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*Smith* 6880 203 (2)  
PPD-AAC-179-81  
MAY 30 1975

ACTION MEMORANDUM FOR THE ADMINISTRATOR

THRU : ES  
FROM : AA/PPC, Philip Birnbaum  
SUBJECT: Mali Livestock Sector Grant

213p.

Problem: Being greater than \$2 million, the proposed grant requires your authorization.

Discussion: As you know, AID has been engaged in a continuing, collaborative dialogue with the Government of Mali (GOM) over the past three years regarding the development of the country's livestock industry. This dialogue, which originated before the impact of the recent drought, focussed on livestock because of its strategic importance for the development of the country (see sector analysis in the attached grant proposal) and because of its prospects for future growth and modernization over the intermediate and long term.

Our dialogue with Mali has proceeded at both the policy and technical levels, with the advent of the drought lending increased urgency to the need for action. This work has already resulted in two important AID undertakings for livestock development: (a) the approval in FY 1973 of a PROP to provide five years of follow-on technical assistance and training for the country's central animal vaccine production and research facility (itself the product of an earlier AID loan) and (b) approval in FY 1974 of a \$3.4 million grant to expand and modernize livestock production and marketing operations in the intermediate rainfall area of the country (Mali Livestock Development Project). Both of these interventions address critical aspects of the Malian livestock industry: (a) animal health, (b) strengthening the capacity of the marketing system to provide cattle for domestic consumption and exports, and (c) exploiting the potential of the intermediate rainfall zone as an area for growing out cattle and for encouraging sedentary farmers to grow cattle for slaughter.

The selection and design of these two earlier undertakings, have been the product of a process of inter-action between AID and the GOM. The same approach has been followed to an even greater degree with the formulation and design of the present sector program which began a year ago and resulted in the preparation of a draft program proposal which attempted to relate AID assistance to the recently formulated GOM livestock development strategy.

The proposal was reviewed in Washington, fleshed out over the summer, and summarized in an October 16 memorandum to you asking that you approve it "in principle" and authorize its release to the GOM looking toward further negotiations and the preparation of definitive proposal. Following your approval of the memorandum on November 7, a senior negotiating team from the Bureau for Africa held discussions with the GOM which concluded with agreement on all major points at a meeting chaired by the Minister of Production on December 4.

The sector grant paper was subsequently approved by the Africa Bureau's Executive Committee for Project Review (ECPR) on January 22 subject to the resolution of several issues raised at the meeting (see Issues section below).

A. Why a Sector Grant?

The sector grant approach is appropriate for livestock development in Mali for a number of reasons:

The GOM has developed a viable livestock strategy, based on a Five Year Plan, which offers an integrated approach to zonal specialization, and to production, finishing and marketing factors. The plan represents a significant achievement for the GOM and provides a basis for policy level and sector-wide discussions between Mali and external donors, and for evaluating discrete inputs.

The proposed AID sector program is characterized by a series of discrete activities. However, taken together with our previous initiatives (as noted above), it provides for an ensemble of activities touching upon most key elements of Malian strategy. By managing this program, and other AID inputs in an integrated fashion, it facilitates AID focus with the GOM on the sectoral significance of these activities rather than as separate, area-specific undertakings. The GOM also sees the program in this light. The sector grant approach also means that certain elements of the program -- training, research, land use planning, financial advice -- will be provided not only in relation to the discrete areas and activities on the field sites to be developed but in relation to strengthening the GOM's overall capacity to carry out livestock development.

This approach also stresses maximum emphasis on GOM leadership in design, detailed planning, execution and evaluation as the means to most effectively impact upon GOM planning and management. As noted above, the major elements of the program were proposed by the GOM and the design of individual activities done in full collaboration between GOM and AID representatives and technicians. The style of execution must similarly

stress GOM leadership in executing and evaluating the experimental methods proposed. AID will therefore need the flexibility to refine the design and implementation plans of the program on the basis of continuing GOM-US collaboration.

Finally, donor coordination is a desirable facet of sector programming. In Mali the primary responsibility for this coordination has come from the GOM, which has heretofore been reluctant to bring donors together. However, there is recent evidence of a shift in attitude and, as further lessons are learned from the program, the value and path of coordinated livestock planning by the GOM with all donors will hopefully become clearer and more acceptable.

The sector grant proposed here represents a significant commitment of AID resources over a considerable period. The program is conceived as a five year program with funding for the first three years in the amount of \$7 million being proposed for this paper. It is also proposed that an additional \$3.5 million be authorized for a major range development test project (see first item in "Issues" section below). A third tranche for the remaining two years of the program (roughly estimated at \$2.5 million) would be required in FY 1978. The 5 year total would therefore be \$13 million of which \$10.5 million is proposed for authorization now.

#### B. Issues

I wish to call your attention to the following issues that have been raised in relation to this sector program:

1. Test Tsetse Clearing Project. The draft grant proposal included funding for only the planning, training and institution-building necessary to create a Malian capacity to clear and develop tsetse-infested areas for livestock and agricultural development but did not include funds for the actual clearing and development of a Test Site. At the January 22 meeting it was felt that funding (estimated at \$3.5 million) for the latter should also be authorized. Obligation of these funds (through a subsequent amendment to the Grant Agreement) would be conditional on completing the necessary preparations, plans, feasibility analysis, and a GOM range management scheme which is acceptable to AID. We anticipate that this can be accomplished within the first three years of the program. We believe that authorization now, however, would be desirable in terms of establishing AID policy on the subject and to demonstrate to the GOM our seriousness of purpose in financing a test site once the Malians and we have completed the preparatory work.

2. GOM Contributions to the Project. The problem is one of seeking to assure that the GOM will be able to meet the local cost of project activities at the end of the five year grant period, despite its straitened overall budgetary situation. To this end, a Joint Fund into which both AID and the GOM will make contributions has been agreed

to, and a target has been set of full GOM financing of operating costs by the end of the fifth year. The exact cost sharing formula is still to be negotiated. We believe that in these negotiations, AID should press the GOM to make the fullest reasonable contribution which will, at a minimum, assure cash funds for the operating cost of program activities by the end of the project. The formula should also relate GOM contributions to the Joint Fund to (a) revenue increases accruing from the return on the proposed investments, (b) improvements in cattle tax collections, (c) installation of user charges. To this end, we will respond to the GOM's recent request for technical assistance in tax collections and we propose to include, as a Covenant to the Grant Agreement, a stipulation that the GOM will use its best efforts to introduce user charges for those benefitting from project improvements.

3. Price Policy. As noted in the sector analysis of the grant paper, the GOM's domestic price controls on beef -- while understandable from its standpoint -- have created artificial seasonal shortages in domestic markets, has operated as a disincentive to producers, and has led to clandestