Phase II.

To begin to answer those questions careful research will be undertaken from April 1978 through 1979. Approximately 120 herder families (with their communities) will be carefully chosen. Half of these will be receiving Project interventions in animal health and nutrition. Of these 60, half will be Peul and half Tuareg. Variables which will govern selection will include wealth, political power, family size, herd composition, and of course willingness to cooperate. It is suggested that of the 30 Tuareg, fifteen be chosen from among the Kel Faday of the northwestern part of our zone along the new highway route, and fifteen from among Kel Admit or Kel Tamesna Tuareg east of Abalak and north of Gadabeji. The control groups of Tuareg should come from Kep Ferwan north and south of Aderbissinat. Peul families in the same general areas should be chosen. In both cases, the southern tier of the Project zone, where relationships to agriculture dilute the emphasis and dependence on livestock activities, should be left to later phases of the Project.

In the work of this Unit and the other technicians, several social constraints may be expected. For example, a critical element of the long-term need to work closely with herders will be the selection of Tuareg and Peul research assistants who will be able to gain the full confidence of the communities they work in. It is predictable that without this confidence none of the social interventions, and not many of the technical

parts of the Project except those with an obvious and immediate payoff, will succeed. Poor selection of assistants, in other words, would be a major obstacle to Project success.

Second, Peul and Tuareg communities will each have their own problems. It will be difficult to recruit Peul assistants, who will probably have to be from outside the zone (but that contingency is still more desirable than having all Tuareg assistants). Analysis of marketing will be of very different patterns, and it would be unwise not to have female assistants to do the data collection on women's activities, especially among the Peul. The Peul will be in any case more difficult to approach, and perhaps more difficult to convince as to the worthwhileness of long-term limitation on herd size.

Third, the low population density of a pastoral economy will entail substantial logistical problems for Project staff and for the building of communication and associations within the zone. This constraint will be overcome in part by the experiments in communication that will take place, and by the commitment of staff to mobility in the area. But compared to work in agricultural areas, the ratio of effort expended to people contacted will necessarily remain high.

Fourth, changes in the external economy, impossible for the Project to control, may have profound reverberations on herders. The tripling of uranium mine labor demands over the next five years, the paving of the highway north from Tahoua to Arlit with more and more trucks returning south from the mines empty, the increased tourist traffic through Agadez, the possibility of major truck traffic via a resuscitated tran-Saharan route to Nigeria (experiments have shown that this route from Europe to Kano may be cheaper than the route via Lagos), the replacement of camel transport by trucks (Bilma salt, for example, is said to be cheaper when truck-transported, and in general, the camel herd is said to be reduced by one-fourth in Agadez, from 80,000 to 60,000) - each one of these in itself could affect the pastoral economy either positively or negatively.

The social implications of the Project are thus immense. If it fails, pastoral resources will continue to decline until pastoralism is a viable economy for only a handful of marginal people, and the alienation of herders from outsiders will be complete. But, if it is successful, we will have been able to encourage pastoralists to change their management and marketing strategies by overcoming some of the technical constraints under which they now operate. We will have revivified a capacity for and a spirit of self-control over their resources that has not existed for many decades. We will have helped to increase the pastoralists' bargaining power in the Nigerien economy by improving their livestock production and marketing capacities. We will have found ways to bring government and pastoralists into close communication toward mutually desired goals of increasing herder welfare and conserving range resources, and we will have found mutually acceptable means of achieving those goals.

2. Spread Effects and Replicability

The Phase I Project is designed both to gather information on the above and to field-test methods of effective and efficient innovation in the pastoral cultural ecology. The purpose of Phase I is to design a master strategy for range management in the entire zone - that is, to design the means of spreading what we have learned in the pilot interventions of Phase I.

One major issue that will arise is the cost-benefit ratio of such a broadened program. The pilot programs in water storage, well improvement, animal nutrition, marketing, and the herder community aide program, extension methods, and herders' associations are all designed with goals of cost-effectiveness in mind. The limited resources of the GON also require that the costs of extending the program throughout the zone be minimized.

A second issue is the relative isomorphism of pilot intervention sites to the entire (Phase II) Project Zone. That is, spread effect can be limited if the zone contains types of physical and social resources very different from those worked on in Phase I. Concentration of the effort in the fully pastoral zone, and careful selection for representativeness of the cooperating and the control herds and communities will ensure that the entire pastoral zone is understood and planned for. On the other hand, the "southern tier" where agriculture is as important as livestock, and some small populations like the Arabs of the southeast part of the zone, will require special attention that may be beyond the means of the first phase.

Replicability of the entire Project in other areas of Niger (and in the pastoral zone of neighboring Sahelian countries) will be assured by the following elements of Project design: intensive research on herding management that will apply in broad outline throughout the Sahel, development of cost-effective technical interventions, and the development of the GON capability to design and implement expanded resource management plans and effective applied research and extension operations. Replicability will be diminished to the extent that other pastoral areas are radically different in social characteristics or in dynamics from ours, but only if the services and capabilities developed become inflexibly committed to the idea that what is good for the first zone in which these concepts and stragegies are developed is necessary for the rest of the country.

3. Beneficiaries and Potential Opposition

Project beneficiaries of Phase I will be, in the first instance, the sixty families/herds/communities in which intensive interventions in health, nutrition, and marketing strategy will be carried out. Such a simple statement, however, belies the purpose of the Project and of those intensive interventions themselves, because (a) sixty other families and communities will be organized in terms of the social interventions (aide network, extension education, etc.); (b) yet other areas will gain

from the experimental water catchments, range reseeding trials, and construction and equipping of the four livestock posts, and (c) the knowledge of benefits which can be achieved in the area will immediately be serviceable for the Phase II extension covering a much larger area of the pastoral zone. In a larger sense that is directly conceived by the Project, in other words, the beneficiaries will be all the pastoralists of the Project zone and those of their descendants who choose to remain in a pastoral economy made more viable by the resource conservation generated by Project success.

Opposition to the Project is not expected to be direct - there is no one concretely threatened by the improvements planned in the pastoral zone. In the middle run, competition may come from (a) other sectors of the administration arguing that the pastoralists are getting too much attention, or from (b) livestock transporters and middlemen who may lose bargaining power as pastoralists acquire more information and set up effective marketing organizations. These sources of opposition may be anticipated, but will otherwise simply have to be played out over time.

More challenging to the Project will be the long-term changes in the local economy described above. If several thousand jobs open in the mining, transport, and tourist industries, many Tuareg may give up pastoralism, or southerners may pour into the zone, profoundly altering the social relations now existing. It is thus possible to contemplate the pasture left behind for Peul as Tuareg reenter a commercial economy revivified - as the classic writer on the trans-Saharan economy, E.W. Bovill predicted - on a scale that surpasses the precolonial trade. On the other hand, it is also possible that the intensification of the pastoral economy will drive Peul away to areas - in Cameroon, the Central African Empire, or farther east - where they can continue to herd in their way without yielding to outsiders.

The long-term strategy for the pastoral zone must, therefore, conceive and debate the radically different alternatives of a rangeland with few Tuareg, and a rangeland where both are integrated into a multi-purpose pastoral economy that conserves resources while it generates better living standards for pastoralists. For both the GON and USAID, the vistas are broad, the possibilities as to the future of the zone are numerous, and the challenges will require imagination and sensitivity.

ANNEX H - Appendix A

Note on Women in the Pastoral Zone

1. The Phase I Project will not affect the status of women in the Project zone positively or negatively. Household and herding labor, divided according to sex for many tasks, demands the strict cooperation of both men and women. Much of the management decision-making is done by men, although women's experience and contributions are of necessity highly valued. This situation is not likely to change as result of Project interventions, while the benefits are likely to flow to both men and women, household by household, as herd productivity increases.

2. The Sahelian drought disrupted family life severely in the pastoral zone. As the Rupp Report makes clear, women left behind by men migrating for work were often especially strongly affected, and women as well as men were owners of animals that perished. As family and herd reconstitution proceeds, some of these effects (and those on the elderly, the very young, etc.) are being relieved. Care must be taken during the project to watch out for the special interests of all these groups, for example, to ensure that women's herders are included in the research design. Having female research assistants should help focus on these issues.

ANNEX H - Appendix B

The Herder Sociology Unit

The analyses and animation necessary to develop the herder community aide network, the communication materials and techniques, and the herder's associations, the realization and evaluation of pilot schemes for these innovations, and the planning of means to extend these innovations to the entire Phase II Project zone, are the responsibility of the Project Herder Sociology Unit. This unit collaborating with all other project staff, will have the following responsibilities:

(a) To carry out intensive studies of (i) a selected sample of herding groups to determine current range and animal management techniques and strategies and modes of leadership and decision-making with respect to resource use; and (ii) the regional traditional economy (markets, caravan trade, well construction, blacksmithing and herder/sedentary relations);

(b) To design and carry out a census of human and animal populations in the project zone and establish a means of updating the census at appropriate intervals;

(c) To stimulate and set up pilot herders' organizations to make decisions on resource management in their own areas, on the basis of new information levels and understandings of the zone as a finite and fragile system, that are consistent with overall good planning as developed by project technicians and with the rights of all users.

(d) To design and build communications techniques for increasing the flow of technical information downward from government and project management, horizontally from herding group to herding group, and upward from herders to government and project, including the possibilities of (i) the use of cassettes in indigenous languages as teaching techniques, (ii) the creation of a network of aide-encadreurs, members of the herding groups themselves be points of (two-way) communication, and (iii) the design of improved systems of information sharing among herding groups by radio or other means.

(e) To establish a long-term professional capability for applied research and extension related to herders and herding within the Service d'Elevage, and to train assistants in sociological and anthropoligical research techniques.

(f) To conclude by designing means of extending the successful innovations throughout the Phase II Project zone.

Personnel and duties

I. The Herder Sociology Unit will consist of:

A. Technical Staff

1. The Senior Sociologist

2. The Deputy Senior Sociologist (counterpart)

B. Technical Assistants

1. The Unit Technical Assistant (ex-PCV)

2. Two (2) Senior Research Assistants (one Peul, one Tuareg)

3. Four research assistants (enquêteurs) (two Peul, two Tuareg)

(NOTE: of the six research assistants at least one Peul and one Tuareg will be women)

II. Duties of each Unit member include, but are not limited to the following:

A.(1) The Senior Sociologist will:

1. Supervise, design, participate in all social research.

2. Develop communications channels and means of herder participation in the project (including full review of Phase II Project planning) by setting up the herder community aide network, working with herder community leaders, and working to a communication system.

3. Set up ten pilot herders' associations and monitor progress and achievements over the course of one year.

4. Formulate a program of activities related to the herder population in the entire Zone for the Phase II Project.

5. Have general responsibility for the Herder Sociology Unit's organization, staffing, working relationship and coordination with other Project Staff.

A.(2) The Deputy Senior Sociologist will:

1. Work with and act vice the Senior Sociologist on all research activities, and have primary responsibility for research on the social aspects of regional economic institutions (organization of marketing, caravan trade, etc.)

2. Be directly responsible for the animation of herder participation in problem-solving related to project goals and activities.

3. Act on behalf of the Unit as liaison with other permanent and temporary government services and activities in the project area (for example the services offered at the time of the cure salée.)

4. Develop with other Project Technical Staff means of extending information to the level of herders.

5. Act as supervisor on personnel matters for the technical assistants of the Unit.

B.(1) <u>The Unit Technical Assistant will:</u>

1. Supervise the fieldwork and edit the research activities of the research assistants.

2. Coordinate schedules and to routine problem-solving for all unit activities.

3. Act as logistics assistant and liaison with project headquarters in Niamey and Maradi.

B.(2) <u>The Senior Research Assistants will</u>:

1. Act as interpreter/field assistants to the Technical Staff at the beginning of Unit activities.

2. Build rapport with and collect data from herding groups as directed by the Senior Sociologist.

3. Each act as trainers of and immediate supervisors to two research assistants.

4. Help animate and build the network of aide-encadreurs as long-term contact points within the herding communities.

B.(3) <u>The Research Assistants will</u>:

1. Build and maintain rapport with, and collect data through intensive fieldwork among, herding groups, as directed by the Technical Staff and the Senior Research Assistants.

2. Seek to carry forward the goals of the Project during their work at the basic level of Project beneficiary communities.

Subsidiary Activities of Herder Sociology Unit to be carried out by Consultants.

1. Pastoral - Zone Census

At two points during 1979 a full census of the Phase II Project pastoral zone will be undertaken. Regular GON census staff will carry out the census. For the special problems of censuring in nomadic zones, consideration of remote techniques, the design of special census schedules, and the training of census personnel and the supervision of the census itself one short-term consultant demographer for one period of one month and consultant two periods of three months each will be hired for November 1978, and March-May and August-October 1979. The censuses themselves will take place in May and September. The two dates are chosen because they guarantee maximum variation in the location and total numbers of the population, data vital for range use planning. The final report will be delivered by January 1, 1980

2. South-east sector sociological report

The southeastern area of the large Project (triangular) zone that which falls within the Arondissement de Tanout, is the least well-known in previous research studies, to ADO Niamey and Project staff, or in the studies so far undertaken for the preparation of this Project. The Phase I Project will have few if any facilities within this arrondissement, though a small portion of it falls within the Phase I area. To remedy this lack of knowledge and to prepare for Phase II interventions in this area, a short report detailing population groups, leadership patterns, local economic institutions and patterns, and development issues for this arrondissement will be completed by April 1978. The report will be written by a researcher currently in the area, who will be the best single source of such data by the time the report is needed.

3. Land use: Legislation and Tradition

For purposes of the development of the Phase II master range management plan, a professional analysis of the national and traditional land tenure systems will have to be carried out. The Project Sociologist and his staff will be collecting extensive data on land and water use, migration, and traditional modes of resource management, and will produce interim and final reports on these matters. For the purposes of articulation with an analysis of national legislation and legal tradition, a two-month consultancy by a specialist trained in both anthropology and law will take place during late 1979. This personal service contractor, who will be French-speaking and conversant with French legal systems and capable of analyzing field data on traditional law, will work with the range management technician, the sociologist, and the appropriate GON ministries to produce a report by the end of November 1979.

ANNEX H - Appendix C

Timetable of Activities - Herder Sociology Unit

For planning purposes this section presents a listing of the most significant activities and events related to the sociological research and experimentation component of this project. The dates are based on the assumption that a project agreement will be signed in July or August 1977, and that recruitment for a French-speaking social anthropologist or sociologist can begin by late spring 1977 at the latest to ensure his arrival by January 1978.

January 1978	- Project Senior Sociologist arrives;
February 1978	- Deputy Senior Sociologist (counterpart) and Technical Assistant nominated and approved;
March 1978	- Three above officers choose and relocate to field headquarters;
April 1978	- Preliminary reconnaissance by above officers, permissions for research sought and gained from sample herding communities;
April 1978	- Southeast sector sociological report completed;
May 1978	- Research assistants hired;
June 1978	- Field research begins in herding communities, sample census in herder communities completed by late dry season, animation for herder community aide network and herders associations begins;
October 1978	- Interim reports on local economic institutions completed;
December 1978	- Interim reports on well proprietorship and water rights, land tenure principles, and camping group composition and range use decision-making completed;
December 1978	- Herder community aide network for sample herder communities constructed and aides performing duties;
February 1979	- Ten pilot herders associations organized;
February 1979	- Extension/communications materials and techniques designed, implementation experiments begin;
May 1979	- First census of Phase II Project Zone completed;

September 1979 - Second full census of Project Zone completed;

October 1979 - Detailed migration maps, range use observational data, household decision-making, and census updates completed;

November 1979 - Final report of Land Tenure consultant received;

December 1979 - Final Research reports written;

January 1980 - Final Report of Pastoral Zone census received from consultant;

February 1980 - Evaluations of herder community aide network, herders' associations, and communication/extension mechanisms completed;

April 1980 - Detailed plans completed for replication of herder community aide network, herders' associations, and communication/extension techniques to entire Phase II Project Pastoral Zone.

ANNEX I

Economic Analysis

Potential Economic Benefits from an Expanded Animal Health and Livestock Extension Program

As noted in Part IV of the project paper, it is neither possible nor appropriate to attempt to quantify the benefits of this Phase I project in terms of increased value of production. What can be done however is to illustrate, through the use of herd projections models, the potential benefits that could be derived from the type of large-scale program envisioned for Phase II. The attached tables show projections for herds that receive improved services and those that do not. The changes in herd parameters that are assumed to result from the improved services are shown in the following table:

	Unimproved Herds	Improved Herds
Age at first calving	4 years	3 years
Calving rate	50%	65%
Male calf mortality	25%	10%
Female calf mortality	15%	10%
Immature mortality (1 to 4 years)	5%	3%
Adult mortality	3%	3%

For the unimproved herd it is assumed that no females are called before 10 years of age and all males are sold by the age of 8. For the improved herds, all sterile cows are sold by the age of 5, except that stud bulls are kept in the ratio of 1 bull to 25 cows.

Based on the SEDES/IEMVT report cited in table 2, a typical herd in the pastoral zone in 1975 was composed of 80% females, of which 65% were adult. Beginning with this herd composition and the parameters and animal sales practices given above, a traditional herd of 100 cattle receiving no project inputs increases to a level of 120 over a period of 10 years before reaching zero growth. At that point the herd offtake is 12 animals per year, divided equally between males and females (See Table 3).

If, by introducing improved services, the parameters could change to those shown in the above table for improved herds, the effects in terms of increased livestock production are remarkable. Specifically, the herd

increases from 100 to 136 over a period of 11 years before achieving zero growth. At this time the offtake rate is 16.1% which amounts to animal sales of 22 animals per year, i.e., an increase of 61% over the unimproved herd. The economic implications of this increased productivity are analyzed in Tables 4, 6, 7. In the 11th year of project impact the unimproved comparable figures for the improved herds are $736 and $3,244 respectively. Analying these figures to the estimated herd population in the possible Phase II project area yields an annual net economic return to project inputs of almost $3 million in year 11 and every year thereafter.

Similar calculations for sheep flocks given in Tables 8-12, show increases in productivity and economic returns of similar magnitudes.

It should be noted that, although the parameters used in these tables result in increased herd size for cattle, the increased productivity makes possible an increase in offtake rate from 10% under the tradition system and 16% under the improved system. This means that keeping his herd size at 100, the herder can increase his offtake from 10 animals per year to 16 animals per year. As indicated elsewhere in this paper this increase in productivity is an essential precondition to the acceptance of limitation of numbers by traditional herders.

In the absence of specific information on the cost of project inputs it is not possible to calculate an internal rate of return implied by the benefits presented above. Furthermore, the actual impact of interventions to improve productivity may in fact turn out to be substantially different from what is assumed in this analysis. The Phase I project will provide concrete data on costs and benefits, so that it should be possible to quantify the returns to the Phase II project before implementation gets underway.

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1. Herd Population in Project Area

2. Estimated Composition of Cattle Herds in the Pastoral Zone in 1975

3. Simulation Model of Herds w/o Project Inputs

4. Economic Returns from Herds as Presented in Table 3

5. Simulation Model of Herds with Project Inputs

6. Economic Returns from Improved Herds

7. Comparison of Economic Returns to Unimproved and Improved Herds

8. Simulation Model of Sheep Flock w/o Project Inputs

9. Economic Returns from Flock Presented in Table 8

10. Simulation Model of Sheep Flock with Project Inputs

11. Economic Returns from Improved Flock

12. Comparison of Economic Returns to Unimproved and Improved Flocks.

TABLE 1 - ESTIMATED POPULATION OF ANIMALS IN THE FOUR ARRONDISSEMENTS THAT COMPRISE THE PROJECT ZONE IN 1972 AND 1975

ARRONDISSEMENT	AREA IN SQ. KILOMETERS	ANIMAL POPULATION IN THOUSANDS OF HEAD											
		CATTLE		CAMELS		SHEEP		GOATS		DONKEYS		HORSES	
		1972	1975	1972	1975	1972	1975	1972	1975	1972	1975	1972	1975
DAKORO	14,000 1/	150	130	3	18	120	160	250	250	12	15	5	5
TANOUT	33,947	159	70	19	20	97	80	242	260	10	11	5	6
AGADEZ	145,635	88	13	50	4	45	15	115	40	18	40	1	1
TCHIN-TABARADEN 2/	73,540	60	39	15	1	24	26	70	52	2	3	1	1
TOTAL ANIMALS	-	457	252	87	43	286	281	677	602	42	69	12	13
ESTIMATED CHANGE IN POPULATION BETWEEN 1972 AND 1975	-	- 45%		- 51%		- 2%		- 11%		+ 64%		+ 8%	
ESTIMATED ANIMAL UNITS (UBTs) 3/	-	366	202	87	43	29	28	68	60	21	35	12	13

ESTIMATED TOTAL ANIMAL UNITS IN THE PROJECT ZONE (IN UNIT BOVINE TROPICALE)

1972	1975	NET CHANGE
583,000 UBT	381,000 UBT	- 35%

1/ ESTIMATED AREA.

2/ ONLY EASTERNMOST 20% OF TCHIN-TABARADEN ARRONDISSEMENT IS COUNTED IN ANIMAL POPULATION ESTIMATE.

3/ ANIMAL UNIT EQUIVALENCY IN UNIT BOVINE TROPICALE IS EVALUATED AS FOLLOWS:

ONE HEAD	EQUALS	UBT
CATTLE		0.8
SHEEP AND GOATS		0.1
CAMEL AND HORSES		1.0
DONKEY		0.5

TABLE 2 - ESTIMATED COMPOSITION OF CATTLE HERDS IN THE PASTORAL ZONE IN 1975

	HERD COMPOSITION IN THE CENTRAL WEST ZONE				HERD COMPOSITION IN THE CENTRAL EAST ZONE			
	PEUL HERDS		TUAREG HERDS		PEUL HERDS		TUAREG HERDS	
AGE CLASS	% MALES	% FEMALES	% MALES	% FEMALES	% MALES	% FEMALES	% MALES	% FEMALES
0-1 YEARS	9.9	12.0	9.5	12.1	6.6	9.4	6.5	12.6
1-2 YEARS	4.3	4.9	5.6	8.5	1.3	4.3	4.4	6.2
2-3 YEARS	4.4	6.0	1.6	5.7	2.5	5.8	3.8	7.1
3-4 YEARS	3.2	6.2	0.7	4.5	1.9	7.0	1.8	4.4
4-5 YEARS	2.1	8.8	0.4	6.0	0.9	8.2	0.8	4.9
5-6 YEARS	0.6	10.3	0.4	8.2	1.9	9.0	1.0	9.3
6-7 YEARS	0.9	9.2	2.5	11.5	1.1	9.6	1.3	11.4
7-8 YEARS	0.8	9.4	2.2	6.6	0.8	9.3	0.6	10.4
8-9 YEARS	0.5	4.4	1.0	6.0	0.6	9.1	0.5	6.6
9-10 YEARS	0.3	2.5	0.7	2.7	0.4	4.2	0	3.0
10 + YEARS	0.3	3.4	0	3.6	0.3	5.8	0.2	3.4
TOTAL	22.9 1/	77.1	24.6	75.4	18.3	81.7	20.9	79.1 2/

SOURCE: FAO/IEMVT, PROJETS D'AMENAGEMENT ET D'INTERVENTION DANS QUATRE ZONES DE MODERNISATION PASTORALE DU NIGER, PARIS, UNDATED, MIMEO, PP. 72-73.

1/ THERE IS A COMPUTATION ERROR IN THIS COLUMN. THE TOTAL IS RECORDED AS 22.9 % WHEREAS THE ACTUAL TOTAL OF PERCENTAGES LISTED IS 27.3 %. SOURCE OF THIS ERROR IS UNKNOWN.

2/ THERE IS A SIMILAR COMPUTATION ERROR IN THIS COLUMN. THE TOTAL IS RECORDED AS 79.1 % WHEREAS THE ACTUAL TOTAL OF PERCENTAGES LISTED IS 79.3 %.

TABLE 3 - SIMULATION MODEL OF TRADITIONAL HERD IN PROJECT ZONE MANAGED FOR ZERO GROWTH BUT WITHOUT ANY PROJECT INPUTS

CATEGORY	PROJECT YEAR 0	1	2	3	4	5	6	7	8	9	10 - 25
HERD SIZE AT START OF THE YEAR	100	100	105	114	119	123	122	116	120	120	120
ANNUAL CALF CROP	-	26	25	24	22	22	20	20	21	21	21
MALES:											
0-1 YEAR	8	10	9	9	8	8	7	7	8	8	8
1-2 YEARS	2	6	9	9	9	8	8	7	7	8	8
2-3 YEARS	2	2	6	8	9	8	8	8	7	7	8
3-4 YEARS	2	2	2	5	7	8	7	8	6	7	7
ADULTS	6	4	5	6	9	13	12	15	16	14	13
% MALES IN HERD	20	23	27	31	34	37	36	38	37	37	37
FEMALES:											
0-1 YEAR	11	11	11	10	9	9	9	9	9	9	10
1-2 YEARS	6	9	10	10	10	9	9	9	9	9	8
2-3 YEARS	6	6	9	10	10	9	8	8	8	9	8
3-4 YEARS	5	6	6	8	8	9	8	7	8	9	7
ADULTS	52	49	47	44	44	41	40	42	42	41	43
% FEMALES IN HERD	80	77	73	69	66	63	64	62	63	63	63
HERD SIZE AT END OF THE YEAR	100	105	114	119	123	122	116	120	120	120	120
HERD GROWTH RATE (%)	0	5.0	8.5	4.4	3.4	-1.0	-5.0	1.0	0	0	0
OFFTAKE RATE (%)	-	5.7	4.4	6.7	7.3	9.0	10.3	5.8	9.2	9.2	10.0
OFFTAKE COMPOSTION (♂)	-	2	1	1	2	2	3	3	7	6	6
OFFTAKE COMPOSTION (♀)	-	4	4	7	7	9	9	4	4	5	6

2/ HERD COMPOSITION IN YEAR 0 BASED ON IEMVT COMPOSITION ESTIMATE PRESENTED IN TABLE 2.

ASSUMPTIONS USED IN TABLE 3

1. AGE AT FIRST CALVING AVERAGES FOUR YEARS.
2. SEX RATIO AT BIRTH IS 1 :: 1.
3. CALVING RATE IS 50 %.
4. CALF MORTALITY OVERALL IS 20 % BUT RATES ARE DIFFERENT BETWEEN SEXES WITH MALE MORTALITY AT 25 % AND FEMALE MORTALITY AT 15 %.
5. IMMATURE MORTALITY (1 - 4 YEARS) IS 5 % TOTAL.
6. ADULT MORTALITY IS 3 %.
7. ACTUAL COW STERILITY IS 4 %.
8. NO FEMALE CULLING TAKES PLACE ON VOLUNTARY BASIS BEFORE TEN YEARS OF AGE.
9. ALL MALE SALES ARE ADULT ANIMALS AT EIGHT YEARS OLD OR LESS.

TABLE 4 - ESTIMATED ECONOMIC RETURNS FROM UNIMPROVED TRADITIONAL HERD PRESENTED IN TABLE 3

CATEGORY	PROJECT YEAR 1	2	3	4	5	6	7	8	9	10	11-25
VALUE OF THE SALES OF SLAUGHTER CATTLE :											
A. Number of Adult Males	2	1	1	2	2	3	3	7	6	6	6
Number of Cull Females	4	4	7	7	9	9	4	4	5	6	6
C. Value per Head for Males in FCFA	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
D. Value per Head for Females in FCFA	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000
E. Total Value of Male Sales in FCFA	70,000	35,000	35,000	70,000	70,000	105,000	105,000	245,000	210,000	210,000	210,000
F. Total Value of Female Sales in FCFA	88,000	88,000	154,000	154,000	198,000	198,000	88,000	88,000	110,000	132,000	132,000
G. Total Value of All Sales of Slaughter Cattle											
1. In FCFA	158,000	123,000	189,000	224,000	268,000	303,000	193,000	333,000	320,000	342,000	342,000
2. In U.S. Dollars	632	492	756	896	1,072	1,212	772	1,332	1,280	1,368	1,368
VALUE OF DOMESTIC CONSUMPTION/SALES OF WHOLE MILK :											
A. Estimated Number of Lactating Cows in the Herd	49	47	44	44	41	40	42	42	41	43	43
B. Average Production per Lactation in Liters	400	400	400	400	400	400	400	400	400	400	400
C. Average Offtake of Milk by Herder (40% of Total)	7,840	7,520	7,040	7,040	6,560	6,400	6,720	6,720	6,560	6,880	6,880
D. Average Price/Liter of Milk	25	25	25	25	25	25	25	25	25	25	25
E. Total Value of Milk (FCFA)	196,000	188,000	176,000	176,000	164,000	160,000	168,000	168,000	164,000	172,000	172,000
(U.S. $)	784	752	704	704	656	640	672	672	656	688	688
TOTAL VALUE OF HERD PRODUCTION IN FCFA	354,000	311,000	365,000	400,000	432,000	463,000	361,000	501,000	484,000	514,000	514,000
AND U.S. DOLLARS/ANNUM	1,416	1,244	1,460	1,600	1,728	1,852	1,444	2,004	1.936	2,056	2,056

TABLE 5 - SIMULATION MODEL OF TRADITIONAL HERD IN PROJECT ZONE MANAGED FOR ZERO GROWTH WITH PROJECT INPUTS

CATEGORY	PROJECT YEAR 0 1/	1	2	3	4	5	6	7	8	9	10	11 - 25
HERD SIZE AT START OF THE YEAR	100	100	125	132	136	141	143	140	140	140	140	136
ANNUAL CALF CROP	-	37	38	27	23	25	29	29	31	27	25	25
MALES:												
0-1 YEAR	8	17	17	12	10	11	12	13	14	12	11	12
1-2 YEARS	2	8	16	17	12	10	11	12	13	13	12	11
2-3 YEARS	2	2	8	16	16	11	9	11	12	13	13	11
3-4 YEARS	2	2	2	7	16	16	11	9	11	12	12	12
4-5 YEARS	2	2	2	2	7	15	16	10	7	10	10	12
5 + YEARS	4	3	3	2	2	3	3	3	2	2	2	2
% MALES IN HERD	20	27	36	41	45	46	44	41	42	44	44	44
FEMALES:												
0-1 YEAR	11	17	17	12	10	11	13	13	14	13	12	11
1-2 YEARS	6	10	16	17	12	10	11	12	13	13	13	12
2-3 YEARS	6	6	10	16	17	12	10	11	12	13	13	13
3-4 YEARS	5	6	6	9	15	16	11	10	10	13	13	12
4-5 YEARS	12	5	5	6	8	15	14	10	9	12	12	12
5 + YEARS	40	47	30	20	16	13	19	27	23	10	11	12
% FEMALES IN HERD	80	73	64	59	55	54	56	59	58	17	15	16
HERD SIZE AT END OF THE YEAR	100	125	132	136	141	143	140	140	140	140	136	136
HERD GROWTH RATE (%)	0	25	5.6	3.0	3.6	1.4	- 2.0	0	0	0	- 3.0	0
OFFTAKE RATE (%)	-	4.8	17.4	12.5	8.5	11.9	18.6	15.7	18.6	16.4	17.6	16.1
OFFTAKE COMPOSITION (♂)	-	2	1	3	2	6	15	16	12	8	12	11
OFFTAKE COMPOSITION (♀)	-	4	22	14	10	11	11	6	14	15	12	11

1/ HERD COMPOSITION IN YEAR 0 BASED ON IEMVT COMPOSITION ESTIMATE PRESENTED IN TABLE 2.

ASSUMPTIONS USED IN TABLE 5

1. AGE AT FIRST CALVING AVERAGES THREE YEARS.

2. SEX RATIO IS 1 :: 1 AT BIRTH.

3. CALVING RATE IS 65 %.

4. CALF MORTALITY OVERALL IS DOWN TO 10 % AND RATE IS THE SAME FOR BOTH SEXES.

5. IMMATURE MORTALITY IS 3 % BETWEEN 1 - 3 YEARS.

6. ADULT MORTALITY IS 3 %.

7. ACUTAL COW STERILITY IS 4 %.

8. RIGOROUS CULLING OF UNPRODUCTIVE FEMALES TAKES PLACE WITH ALL FEMALES THAT HAVE NOT HAD A CALF BY FIVE YEARS OF AGE CULLED AND ALL REMALES CULLED FROM THE HERD BY EIGHT YEARS OF AGE.

9. ALL MALES ARE SOLD FROM THE HERD BY 5 YEARS OF AGE EXCEPT THAT STUD BULLS ARE RETAINED IN THE RATIO OF 1 BULL :: 25 COWS.

TABLE 6 - ESTIMATED ECONOMIC RETURNS FROM IMPROVED TRADITIONAL HERD PRESENTED IN TABLE 5

CATEGORY	PROJECT YEARS										
Value of the Sales of Slaughter Cattle:	1	2	3	4	5	6	7	8	9	10	11-25
A. Number of Adult Males	2	1	3	2	6	15	16	12	8	12	11
B. Number of Cull Females	4	22	14	10	11	11	6	14	15	12	11
C. Value per Head for Males in FCFA	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000	35,000
D. Value per Head for Females in FCFA	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000
E. Total Value of Males Sales in FCFA	70,000	35,000	105,000	70,000	210,000	525,000	560,000	420,000	280,000	420,000	385,000
F. Total Value of Female Sales in FCFA	88,000	484,000	308,000	220,000	242,000	242,000	132,000	308,000	330,000	264,000	242,000
G. Total Value of All Sales of Slaughter Cattle - In FCFA	185,000	519,000	412,000	290,000	452,000	777,000	682,000	728,000	610,000	684,000	627,000
Total Value of All Sales In U.S. Dollars	632	2,076	1,648	1,160	1,808	3,108	2,728	2,912	2,440	2,736	2,508
Value of Domestic Consumption/ Consumption/Sales of Whole Milk:											
A. Estimated Number of Lactating Cows in Herd	58	41	35	39	44	44	47	42	39	38	40
B. Average Production of Milk Per Lactation in Liters	460	460	460	460	460	460	460	460	450	460	460
C. Average Offtake of Milk by Herder (40% of the total)	10,672	7,544	6,440	7,176	8,096	8,096	8,648	7,728	7,176	6,992	7,360
D. Average Price per Liter of Whole Milk in FCFA	25	25	25	25	25	25	25	25	25	25	25
E. Total Value of Milk In FCFA	266,800	188,600	161,000	179,400	202,400	202,400	216,200	193,200	179,400	174,800	184,000
Total Value of Milk In U.S. Dollars	1,067	754	644	718	810	810	865	773	718	699	736
Total Value of Herd Production: In FCFA	424,800	707,600	573,000	459,400	654,400	979,400	898,200	921,200	789,400	858,800	811,000
In U.S. Dollars	1,699	2,830	2,292	1,878	2,618	3,918	3,593	3,685	3,158	3,435	3,244

TABLE 7 – COMPARISON OF ECONOMIC RENTERS ON UNIMPROVED AND IMPROVED TRADITIONAL CATTLE HERDS IN THE PROJECT ZONE

YEAR OF THE PROJECT	GROSS ECONOMIC RENTERS ON UNIMPROVED HERD	GROSS ECONOMIC RENTERS ON IMPROVED HERD	NET ECONOMIC RENTERS ON PROJECT INPUTS	GROSS ECONOMIC RENTERS ON ALL UNIMPROVED HERDS	GROSS ECONOMIC RENTERS ON ALL IMPROVED HERDS	NET ECONOMIC RENTERS ON PROJECT INPUTS
1	1,416	1,600	282	3,124,880	4,281,480	1,146,600
2	1,244	2,830	1,586	3,124,880	7,124,120	3,999,240
3	1,450	2,202	232	3,680,172	5,775,840	2,095,667
4	1,600	1,879	279	4,032,062	4,732,560	600,498
5	1,728	2,610	800	4,355,179	6,507,360	2,242,182
6	1,852	3,018	2,066	4,667,707	8,872,360	5,205,653
7	1,444	3,502	2,140	3,638,403	8,054,360	5,414,957
8	2,004	3,685	1,681	5,050,815	8,286,300	4,235,385
9	1,936	3,158	1,222	4,879,430	7,958,160	3,078,740
10	2,056	3,435	1,379	5,181,874	8,656,300	3,474,326
11	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
12	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
13	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
14	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
15	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
16	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
17	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
18	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
19	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
20	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
21	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
22	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
23	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
24	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
25	2,056	3,244	1,188	5,181,874	8,174,880	2,993,006
TOTAL UNDISCOUNTED RENTERS ON HERD	47,580	77,766	30,186	119,485,502	195,972,840	76,487,338

NET PRODUCTIVITY INCREASE PROJECTED IS APPROXIMATELY 64 %.

TABLE 8 – SIMULATION MODEL OF TRADITIONAL FLOCK IN PROJECT ZONE MANAGED FOR ZERO GROWTH BUT WITHOUT ANY PROJECT INPUTS

CATEGORY	PROJECT YEAR 0	1	2	3	4	5	6	7-25
FLOCK SIZE AT START OF THE YEAR	100	100	101	104	102	101	100	100
ANNUAL LAMB CROP	–	54	53	55	53	53	53	54
FEMALES:								
BREEDING EWES	60	59	61	59	59	60	59	59
1-2 YEAR-OLD REPLACEMENTS	20	20	19	20	20	19	19	20
NUMBER OF FEMALES IN FLOCK	80	79	80	79	79	78	79	79
% OF FEMALES IN FLOCK	80	78	77	77	78	78	79	78
MALES:								
BREEDING RAMS	2	2	2	2	2	2	2	2
2 YEAR-OLD MALES	0	0	2	0	1	0	0	0
1 YEAR-OLD MALES	18	20	20	21	19	20	19	20
NUMBER OF MALES IN FLOCK	20	22	23	23	22	22	21	22
% OF MALES IN FLOCK	20	22	23	23	22	22	21	22
FLOCK SIZE AT END OF THE YEAR	100	101	104	102	101	100	100	101
FLOCK GROWTH RATE (%)	0	1	3	– 2	– 1	– 1	0	1
OFFTAKE RATE (%)	–	18.8	15.4	22.5	19.8	20.0	20.0	18.8
OFFTAKE COMPOSITION:								
A.) MALES	–	14	14	18	16	16	18	15
B.) FEMALES	–	5	2	5	4	4	2	4

ASSUMPTIONS USED IN TABLE 8

1. Average age at first lambing is two years.
2. Sex ratio at birth is 1 :: 1.
3. Lambing rate is 90 %.
4. Mortality in lambs is 25 %.
5. Mortality in yearlings and adults is 20 %.
6. Ewes are replaced at a rate of about 25 % per year.

TABLE 9 - ESTIMATED ECONOMIC RETURNS FROM UNIMPROVED TRADITIONAL FLOCK PRESENTED IN TABLE 8

CATEGORY	PROJECT YEAR 1	2	3	4	5	6	7-25
VALUE OF THE SALES OF SLAUGHTER ANIMALS:							
A.) NUMBER OF ADULT MALES	14	14	18	16	16	18	15
B.) NUMBER OF ADULT FEMALES	5	2	5	4	4	2	4
C.) SALES VALUE PER MALE IN FCFA	6,000	6,000	6,000	6,000	6,000	6,000	6,000
D.) SALES VALUE PER FEMALE IN FCFA	4,500	4,500	4,500	4,500	4,500	4,500	4,500
E.) TOTAL VALUE OF MALE SALES IN FCFA	84,000	84,000	108,000	96,000	96,000	108,000	90,000
F.) TOTAL VALUE OF FEMALE SALES IN FCFA	22,500	9,000	22,500	18,000	18,000	9,000	18,000
G.) TOTAL VALUE OF ALL SALES IN:							
1. FCFA	106,500	93,000	130,500	114,000	114,000	117,000	108,000
2. U.S. DOLLARS	426	372	522	456	456	468	432
VALUE OF DOMESTIC CONSUMPTION OF MILK:							
A.) ESTIMATED NUMBER OF EWES MILKED	25	25	25	25	25	25	25
B.) AVERAGE AMOUNT OF MILK TAKEN PER EWE IN LITERS	10	10	10	10	10	10	10
C.) AVERAGE PRICE PER LITER OF MILK IN FCFA	20	20	20	20	20	20	20
D.) TOTAL VALUE OF MILK TAKEN IN:							
1. FCFA	5,000	5,000	5,000	5,000	5,000	5,000	5,000
2. U.S. DOLLARS	20	20	20	20	20	20	20
TOTAL VALUE OF FLOCK PRODUCTION IN:							
1.) FCFA	111,500	98,000	135,500	119,000	119,000	122,000	113,000
2.) U.S. DOLLARS	446	392	542	476	476	488	452

TABLE 10 – SIMULATION MODEL OF TRADITIONAL FLOCK IN THE PROJECT ZONE MANAGED FOR ZERO GROWTH WITH PROJECT INPUTS

CATEGORY	PROJECT YEAR 0	1	2	3	4	5	6	7	8–25
FLOCK SIZES AT START OF THE YEAR	100	100	101	101	102	101	100	101	100
ANNUAL LAMB CROP	–	57	56	56	56	57	56	57	56
FEMALES :									
BREEDING EWES	60	59	59	59	60	59	60	59	60
1-2 YEAR-OLD REPLACEMENTS	20	20	19	20	20	20	20	21	20
NUMBER OF FEMALES IN FLOCK	80	79	78	79	80	79	80	80	80
% FEMALES IN FLOCK	80	78	77	77	79	79	79	79	80
MALES :									
BREEDING RAMS	2	2	2	2	2	2	2	2	2
2 YEAR-OLD MALES	0	0	2	2	1	0	0	0	0
1 YEAR-OLD MALES	18	20	19	19	18	19	19	19	18
NUMBER OF MALES IN FLOCK	20	22	23	23	21	21	21	21	20
% OF MALES IN FLOCK	20	22	23	23	21	21	21	21	20
FLOCK SIZE AT END OF THE YEAR	100	101	101	102	101	100	101	100	100
FLOCK GROWTH RATE (%)	0	1	0	1	– 1	– 1	1	– 1	0
OFFTAKE RATE (%)	–	35.6	37.6	38.0	36.6	38.0	36.6	37.6	37.0
OFFTAKE COMPOSITION :									
A.) MALES	–	21	21	22	22	23	22	23	22
B.) FEMALES	–	15	17	16	15	15	15	15	15

ASSUMPTIONS USED IN TABLE 10

1. Average age at first lambing is two years.
2. Sex ratio at birth is 1 :: 1.
3. Lambing rate is 95 %.
4. Mortality in lambs in flock is 15 %.
5. Mortality in yearlings and adults in flock is 10 %.
6. Ewes are replaced at the rate of about 25 % per year.

TABLE 11 - ESTIMATED ECONOMIC BENEFITS FROM EMPLOYED TRADITIONAL FLOCK PRESENTED IN TABLE 10

CATEGORY	PROJECT YEAR 1	2	3	4	5	6	7	8-25
VALUE OF THE SALES OF SLAUGHTER ANIMALS:								
A.) NUMBER OF ADULT MALES	21	21	22	22	23	22	23	22
B.) NUMBER OF ADULT FEMALES	15	15	15	15	15	15	15	15
C.) AVERAGE SALE VALUE OF MALE IN FCFA	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
D.) AVERAGE SALE VALUE OF FEMALE IN FCFA	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500
E.) TOTAL VALUE OF MALE SALES IN FCFA	126,000	126,000	132,000	132,000	138,000	132,000	138,000	132,000
F.) TOTAL VALUE OF FEMALE SALES IN FCFA	67,000	76,500	72,000	67,500	67,500	67,500	67,500	67,500
G.) TOTAL VALUE OF ALL SALES IN:								
1.) FCFA	193,500	202,500	204,500	199,500	205,500	199,500	205,500	199,500
2.) US DOLLARS	774	810	816	798	822	798	822	798
VALUE OF DOMESTIC CONSUMPTION OF MILK:								
A.) ESTIMATED NUMBER OF EWES MILKED	30	30	30	30	30	30	30	30
B.) AVERAGE AMOUNT OF MILK TAKEN PER EWE IN LITERS	10	10	10	10	10	10	10	10
C.) AVERAGE PRICE PER LITER OF MILK IN FCFA	20	20	20	20	20	20	20	20
D.) TOTAL VALUE OF MILK TAKEN:								
1.) IN FCFA	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
2.) IN US DOLLARS	24	24	24	24	24	24	24	24
TOTAL VALUE OF FLOCK PRODUCTION IN:								
1.) FCFA	199,500	208,500	210,000	205,500	211,500	205,500	211,500	205,500
2.) US DOLLARS	798	834	890	822	845	822	846	822

TABLE 12 - COMPARISON OF ECONOMIC RETURNS TO UNIMPROVED AND IMPROVED TRADITIONAL SHEEP FLOCKS IN THE PROJECT ZONE

YEAR OF THE PROJECT	GROSS ECONOMIC RETURNS TO UNIMPROVED FLOCK	GROSS ECONOMIC RETURNS TO IMPROVED FLOCK	NET ECONOMIC RETURNS TO PROJECT INPUTS	GROSS ECONOMIC RETURNS TO ALL UNIMPROVED FLOCKS	GROSS ECONOMIC RETURNS TO ALL IMPROVED FLOCKS	NET ECONOMIC RETURNS TO PROJECT
	(ALL RETURNS TO FLOCK IN US DOLLARS)					
1	446	798	352	1,253,260	2,242,380	989,120
2	393	834	441	1,104,330	3,343,540	1,239,210
3	542	890	348	1,523,020	2,500,900	977,880
4	476	822	346	1,337,560	2,309,820	972,260
5	476	846	370	1,337,560	2,377,260	1,039,700
6	488	822	334	1,371,280	2,309,820	938,540
7	452	846	394	1,270,120	2,377,260	1,107,140
8	452	822	370	1,270,120	2,309,820	1,039,700
9	452	822	370	1,270,120	2,309,820	1,039,700
10	452	822	370	1,270,120	2,309,820	1,039,700
11	452	822	370	1,270,120	2,309,820	1,039,700
12	452	822	370	1,270,120	2,309,820	1,039,700
13	452	822	370	1,270,120	2,309,820	1,039,700
14	452	822	370	1,270,120	2,309,820	1,039,700
15	452	822	370	1,270,120	2,309,820	1,039,700
16	452	822	370	1,270,120	2,309,820	1,039,700
17	452	822	370	1,270,120	2,309,820	1,039,700
18	452	822	370	1,270,120	2,309,820	1,039,700
19	452	822	370	1,270,120	2,309,820	1,039,700
20	452	822	370	1,270,120	2,309,820	1,039,700
21	452	822	370	1,270,120	2,309,820	1,039,700
22	452	822	370	1,270,120	2,309,820	1,039,700
23	452	822	370	1,270,120	2,309,820	1,039,700
24	452	822	370	1,270,120	2,309,820	1,039,700
25	452	822	370	1,270,120	2,309,820	1,039,700
TOTAL UNDISCOUNTED RETURNS TO FLOCK	11,409	20,654	9,245	32,059,290	58,037,740	25,978,450

NET PRODUCTIVITY INCREASE PROJECTED IS APPROXIMATELY 81%

ANNEX J

Financial Analysis

I. Note to the Project Obligations Table 1

In all cases, obligation dates were chosen to provide enough lead time to meet the critical points on the PPT network. Cost estimates are based on present mission accounting records, project experience and REDSO engineering analysis. Unless specified, all figures shown are expressed in thousands of dollars of FY 77 costs.

A. Project Input - Personnel, Long-Term

Standard estimates of $100,000/man-year for long-term professional contractors were used. These costs are inclusive of housing and other logistic support. The long-term professional contractors are the range management advisor, animal husbandry advisor, social anthropoligist and a marketing economist. Costs for the research assistants are estimated to be $25,000 per man-year. Personal service contracts for the services of (primarily) ex-PCVs with area and language ability and expected to cost $25,000 per man-year. The effective dates of all contracts, except two personal service contracts, are expected to be January 1978. Contract extensions of 6 months have been programmed into the financial plan in FY 80. The original contracts are to be signed for two years of service.

B. Project Input - Personnel, Short-Term

Senior Researcher - will be contracted for 6 man-months at $10,000 per man-month. Four man-months will be obligated in FY 78 and 2 man-months in FY 79.

Economist - will be contracted for 4 man-months for recurrent cost study at $10,000 per man-month. Obligation will be made in FY 79.

Land Tenure Expert - will be contracted for 2 man-months at $10,000 per man-month. Obligation will be made in FY 79.

Range Management Advisor - will be contracted for 4 man-months at $10,000 per man-month. Obligation will be made in last quarter of FY 78.

Demographer - will be contracted for 3 man-months at $10,000 per man-month in FY 79 plus $10,000 for data processing.

Agricultural Education Advisor - will be contracted for 6 man-months at $10,000 per man-month. Obligation will be made for 4 months in FY 78 and 2 months in FY 79.

Antropoligist - will be contracted to produce a social analysis of the southeast sector of the project zone for $5,000.

One personal service contract will review and collect all relevant data available in the U.S., Paris and in Sahelian countries on the pastoral zone. Cost $15,000.

C. Project Input - Local Staff

No. & Description	Cost each/qtr. ($ thous.)	Total cost/qtr. ($ thous.)
10 chauffeurs	.544 (includes travel)	5.4
2 mechanics	.470	.9
2 mechanics assistants	.403	.8
2 secretaries	.762	1.5
2 clerk typists	.762	1.5
2 translators	1.478	3.0
21 research assistants	.381	8.0
3 janitors	.200	.6
TOTAL Office and Support - Local		21.7

Because of the distance involved from the capital to the project area and housing sites, and due to the extensive travel required to lay the foundations of the project, a minimum of four drivers will be hired and obligated in FY 77. The project will also hire one each secretary, translator and typist in FY 77. The project plans to hire the full complement of the balance of the office staff in FY 78 in order to provide training and to cope with the expected large volume of documents, both in French and English, expected at the start of the implementation phase of the project.

Laborers will be contracted and obligated during the first quarter 1978. The cost for 10 for construction of exclosures for 6 months is $4.8 and the cost of 5 laborers to mix and haul feed is $1.2 per quarter.

Census takers will be hired in 1979 to complement the local research assistants in the Sociology unit. Cost for 15 for 8 months is $15.3.

D. Project Input - Training

Training cost are based on AID and USDA standard cost for training in FY 77. The detail is as follows:

10	degree training $13,000 each the first year and $11,000 each the second and third year or	$350,000
36	man-months of US or third country practical training at $1,666 per month or	$ 60,000
6	observational tours in US at $5,000 each or	$ 30,000
Local training of GON personnel and Volunteer herder aids		$ 26,000

E. Other Operating Cost

Animal health supplies will be provided in the livestock service to maintain their disease control program in the project area and provide all vaccinations and parasite control required by the 60 study herds. Vaccines and chemicals to include magnesium sulfate, Exhelm II, Rinderpest Vaccine, Pluropneumonia Vaccine, Malathion, BHC, and Rotenone will cost $150,000.

Supplementary feed and minerals for the project will cost $41,000; one half to be obligated in 1978 and 1/2 to be obligated in 1979.

180 Mt. of feed concentrate	$38,000
13,750 Mineral blocks	$65,000

Seed for the reseeding plots are estimated to cost $5,000.

Chemical analysis of forage plants to be contracted with US Laboratory will cost $5,000 to be obligated in FY 79.

Tools to be used in construction of exclosures and reseeding plots (shovels, picks, wheelbarrows, etc.) will cost $2,600 to be obligated first quarter FY 78.

Livestock handling equipment for production study (weighing tapes, sheep crooks, sheep markes, ear notchers, salt block holders, halters, etc.) will cost $1,000 to be obligated first quarter FY 78.

One personal service contractor above will review and literature available in Paris, US, Niger and other Sahelian countries on the social structure and livestock production of Sahelian Nomade and agrostological data on the Sahel, and collect copies of pertinent information for use by the PZM office and project staff. Cost will be $15 to be obligated in FY 78.

Rent for an office in Maradi will cost $8,000 per year with a two years lease to be signed in FY 78 and renewed for 9 month in FY 79. Utilities are estimated to cost $15,000 per year.

Office supplies will cost $6,000 per year or $18,000 total.

POL costs for vehicles to be used in the project are as follows:

Pick-up and passenger - type vehicles 24 x 20,000 km x $.20/km	$ 96,000/year
3 small station wagons 3 x 20,000 km x $.15/km	$ 9,000/year
2 5-ton trucks 2 x 20,000 km x $.40	$16,000/year
TOTAL	$121,000/year

For FY 77 $1,900 will be obligated with all other obligation yearly as per estimates above.

F. Project Specific Input #7 - Construction

Funds will be obligated in FY 78 for a livestock station at Aderbissinat. It is the first station scheduled for completion. Costs are estimated as follows:

Livestock Stations

1. Aderbissinat

House - 110 M^2 @ $348/$M^2$	$ 38,200
Fence - 40 M x 40 M @ $12.12/M	1,940
Well - 45 M depth @ $230/M	10,350
Abattoir/hide drying facility	5,000
TOTAL	$ 55,490

Abalak, Ingall and Gadabeji are scheduled for obligation in FY 79. Their costs are as follows:

2. Abalak

House - 110 M^2 @ $286/$M^2$	$ 31,500
Fence - 40 M x 40 M @ $10.60/M	1,700
Well - 45 M depth @ $230/M	10,350
Abattoir/hide drying facility	4,100
TOTAL	$ 47,650

3. InGall

House - 110 M^2 @ \$307/M^2	\$ 33,800
Fence - 40 M x 40 M @ \$11.40/M	1,800
Well - 45 M depth @ \$230/M	10,350
Abattoir/hide drying facility	4,400
TOTAL	\$ 50,350

4. Gadabeji

House - 110 M^2 @ \$297/M^2	\$ 32,700
Fence - 40 M x 40 M @ \$11.40/M	1,800
Well - 70 M depth @ \$230/M	16,100
Abattoir/hide drying facility	4,600
TOTAL	\$ 55,200

Livestock handling facilities. The first five facilities are scheduled for obligation in FY 78; the balance, in FY 79. The costs are:

1. Five stock handling facilities in vicinity of Aderbissinat
   Holding Pen - 12 M x 12 M and

   Working chute - 14 M long x 0.6 M wide

   Total length of fencing - 380 M @ \$10.60/M \$ 4,100

2. Five stock handling facilities in vicinity of Gadabeji
   Holding Pen - 12 M x 12 M and

   Working chute - 14 M long x 0.6 M wide

   Total length of fencing - 380 M @ \$9.20/M \$ 3,500

The construction of range indicator plots will be obligated during FY 77:

The cost for 20 fenced range indicator and reseeding plots in various locations are each 100 M x 100 M, or 8000 M of fencing @ \$7.55/M \$ 60,400

Surface water catchment areas. One areas is scheduled for obligation in the second quarter of FY 78. The other two areas will be obligated in FY 79. Cost estimated for three are \$ 20,000

Well improvements. The improvements are scheduled for obligation in early FY 78. Estimated costs are as follows:

Local cost - 15 wells	
Cement per well - 4 tons @ $140/ton	$ 8,400
Rebar per well - 500 kgs at $0.56/kg	4,200
Labor per well - $400	6,000
Well improvement equipment costs	
Tripod for hoist (local manufacture)	600
Block and tackle (2 ton capacity)	500
Well ring forms (local manufacture)	1,200
	$ 22,400

G. Project Input - Other Capital Items, all scheduled for obligation in FY 77 or FY 78.

Communication equipment	
Portable tape recorder and tape copying equipment	$ 18,000
Cassettes and bateries	6,000
	$ 24,000

Camping equipment. For project technicians, field workers and local hire interviewers, these items have been estimated at $20,000.

Vehicles of the following type, number and cost, to be obligated in FY 77:

1.	Pickup, 4-wheel drive, long wheel base, 3/4 tons, front-mounted winch 5 @ $8,000 each	$ 40,000
2.	Small pick-up w/crew cab, long wheel base w/trailer hitch and front-mounted winch 2 @ $8,500	$ 17,000
3.	4-wheel drive utility vehicle and (if available) front-mounted 17 @ $8,000 each	$136,000
4.	5-ton truck, 4-wheel drive, w/front-mounted winch and flat bed 2 @ $16,000 each	$ 32,000
5.	Small station wagon 3 @ $5,000	$ 15,000
	TOTAL, vehicles	$240,000

Vehicle equipment for first and second echelon garages is estimated to cost $8,000.

Camels. Thirty camels are planned for transportation in the project zone. Cost of each, including saddles, halters, and feed is estimated at $400 per camel, for a total of $12,000.

Office equipment and hardware is as follows:

10 desks @ $210 each	$ 2,100
15 chairs @ $100 each	1,500
3 typing tables @ $50 each	250
1 dry copy machine (plain paper)	2,200
2 calculators @ $200 each	400
5 IBM electric typewriter @ $600 each	3,000
TOTAL, equipment	$ 8,450

This office equipment must be obligated in FY 77 in order to assure timely delivery by January of 1978, the date the staff is to be in place in Maradi..

An aerial photography contract for mapping of the entire project zone will be obligated in FY 77 with actual photography being done in early FY 78.

Fly, expose, develop, and print one set of natural color photographs at 1:24.000 scale over an area of 15,000 sq. miles to cost $140,000.

Integration of photographs and compilation of photo derived maps including 30 days ground truth mission	$ 60,000
TOTAL	$200,000

Purchase of landsat imagery of project zone in FY 78 will cost $1,500 and imagery of other parts of pastoral zone for comparison and planning purposes in FY 79 will cost $7,500.

Books and other printed material to establish reference library on Range Management in PZM office will cost $3,000.

Equipment for the livestock post to include kerosene refrigerators, microscopes, balling guns scissor, scalpels syringes, etc. to cost $2,100 per post or $8,400 for the 4 post.

Range monitoring equipment for range resource studies to include; rainguages, soil test equipment, scales, tapes, calculators, maps, microscopes, soil augers, thermometers, wind guages, etc. will cost $6,000 and will be obligated in FY 77 to insure delivery as soon as possible.

II. Notes to Table 2, Cost of Inputs Including Inflation and Contingency

Inflation factors are taken into account by the following rationale:

The CFA in Francophone West Africa has been experiencing inflation at the rate of approximately 15% p.a. The CFA is tied to the French franc, also recently experiencing a similar rate of inflation. Most of the imports, commodities bought locally off the shelf are French.

The U.S. inflation rate has been leveling at 9-10% per annum.

The uninflated costs of the project under local currency are:

Local Staff - 399 x .33*		133.3
Other operational - 90%	or	471.2
Construction - 100%	or	329.4
Vehicles - 100%	or	227.1
Health supplies - 50%	or	30.0
TOTAL		CFA 1191.0
		US$ 2716.0

Weighted average inflation:

CFA - 1191.0 @ 15%	178.7
US$ - 2716 @ 10%	271.6
Weighted average	11.5%/year

For FY 78, the inflation rate is 11.5% base cost; for FY 79, the rate is 23.0% of base cost; for FY 80, the rate is 34.5% of base cost.

Due to the inherent uncertainty of all inputs working according to plan, the following rationale is given for the contingency factor:

*Local wages have experienced an annual rise of 5%, or 1/3 of the average of all prices, and are further weighted by .33 here.

Operational costs are the more certain of the two major cost components of this project. A 10% contingency factor covering items such as emergency field medical evacuations (cost, dols. 50.0) is justifiable.

For the other capital items, a 20% contingency has been recommended by the REDSO engineer. This factor covers the uncertainty of the price rises due to scarcity of materials, the cost differences due to location and access to sites and the relatively short lifetime of automotive and electrical equipment utilized in Niger.

The weighted average contingency factor is computed as follows:

Operations:	3125.3 x .10 -	312.5
Capital:	782.5 x .20 -	156.5
Weighten average	-	12.0%

TABLE 1 PROJECTED OBLIGATIONS BY QUARTER, YEAR

($000)

Personnel	77	1st Q	2nd Q	3rd Q	4th Q	FY 78	FY 79	FY 80	LOP
Long-term									
Range Management Adv.		200.0				200.0		50	250.0
Animal Husbandry Adv.		200.0				200.0		50	250.0
Soc. Anthropologist		200.0				200.0		50	250.0
Marketing Economist		150.0				150.0			150.0
Research Assistant		100.0				100.0		25	125.0
Personal Service Contract	50.0	300.0			50.0	350.0	50.0	75	525.0
Short-Term									
Senior Researcher		40.0				40.0	20.0		60.0
Economist							40.0		40.0
Land Tenure Expert							20.0		20.0
Range Management Con.		40.0				40.0			40.0
Demographer							40.0		40.0
Ag. Education Advisor			40.0			40.0	20.0		66.0
Anthropologist		5.0				5.0			5.0
Local									
Office and Support	5.1	21.7	21.7	21.7	21.7	86.8	86.8	65.1	243.8
Laborers		3.6	3.6	1.2	1.2	9.6	4.8	3.6	18.0
Census Takers							15.3		15.3
Training									
Degree (Long-term)		130.0				130.0	110.0	110.0	350.0
Tractical (Short-term)			40.0			40.0	20.0		60.0
Observation				15.0		15.0	15.0		30.0
Local				8.0		8.0	18.0		26.0
Other Operating Cost									
Animal Health Sup.		150.0				150.0			150.0
Mineral and Feed Mix		51.5				51.5	51.5		103.0
Seed		5.0				5.0			5.0
Chemical Analysis							5.0		5.0
Tools (shovel, pick, etc)		2.6				2.6			2.6
Livestock Hand Equips		1.0				1.0			1.0
Review of literature		15.0				15.0			15.0
Rent and Utilities Office		16.0			15.0	31.0	15.0	18.0	64.0
Office supplies		6.0				6.0	6.0	6.0	18.0
POL	1.9	31.0	30.0	30.0	30.0	121.0	121.0	90.7	334.6
Subtotal Operational Cost	57.0	1668.4	135.3	75.9	117.9	1997.5	658.4	543.4	3256.3

	77	1st Q	2nd Q	3rd Q	4th Q	FY 78	FY 79	FY 80	LOP
Capital Cost (Construction)									
Livestock Stations		55.5				55.5	153.2		208.7
Livestock Handling Fac.		4.1				4.1	3.5		7.6
Exclosures	60.4								60.4
Wells & Catchments		22.4	7.0			29.4	13.0		42.4
Other Capital Cost									
Communications Equip.			24.0			24.0			24.0
Camping Equip.		20.0				20.0			20.0
Vehicles	123.0	117.0				117.0			240.0
Vehicle Equip.		8.0				8.0			8.0
Camels		9.0				9.0	3.0		12.0
Office Equipment		8.5				8.5			8.5
Aerial Photo	200.0								200.0
Landsat Images		1.5				1.5	7.5		9.0
Technical Library		3.0				3.0			3.0
Equipment for Post		2.1				2.1	6.3		8.4
Range Monitor Equip	6.0								6.0
Subtotal Capital Cost	389.4	251.1	31.0			282.1	186.5		858.0
Subtotal Project Cost	446.4	1919.5	166.3	75.9	117.9	2279.6	844.9	543.4	4114.3
Inflation		220.7	19.1	8.7	13.6	262.1	194.3	187.5	643.9
Subtotal	446.4	2140.2	185.4	84.6	131.5	2541.7	1039.2	730.9	4758.2
Contingency	53.6	256.8	22.3	10.2	15.8	305.1	124.7	87.7	571.1
GRAND TOTAL	500.0	2397.0	207.7	94.8	147.3	2846.8	1163.9	818.6	5329.3

TABLE 2 - DISTRIBUTION OF PROJECT COST OVER OUTPUTS AND FX BREAK OUT

	Range Mgmt. Experiments	Lvstk Pro. Study & Interventions	Socio-Logical Studies	Human Resource Devel.	General Overhead	Total	Local Cost	U.S. Purchase
Personnel								
Long-Term								FX
Range Management Adv	250.0					250.0	-	250.0
An. Husbandry Adv		250.0				250.0	-	250.0
Soc. Anthropologist			250.0			250.0	-	250.0
Mktg. Economist		150.0				150.0	-	150.0
Research Assistant		125.0				125.0	-	125.0
Personal Serv Cont	17.5	12.5	75.0		150.0	525.0	-	525.0
Short-Term								
Senior Researcher		60.0				60.0	-	60.0
Economist		40.0				40.0	-	40.0
Land Tenure Expert			20.0			20.0	-	20.0
Range Mgt. Con.	40.0					40.0	-	40.0
Demographer			40.0			40.0	-	40.0
Ag. Education Adv				60.0		60.0	-	60.0
Anthropologist			5.0			5.0	-	5.0
Local								
Office and Support		25.1	62.9		155.8	268.0	243.8	-
Laborers	4.8	13.2				18.0	18.0	-
Census Takers			15.3			15.3	15.3	-
Training								
Degree (LT)				350.0		350.0	-	350.0
Practical (ST)				60.0		60.0	-	60.0
Observation				30.0		30.0	-	30.0
Local				26.0		26.0	26.0	-
Operational Cost								
Animal Health Sup		150.0				150.0	-	150.0
Min. & Feed Mix		103.0				103.0	103.0	-
Seed	5.0					5.0	-	5.0
Chemical Analysis	5.0					5.0	-	5.0
Tools (shovel, pick, etc)	2.6					2.6	2.6	-
Livestock Hand Equip		1.0				1.0	-	1.0
Review of Lit.	5.0	5.0	5.0			15.0	-	15.0
Rent & Utilities Off					64.0	64.0	64.0	-
Office Supplies					18.0	18.0	18.0	-
POL	110.0	121.0	33.0		70.6	334.6	334.6	-

	Range Mgmt. Experiments	Lvstk* Pro. Study & Interventions	Socio-Logical Studies	Human Resource Devel.	General Overhead	Total	Local Cost	U.S. Purchase
Capital Cost								
Livestock Stations		208.7				208.7	208.7	-
Livest.Handling Fac		7.6				7.6	7.6	-
Exclosures	60.4					60.4	40.4	20.0
Wells & Catchments	42.4					42.4	42.4	-
Other Capital Cost								
Communication Equip			24.0			24.0	24.0	-
Camping Equip	5.0	5.0	10.0			20.0	-	20.0
Vehicles	81.0	88.0	24.0		47.0	240.0	-	240.0
Vehicle Equip					8.0	8.0	8.0	-
Camels	2.0	2.8	7.2			12.0	12.0	-
Office Equip					8.5	8.5	8.5	-
Aerial Photo	200.0					200.0	-	200.0
Landsat Images	9.0					9.0	-	9.0
Technical Library	3.0					3.0	-	3.0
Equip, for Post		8.4				8.4	-	8.4
Range Monitor Equip	6.0					6.0	-	6.0
Subtotal	1006.2	1488.8	571.4	526.0	521.9	4114.3	1176.9	2937.4
Inflation & Contingency	297.7	439.8	168.9	155.5	153.1	1215.0	347.9	867.1
Grand Total	1303.9	1928.6	740.3	681.5	675.0	5329.3	1524.8	3804.5
Percent of Total	24.5	36.2	13.9	12.8	12.6			

* Animal production outputs could be divided $1,052,100 for Studies and $374,700 for construction and other support to Livestock Service

TABLE 3 - PROJECT INPUTS INFLATED BY INPUT/QUARTER

	77	1st Q	2nd Q	3rd Q	4th Q	FY 78	FY 79	FY 80	LOP
Personnel									
Long-Term									
Range Management Adv		249.8				249.8		75.3	325.1
Animal Husbandry Adv		249.8				249.8		75.3	325.1
Soc. Anthropologist		249.8				249.8		75.3	325.1
Marketing Economist		187.3				187.3			187.3
Research Assistant		124.8				124.8		37.7	162.5
Personal Service Cont	56.0	374.6			62.4	437.0	68.9	113.0	674.9
Short-Term									
Senior Researcher		50.0				50.0	27.6		77.6
Economist							55.1		55.1
Land Tenure Expert							27.6		27.6
Range Management Con		50.0				50.0			50.0
Demographer							55.1		55.1
Ag Education Adv			50.0			50.0	27.6		77.6
Anthropologist		6.2				6.2			6.2
Local									
Office and Support	5.7	27.1	27.1	27.1	27.1	108.4	119.6	98.1	331.8
Laborers		4.5	4.5	1.5	1.5	12.0	6.6	5.4	24.0
Census Takers							21.1		21.1
Training									
Degree (long-term)		162.3				162.3	151.5	165.7	479.5
Practical (short-term)			50.0			50.0	27.5		77.5
Observation				18.7		18.7	20.7		39.4
Local				10.0		10.0	24.8		34.8
Other Operating Cost									
Animal Health Sup.		187.3				187.3			187.3
Mineral & Feed Mix		64.3				64.3	71.0		135.3
Seed		6.2				6.2			6.2
Chemical Analysis							6.9		6.9
Tools (shovel, Pick etc)		3.2				3.2			3.2
Livestock Hand Equip		1.2				1.2			1.2
Review of Literature		18.7				18.7			18.7
Rent & Utilities Office		20.0			18.7	38.7	20.7	27.1	86.5
Office Supplies		7.5				7.5	8.7	9.0	25.2
POL	2.1	38.8	37.5	37.5	37.6	151.4	166.7	136.7	456.9
Subtotal Operational Cost	63.8	2083.4	169.0	94.8	147.3	2494.5	907.7	818.6	4284.6

	77	1st Q	2nd Q	3rd Q	4th Q	FY 78	FY 79	FY 80	LOP
Capital Cost (Construction)									
Livestock Stations		69.3				69.3	211.0		280.3
Livestock Handling Fac.		5.1				5.1	4.8		9.9
Exclosures	67.6								67.6
Wells & Catchments		28.0	8.7			36.7	17.9		54.6
Other Capital Cost									
Communications Equip			30.0			30.0			30.0
Camping Equip.		25.0				25.0			25.0
Vehicles	137.9	146.1				146.1			284.0
Vehicle Equip		10.0				10.0			10.0
Camels		11.2				11.2	41.1		15.3
Office Equip		10.6				10.6			10.6
Aerial Photo	224.0								224.0
Landsat Images		1.9				1.9	10.3		12.2
Technical Library		3.7				3.7			3.7
Equipment for Post		2.6				2.6	8.7		11.3
Range Monitor Equip	6.7								6.7
Subtotal Capitol Cost	435.7	313.6	38.7	-	-	352.3	256.8		1044.7
Grand Total	500.0	2397.0	207.7	94.8	147.3	2846.8	1163.9	818.6	5329.3

TABLE 4 - PROJECTED EXPENDITURES BY YEAR, QUARTER, DATES OF COMPONENT DETERMINED FROM PPT

	77	1st Q	2nd Q	3rd Q	4th Q	FY 78	FY 79	FY 80	LOP
Personnel									
Long-Term									
Range Management Adv			31.2	31.2	31.2	93.7	124.9	106.6	325.1
Animal Husbandry Adv			31.2	31.2	31.2	93.7	124.9	106.6	325.1
Soc. Anthropologist			31.2	31.2	31.2	93.7	124.9	106.6	325.1
Marketing Economist			31.2	31.2	31.2	93.7	93.7		187.3
Research Assistant			15.6	15.6	15.6	46.8	62.4	53.3	162.5
Personal Service Cont	14.0	14.0	60.8	60.8	62.4	198.0	234.1	228.8	674.9
Short-Term									
Senior Researcher			50.0			50.0	27.6		77.6
Economist							55.1		55.1
Land Tenure Expert							27.6		27.6
Range Management Cons.				50.0		50.0			50.0
Demographer							55.1		55.1
Ag. Education Adv				50.0		50.0	27.6		77.6
Anthropologist			6.2			6.2			6.2
Local									
Office and Support	5.7	27.1	27.1	27.1	27.1	108.4	119.6	98.1	331.8
Laborers		1.5	4.5	4.5	1.5	12.0	6.6	5.4	24.0
Census Takers							21.1		21.1
Training									
Degree (long-term)				55.6	35.6	91.2	146.9	158.6	479.5
Tractical (short-term)				20.0	30.0	50.0	27.5		77.5
Observation				18.7		18.7	20.7		39.4
Local					10.0	10.0	24.8		34.8
Other Operating Cost									
Animal Health Sup.				187.3		187.3			187.3
Mineral & Feed Supplements			41.1	5.8	5.8	52.7	76.2	6.8	135.3
Seed			6.2			6.2			
Chemical Analysis							6.9		
Tools (shovel, pick etc)		3.2				3.2			3.2
Livestock Hand Equips			1.2			1.2			1.2
Review of Literature			6.0	12.7					18.7
Office Rent & Utilities		2.5	2.5	2.5	21.2	28.7	30.7	27.1	86.5
Office Supplies			7.5			7.5	8.7	9.0	25.2
POL	2.1	38.7	37.5	37.5	37.5	151.2	166.7	136.9	456.9

	77	1st Q	2nd Q	3rd Q	4th Q	FY 78	FY 79	FY 80	LOP
Capital Cost (Construction)									
Livestock Post				69.3		69.3	100.0	111.0	280.3
Livestock Handling Fac.				5.1		5.1	4.8		9.9
Exclosures		37.6	30.0			67.6			67.6
Wells & Catchments			9.3	18.0	9.4	36.7	17.9		54.6
Other Capital Cost									
Communication Equip.					30.0	30.0			30.0
Camping Equip.			25.0			25.0			25.0
Vehicles	137.9	146.1				146.1			284.0
Vehicle Equip.		10.0				10.0			10.0
Camels			11.2			11.2	4.1		15.3
Office Equip.			10.6			10.6			10.6
Aerial Photo.		224.0				224.0			224.0
Landsat Images			1.9			1.9	10.3		12.2
Technical Library			1.7	2.0		3.7			3.7
Equipment for Post				2.6		2.6	8.7		11.3
Range Monitor Equip		6.7				6.7			6.7
TOTAL	159.7	511.3	480.7	769.9	410.9	2172.5	1760.1	1153.8	5329.3

TABLE 5

GON INPUTS
($ Thousand)

	Life of Project
Personnel	
Project Coordinator and Assistant	26.4
4 Counterparts	38.4
Animal Health Pers	54.0
Participants	63.4
Radio Club Services	9.6
Operating Cost	
Radio Broadcast Time	
Vaccines	20.0
Training Facilities	30.0
POL	4.2
	12.0
Capital Cost	
Land for Post and Enclosures	
Vehicles	14.0
	48.0
Subtotal	320.0
Inflation	73.6
Subtotal	393.6
Contingency	47.2
GRAND TOTAL	440.8

ANNEX K

PPT NETWORK

Narrative Statement

Actions Required Prior to Project Agreement	Action Agent
1. The ADO will prepare an Action Memorandum to the Assistant Administrator requesting funds for preparatory activities	ADO
2. AID/W will grant a waiver for the local purchase of vehicles and certain commodities. This will be done at the time of PP approval	AID/W
3. GON/request ADO to act as its procurement agent. ADO to prepare procurement documents	GON/ADO
4. On the basis of position descriptions contained in the PP, AID/W will begin identifying potential project team members and prepare draft contracts	ADO/AID/W
5. GON to assign project coordinator as counterpart to the AID project manager	GON
6. GON will submit construction plans for livestock stations for 611(a) certification	GON
7. Sign project grant agreement	GON/ADO

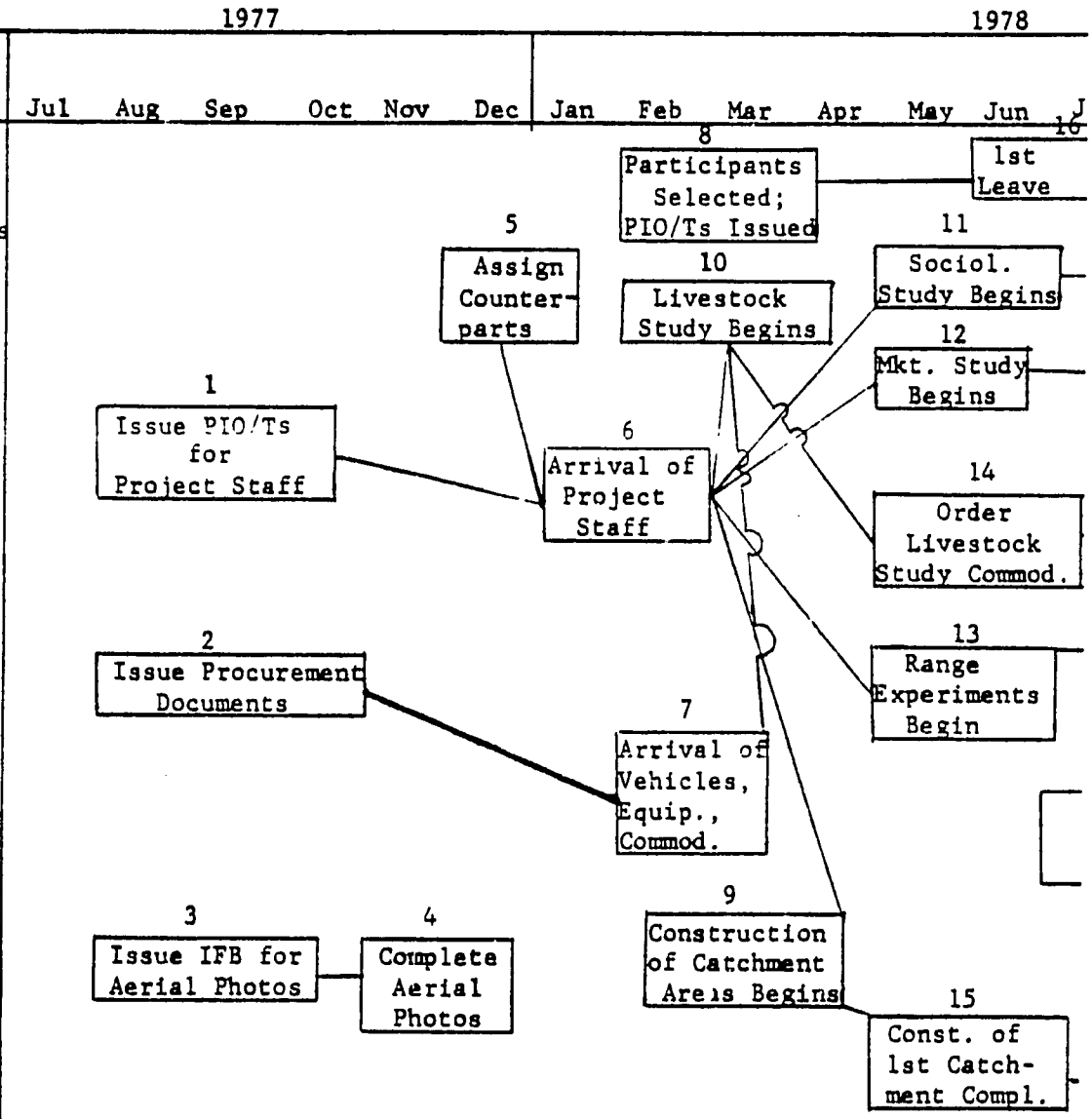
CPT No.	Critical Performance Indicators	Action Agent	Date
1.	Issue PIO/Ts for project personnel	ADO/AID/W	Aug 77
2.	Issue procurement documents for locally and U.S. purchased vehicles, equipment and commod.	ADO	Aug 77
3.	Issue IFB for aerial photography	ADO	Aug 88
4.	Aerial photography to be completed during period when climatic conditions permit clear photos, i.e. October - November	Contr.	Nov 77
5.	GON assigns counterparts for the livestock and range management advisors and the rural sociologist	GON	Dec 77
6.	Arrival of project staff	AID/W	Jan 78

7.	Arrival of equipment and commodities	ADO	Feb 78
8.	Participants selected and PIO/T issued; must be completed in time to assure June departure	GON/ADO	Feb 78
9.	Construction of 1st catchment area begins	Contr.	Feb 78
10.	Livestock study begins with selection of herds and delivery of commodities; interventions must be underway when the "stress period" starts in April	Contr.	Feb 78
11.	Sociology study begins	Contr.	May 78
12.	Marketing study begins	Contr.	May 78
13.	Transects established, range indicators set, and re-seeding trials start	Contr.	May 78
14.	2nd order for commodities for livestock post issued	ADO	May 78
15.	Construction of first catchment completed before start of rains	Contr.	May 78
16.	Academic training participants depart for U.S.	ADO/AID/W	June 78
17.	Construction of livestock posts begins	Contr.	July 78
18.	Well improvement begins	Contr.	Oct 78
19.	First interim analyses by each project advisor	Contr.	Jan 79
20.	First census of pop. and livestock complete	Contr.	Apr 79
21.	Construction of second and third catchment areas complete	Contr.	Apr 79
22.	First evaluation complete	ADO	Apr 79
23.	Training consultant arrives to advise on setting up in-country training (See CPI 27)	ADO/GON	Apr 79
24.	Recurring cost study complete	Contr.	Aug 79
25.	Non-degree participants return to be counterparts	ADO/AID/W	Aug 79
26.	2nd census of pop. and livestock complete	Contr.	Aug 79
27.	In-country training of personnel in livestock extension and range management begins	GON/Contr.	Sept 79

28.	Submission of PRP for Phase II	ADO	Oct 79
29.	Socio-legal study of land tenure complete	Contr.	Oct 79
30.	Social study of herders, range management and community aides complete	Contr.	Apr 80
31.	Marketing study complete	Contr.	Apr 80
32.	Livestock production systems study complete	Contr.	Apr 80
33.	Construction and staffing of livestock post complete	Contr./GON	May 80
34.	Final Report: Range Management and livestock extension program for Phase II implementation complete	ADO/GON/ Contr.	July 80

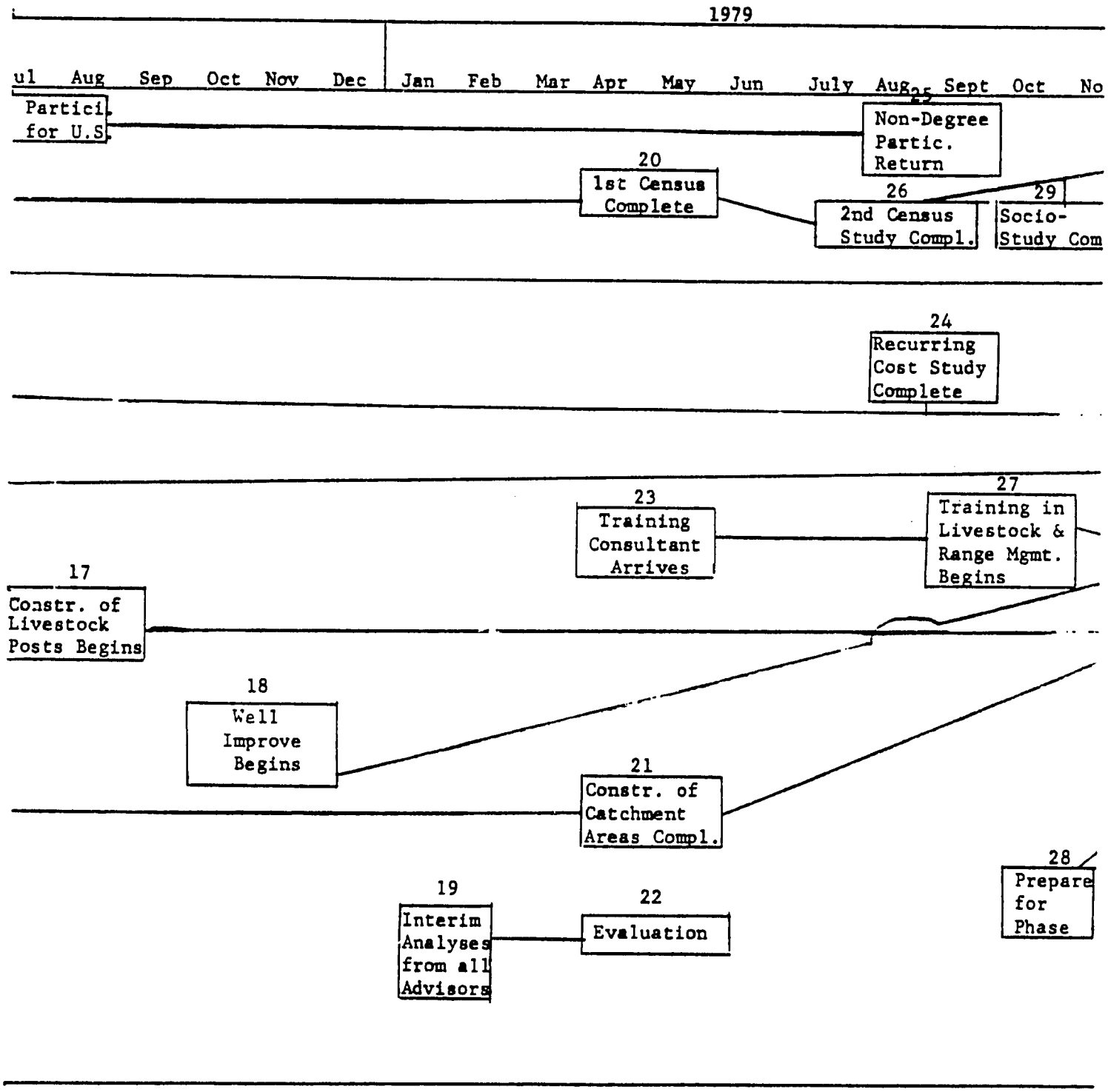
PRIOR ACTIONS

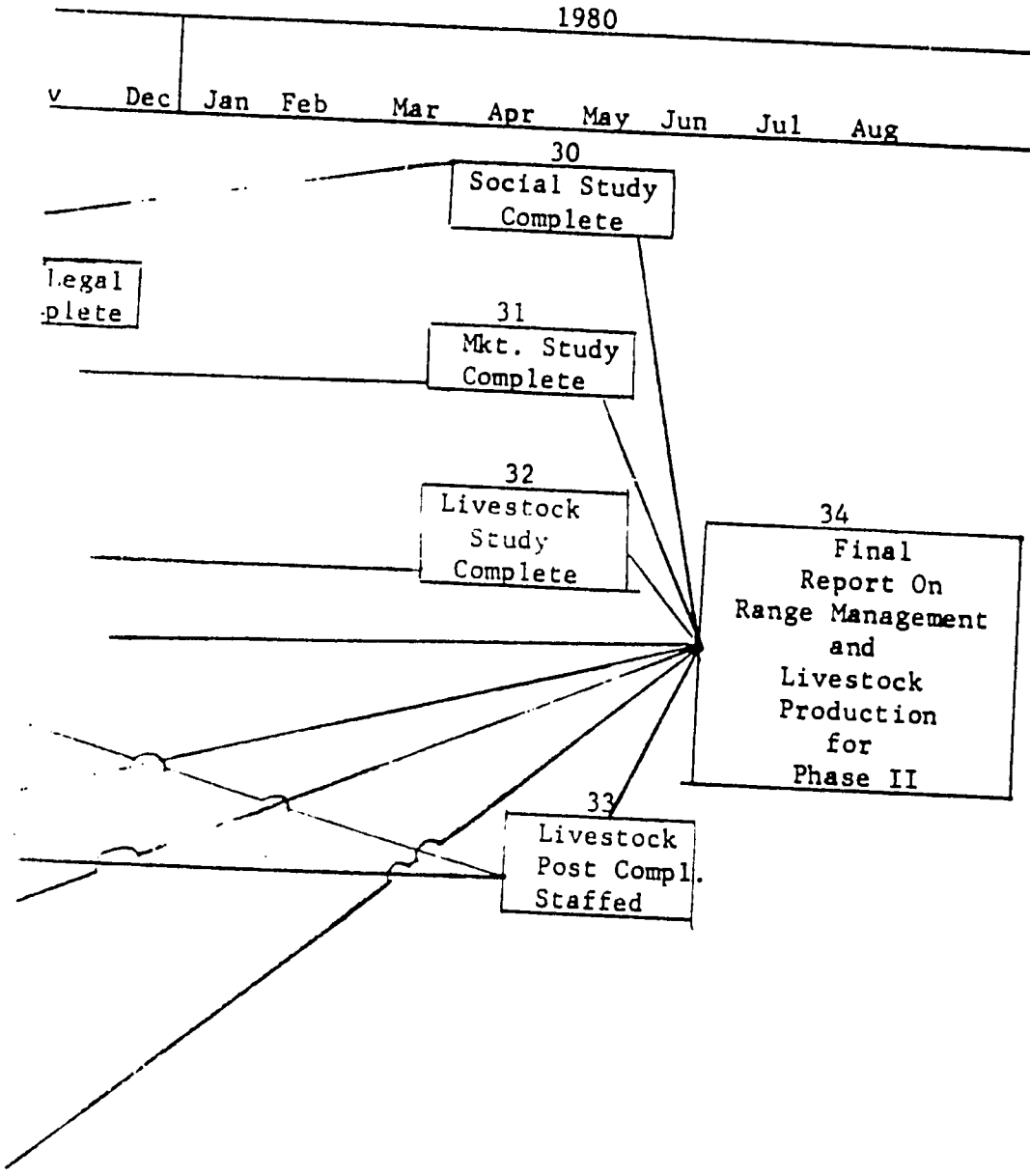
1. Action memo for pre-ProAg Activities
2. Receive waiver for local purchases
3. Begin recruitment of project staff
4. GON to submit construction plans for 611(a) cert.
5. GON to assign project coordinator
6. GON to assign procurement agent
7. Sign ProAg



Funding Schedule

P P T N E T W O R K C H A R T

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Dec
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Social Study Complete
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31
Mkt. Study Complete
32
Livestock Study Complete
34
Final Report On Range Management and Livestock Production for Phase II
33
Livestock Post Compl. Staffed

ANNEX I

Initial Environmental Examination

Project Location: Republic of Niger

Project Title: Niger Range Management and Livestock

Funding: FY 77 $500,000 LOP $5,280,000

Life of Project: Three years

IEE Prepared by: Mr. M.J. Morgan, Agricultural Engineer, REDSO/WA

Environmental Action Recommended:
It is recommended that a negative determination be made regarding the need for an Environment Impact Statement.

Concurrence: _____ Date: _____

Assistant Administrator's Decision Date: _____

I. Examination of Nature, Scope and Magnitude of Environmental Impacts

A. Description of Project

The Niger Range Management and Livestock Project has its long-term goal to increase the real income and well-being of traditional herders in the pastoral zone. Because of the low productivity of the herds and the limited carrying capacity of livestock numbers of the range areas of Niger, achieving the goal entails devision measures to control or reduce the number of livestock using the range but also increasing animal productivity which will in the final analysis increase herder incomes. Because of the complexity of the problems being addressed and the paucity of information on which to base a large scale program, this project will be carried out in two phases.

The main purpose of Phase I is to develop a means to maintain the ecological balance in the pastoral zone of Niger. The project will carry out certain studies and experiments in an area of about 4 million hectares bounded by Agadez in the north, Abalak in the west, Aderbissinat in the east and Dakoro in the south. At the end of the project, the technical, social and economic issues related to increasing productivity and controlling range use will have been studied and a workable program of increased productivity coupled with rational range resource use will be developed for implementation in a larger Phase II activity.

The area is inhabited by two nomadic herder groups, the Tuareg and the Peul, each of which follows somewhat different herding and transhumance practices. These differences and their implications for this project are discussed in the Social Analysis Annex. All that needs to be noted here is that there exists a well established system of range and water use based in the private ownership of traditional hand-dug wells. the Tuareg have occupied the zone in which the project area is located for centuries and it is only in relatively recent times (the last 50 years) that the Peul have moved into the area. The Tuareg characteristically migrate between permanent wells owned by members of their kinship groups in the central and southern parts of the project zone area. In the rainy season they go on the "salt cure" in the area northwest of Agadez. The Peul have introduced themselves into this system by either purchasing old wells or watering rights from Tuaregs, or by using the public wells that have been constructed by the GON during the last 10 to 15 years. They migrate between areas where they have water rights and to pastures south of the project zone where free can be obtained from shallow wells.

The underlying strategy of this project is to put together an effective system of range management that is based as much as possible on the practices that currently exist in the area.

According to the latest estimates, the four arrondissements affected by the project contains 250,000 cattle, 280,000 sheep, 602,000 goats, 43,000 camels, 69,000 donkeys and 13,000 horses. There are an

estimated 5,000 herder families. (These are only estimates as the GON has never had a census of people much less animals.) Cattle have declined 45% between 1972 and 1975 while sheep, goats and camels have declined 2%, 11% and 51% respectively. The drought years of 1972-1974 are responsible for the reduction in numbers.

The range management component will aim at defining the technically feasible ways of protecting and improving the natural resources of the project area. The specific range management related experiments to be carried out under this project are:

B. Identification and Evaluation of Environmental Impacts

1. Three natural water catchment areas to provide water for a longer period of time will be carefully selected on the basis of under-utilization of range areas nearby. Improvement will consist of deepening for more storage capacity; fencing of the water source to prevent livestock from polluting the water; provision of an outlet pipe and watering troughs for watering livestock; and control of the number of head of livestock grazing in the area.

2. Traditional, privately owned wells will be improved to reduce possibilities of contamination and to increase their useful life. The improvement will include lining of the well with concrete caisson for the first 5 to 10 meters to prevent sloughing of loose material into the aquifer; construction and installation of an improved water drawing device to prevent contamination.

3. Range indicator plots will be established and fenced to determine, if possible, what the effects of no grazing will be to improve the range. Reseeding plots, on a trial basis, will be established and fenced to determine if this technique has merit for improving the range.

4. During the life of Phase I of the project the extent of fire damage will be monitored and the technical and economic feasibility of reducing the damage will be explored. This will include the study of the costs and results of a firebreak construction program now underway just south of the project area.

There will not be any short-term invironmental effects from these interventions but, if these proposed experiments are successuly concluded, there could be major long-term benefits for the entire northern part of the pastoral zone in Niger.

The livestock production component will provide: support to the existing livestock program which consists mostly of animal health procedures; construction of four additional veterinary posts and 10 livestock handling facilities for improving the coverage of the animal health program; and carrying out a major study to determine the costs and benefit of a comprehensive small-herder oriented-livestock productivity program in the pastoral zone.

The additional veterinary posts will be constructed at Gadabeji, Aderbissinat, InGall, and Abalak. Each veterinary post will consist of a combination home and office building for which adequate water-sealed sanitary facilities will be provided. This will be fenced to keep animals out of the compound. A well will be dug for use of the staff and a small combination abattoir/hide drying facility (36M2) will be constructed. There will not be any displacement of residents in order for the construction to proceed. There will not be any undue extra traffic caused by the location of the centers. The centers will be used as an area headquarters so that the veterinary service will be able to more adequately provide to the animal health needs of the herders.

It is recommended that a Negative Determination be made for Phase I of this project as it is designed to gather information for the formulation of a rational range management and animal productivity plan for which the long range goal is to improve the environment.

II. Description of Possible Impacts (See attached Impact Indentification Form)

A. Land Use

The project area is in a severe state of deterioration and is worsening in an accelerated manner. Perennial grasses have largely disappeared. Large areas are completely denuded. Wind and water erosion is serious. Project activities are designed to reverse the present degradation of the range. The range management plan will institute controls on the use of the rangeland which, in time, will be effective in regenerating the vegetative cover. These controls will be designed to fit the grazing patterns of the nomadic herder practices. There should be a beneficial environmental impact in time but it is not expected that Phase I of the project will have any great effect since it is primarily an investigative endeavor.

B. Water Quality

Water is a scarce, coveted basic necessity for the herders' livelihood. During the drought it is surmised that more livestock died from starvation than from lack of water. Herders kept the herds near a well or water hole until the grass was completely gone. A well planned range management system is designed for optimum carrying capacity of rangeland which necessarily also takes into account availability of water for livestock grazing on that range. The deepening of natural catchment basins in under-grazed areas will allow for better use of the grass and less use of other areas now over-grazed.

The wells observed in the project area were all contaminated. The contaminated water is a source of parasites for both humans and animals. This is due first to the herders allowing their ropes used for drawing water to be dragged in the dirt and the ever present manure near the wells

and, second, to the number of small animals that accidentally fall into the wells. The well improvement activity will initiate a program to assist in alleviating that condition by lining of traditional wells, construction of top well rings to keep animals from falling in, and concrete aprons and the installation of water-drawing devices to eliminate contamination of the wells from ropes. There will be a limited beneficial environmental impact from well improvement and from altering grazing patterns around natural water catchment areas.

C. Atmospheric

Project activities should have no effect on air pollution.

D. Natural Resources

1. Diversion, storage or increased use of water

The improvement of the natural catchment areas will prolong the length of time water is available in the range area adjacent to the watering point. The amount of additional water stored will be carefully calculated in relation to available grass in the area. This will allow for more adequate use of the grass around the catchment area, which in turn will decrease the grazing on other areas. This will be a beneficial environmental impact.

E. Cultural

1. There will be no alteration of physical symbols in the project area.

2. There may possibly be some additional contact between the Peul and Tuareg tribal groups but since this is already taking place the minimal amount that will come about by project activities will be of no great consequence.

3. In time it is hoped that a more structured control of range use can be introduced in the project area, but, as described in the social analysis section of this Project Paper, the project strategy is to base improved controls on the traditional range and water use system that already exists in the area.

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Areas and Subareas	Impact Identification and Evaluation *
A. LAND USE	
1. Changing the character of the land through:	
a. Increasing the population	N
b. Exacting natural resources	N
c. Land clearing	N
d. Changing soil character	N
2. Altering natural defenses	N
3. Foreclosing important uses	N
4. Jeopardizing man or his works	N
5. Other factors	N
6. Control of use	L
B. WATER QUALITY	
1. Physical state of water	N
2. Chemical and biological status	L
3. Ecological balance	L
4. Other factors	

* N - None
L - Limited

C. ATMOSPHERIC

1. Air additives _____ N

2. Air pollution _____ N

3. Noise pollution _____ N

4. Other factors _____

_____

_____

D. NATURAL RESOURCES

1. Diversion, altered use of water _____ L

2. Irreversible, inefficient commitments _____ N

3. Other factors _____

_____

_____

E. CULTURAL

1. Altering physical symbols _____ N

2. Dilution of cultural traditions _____ L

3. Other factors _____

_____

_____

F. SOCIOECONOMIC

1. Changes in economic/employment patterns _____ N

2. Changes in population _____ N

3. Changes in cultural patterns _____ N

4. Other factors _____

_____

_____

G. HEALTH

1. Changing a natural environment _____ N

2. Eliminating an ecosystem element _____ N

3. Other factors _____

_____

_____

G. GENERAL

1. International impacts _____ N

2. Controversial impacts _____ N

3. Larger program impacts _____ N

4. Other factors _____

_____

_____

I. OTHER POSSIBLE IMPACTS (not listed above)

_____

_____

_____

_____

ANNEX M

Statutory Checklist

A. GENERAL CRITERIA FOR COUNTRY

In 1977 Country Checklist for Niger was submitted with the Niamey Productivity Project PP and items have not changed since it was submitted.

B. GENERAL CRITERIA FOR PROJECT

1. App. Unnumbered; FAA Sec. 653(b). (a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;	By Congressional Presentation and Congressional Notifications when appropriate.
(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure plus 10%)?	Yes
2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost of the U.S. of the assistance?	(a) Yes (b) Yes
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	No further legislative action will be necessary within recipient country.
4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?	Project deals with livestock production and range management and is not a water or water related land resources project.

5.	FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?	Yes. A611(e) certification is attached to this project paper.
6.	FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance is for newly independent country, is it furnished through multilateral organizations or plans to the maximum extent appropriate?	Project is not susceptible of execution as part of regional or multilateral project.
7.	FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusion whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	This project will deal primarily with small herders operating in a free enterprise market; experiments will be carried out with multipurpose cooperative-type organizations.
8.	FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	As project is ultimately aimed at traditional herders in a rural setting, it will neither encourage nor discourage private U.S. trade and investment except to the extent that as the rural economy grows, demand for goods and services will grow.

9. FAA Sec. 612(b); Sec. 636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.

This project is primarily a research effort to design a large scale program. Although the GON does not have the budgetary resources to contribute to a research project of this kind, it is understood that any major program stemming from the research will receive substantial GON budgetary support. Due to budgetary constraints of the GON a portion of the grant funds in addition will be required to meet local currency cost. The U.S. owns no applicable foreign currency.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release?

The U.S. does not own applicable U.S. foreign currency.

C. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, expecially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

1.a.(a) Project aimed 100% at involving rural poor in development and increasing their access to local economy and increasing the yields from traditional livestock production.

(b) Long-range purpose of the project is to ultimately establish cooperative organizations to manage the use of rangeland, market animals and and purchase essential commodities.

b. FAA Sec. 103, 103A. Is assistance being made available: for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; if for agricultural research, is full account taken of needs of small farmers?	Project is directly aimed at providing training and services to traditional herders in remote areas for the purpose of increasing their incomes and protecting their natural resources.
c. FAA Sec. 110(a); Sec. 208(e) Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that is will provide at least 25% of the cost of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?	A waiver is being requested based on Niger's status as one of the "relatively least developed".
d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?	Grant capital assistance will not be disbursed over more than 3 years.
e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appro-private emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic political, and social development, including industry, free labor unions, co-operatives, and Voluntary Agencies; transportation and communications; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.	This project is aimed at increasing the productivity of small traditional herders using existing systems as the starting point. The herders will receive training in improved practices and government employees will receive training in extension work. The project is basically small farmer and private sector oriented. Women are already integrated into the economic life of nomadic herders and this project will seek ways to increase their involvement further.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capabilities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.	Project is fully cognizant of the needs and desires of the people of the country and is designed as to determine their capacity for longer-term development efforts; national research organizations will be used in the evaluation and monitoring of project activities and the design of future activities. Project will be implemented by host-government services, and will train host country personnel to staff national livestock extension and range management programs.
g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(8). Does the activity give reasonable promise of contributing to the development; of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?	This activity does promise to contribute to the development of economic resource, productive capacity, and self-sustaining economic growth. It is related to and consistent with the GON's development program, and the Sahel Development Program. The PP shows that the project is economically and technically sound.
h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.	Project will have no adverse effect on economy or areas of surplus labor in the U.S. with the exception of waivers for off-shore purchase of vehicles, local purchases and construction, all commodities will be purchased from US source suppliers.

STANDARD ITEM CHECKLIST

A. Procurement

1. FAA Sec 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of goods and services financed?	Yes.
2. FAA Sec. 604(a). Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him?	Yes.
3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed?	Niger does not discriminate against U.S. marine insurance.
4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?	There will be no offshore procurement of agricultural commodities under this project.
5. FAA Sec. 608(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items?	Yes.
6. MMA Sec. 901(b). (a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.	Yes.

7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?	Yes to both questions.
8. International Air Transport. Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available?	Yes.

B. Construction

1. FAA Sec. 621(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest?	Yes.
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?	Yes.
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million?	Yes. U.S. assistance will not exceed $100 million.

C. Other Restrictions

1. FAA Sec. 201(d). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?	Project contains no loan protion.
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?	Fund will not be administered by international organization
3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Block countries, contrary to the best interests of the U.S.?	This project will have no relationship to foreign aid projects of communist-bloc countries.
4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction?	Yes.
5. Will arrangements preclude use of financing:	
a. FAA Sec. 114. to pay for performance of abortions or to motivate or coerce persons to practice abortions?	Yes.
b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property?	Yes.
c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs?	Yes.
d. FAA Sec. 662. for CIA activities?	Yes.

e.	App. Sec. 103. to pay pensions, etc., for military personnel?	Yes.
f.	App. Sec. 106. to pay U.N. assessments?	Yes.
g.	App. Sec. 107. to carry out provisions of FAA Sections 209(d) and 251(h)? (transfer to multilateral organization for lending).	Yes.
h.	App. Sec. 501. to be used for publicity or propaganda purposes within U.S. not authorized by Congress?	Yes.

MG/RV
REPUBLIQUE DU NIGER

MINISTERE
DES AFFAIRES ETRANGERES
ET DE LA COOPERATION

DIRECTION DES AFFAIRES
POLITIQUES ET CULTURELLES

N° ..... /MAE/C/DAPC

AMERICAN
Association for Assistance
Niamey, le 1976

LE MINISTRE DES AFFAIRES ETRANGERES
ET DE LA COOPERATION

A

Monsieur A. BARON
Représentant Régional de l'USAID
Ambassade des Etats Unis d'Amérique
N I A M E Y

Objet : Avant Projet de Range Management et d'Elevage

Référence : Votre lettre n° 887 du 16 janvier 1976

Monsieur le Représentant,

Comme suite à votre lettre citée en référence par laquelle vous nous avez adressé un avant projet de Range Management et d'Elevage dans le Centre du Niger j'ai l'honneur de vous informer de l'assentiment du Gouvernement du Niger sur les propositions faites dans ce document.

En effet, selon les termes de ce document il s'avère que :

1°- Les objectifs de l'avant projet correspondent aux orientations du Gouvernement en matière de développement de l'Elevage en zone pastorale. Ce document tend à assurer :

- une meilleure gestion des ressources pastorales (eau, pâturage, bétail) par le moyen d'une structure de gestion faisant participer activement les éleveurs à l'exploitation contrôlée des ressources,

.../...

- un accroissement de la production annuelle en milieu d'éleveurs nomades et transhumants par la vulgarisation de techniques améliorées ;

2° - Le déroulement du projet en deux périodes est raisonnable :

- une première phase d'intervention concentrée dans une zone de un million d'hectares sera consacrée à tester et à mettre au point les techniques d'élevage et les modalités de leur vulgarisation ;

- la seconde phase consistera à étendre les résultats obtenus à une zone plus vaste.

3° - Les activités du projet telles que décrites à l'avant-projet sont considérées comme une esquisse du type d'intervention qui sera défini plus précisément au projet définitif ; les négociations ultérieures entre l'AID et le Gouvernement pour l'établissement du projet définitif préciseront certains points, notamment :

- la nature de la structure de gestion du projet ;

- l'importance à donner au développement des ressources en eau (infrastructure pour le captage et l'exhaure de l'eau) et à l'action sanitaire sur le terrain ;

- le nombre et la qualification des agents de direction et d'encadrement du projet à former, ainsi que les modalités de cette formation qui s'appuiera essentiellement sur les établissements nigériens de formation agricole et vétérinaire par adaptation des programmes ;

- l'extension des interventions aux autres espèces domestiques que les bovins (moutons, chèvres, dromadaires) ;

- la part de la recherche appliquée dans le projet ;

- l'intégration du projet dans l'ensemble du programme de développement de l'élevage pour valoriser la production animale de la zone du projet ;

.../...

- le rattachement du projet aux autres opérations du secteur rural en cours ou en projet dans la région du Centre-Niger, notamment à l'opération de productivité agricole du Département de MARADI et aux 3 centres de multiplication du bétail du Centre Niger.

4° - Les études préliminaires prévues pour l'établissement du dossier de demande de financement du projet à remettre à l'AID à Washington en août 1976 sont pour une grande partie l'actualisation des travaux conduits de 1969 à 1973 pour inventorier les ressources et analyser les besoins pour la mise en valeur de la zone pastorale ; ces études préliminaires pourront être réalisées dans le délai prévu de 5 mois surtout si comme celà est souhaitable, les agents du service de l'Elevage collaborent à la collecte des informations sur le terrain.

5° - Le programme d'intervention présenté dans l'avant-projet est assorti de moyens financiers et humains importants (montant du financement de l'ordre de un milliard de francs CFA pour trois années, assistance technique spécialisée, formation d'agents nigériens) qui offrent de bonnes garanties quant à la realisation des objectifs fixés.

Je vous saurais donc gré de bien vouloir intervenir auprès des autorités compétentes de l'AID pour que le démarrage des études prévues dans l'Avant-Projet puisse se faire dans les meilleurs délais.

Veuillez agréer, Monsieur le Représentant, les assurances de ma parfaite considération./.

Capitaine MOUMOUNI DJENNAKOYE ADAMOU

DRAFT: Johnson/mb

Object: Range Management and Livestock P.P.

Ref: Letter No 887, dated January 16, 1976

FROM: Ministry of Foreign Affairs
Captain Moumouni Djermakoye

Sir,

Reffering to your letter mentioned above, in which you transmitted to us a Range Management and Livestock P.P in the Center of Niger, I have the honor to inform you of the agreement of the Government of Niger with the made proposals in this document.

As a matter of fact, under terms of this documents, it occurs that:

1. The purposes of the P.R.P meet the orientations of the Government in the livestock development in pastoral zone. This document aims to insure:

- better management of pastoral resources (water, pasture-land, cattle) by the means of a management structure offering active participation, to the herders, to a controlled exploitation of resources;

- an increase of the annual production among the nomadic and migratory herders by the extension of improved practices.

2. The project implementation on two periods is rational:

- a first phase of intervention located in one million of "hectares" area will focus on testing and adjusting livestock practices and the means of their extension;

- the second phase will consist in extending the obtained results to a larger zone.

3. The project activities as described in the P.R.P are considered as an outline of the type of intervention which will be defined more precisely in the final project; subsequent negotiations between AID and the Government for the establishment of the final project will precise certain points especially:

- the nature of the project management structure;

- the emphasis on the development of water resources (infrastructure for water collecting and dewatering) and on the sanitary action in the field;

- the number and the qualification of the project managing and monitoring agents to be trained, as well as the features of this training which will essentially rely on nigerien agricultural and veterinarian institutions by adapting programs;

- the extension of interventions to other domestic species than bovines (sheeps, goats, camels);

- the part of the applied research in this project;

- the integration of the project in the whole livestock development program to increase the livestock production of the project zone;

- the connection of the project with other rural operations going on or planned in the center of Niger area, especially with the agricultural productivity operation in the Maradi Department and with tree cattle multiplication centers of the center of Niger.

4. The preliminary surveys designed to set up of the project financing request paper to transmit to AID Washington on August 1976, are for the most part the actualization of the works conducted from 1969 to 1972, to inventorize resources and analize the needs for the pastoral zone development; tree preliminary surveys will be able to be done in the planned five months period, especially, if, as it is desired, the "Service de l'Elevage" agents participate to the collection of data on the field.

5. The intervention program in the P.P is presented with important financial and human means (financing amounting to approximatively one billion of CFA francs for three years, specialized assistance, nigerien agents training) which are good guarantees to carry out such fixed aims.

I would appreciate if you could intervene with the appropriate AID authorities so that the planned surveys in the P.P might start as soon as possible.

Sincerely your.

Captain Moumouni Djermakoye
Ministry of Foreign Affairs

ANNEX O

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Waiver Request for 25% Contribution

It is requested that a waiver of the requirement that the recipient country finance 25% of project cost, Section 110(a) Foreign Assistance Act of 1961, be granted for the Niger Range and Livestock project (683-0202).

The justification for this waiver is: 1) Niger is one of the countries on the UNCTAD list of "Relatively least developed countries." With a per capita GNP of approximately $100 it is one of the poorest of these countries. It was further one of the most seriously affected of the Sahelian countries by the recent drought and has not yet recovered from the effects of the drought.

2) The GON has demonstrated an increasing commitment to economic development and improving the standard of living of its people. In the current 3 year development plan, the GON will raise development investment to 25% of GDP as compared to 10% of GDP before the drought. The GON will finance approximately 10% of the programmed investment from its own resources with the other 90% financed primarily through Grants and Loans from the European Development Fund, the World Bank Group, the French and German Governments. Other contributors include the U.S., Canada, and Saudi Arabia. The GON has identified the livestock herds and range resources of the pastoral zone as a major national resource and is committed to the preservation and improvements of its range resources by balancing animal numbers with carrying capacity of the Range. The implementation of this project is seen by the GON as a key to the implementation of this policy.

3) This project is essentially a pilot activity that will enable the GON to develop a comprehensive program for Range Management and livestock production in Niger's Pastoral Zone. A new office has been created in the GON Ministry of Rural Development and is currently being staffed to oversee and implement all livestock projects in the pastoral zone. While the GON contribution does not reach 25% it is not insignificant. The GON has committed an almost equal number of professional personnel to the project as the AID financed expatriate staff. But, due to the salaries and support cost of expatriate personnel in Niger (44% of the AID funded project cost) and the relatively low salaries paid to GON personnel, the GON share appears lower when computed in dollars than it would if all inputs were compared in kind.

4) It is therefore felt that this project meets the intent of Congress in that support of the project has been demonstrated by the recipient and meets all of the requirements of the legislation for waiver eligibility and the AID guidelines in Handbook 3.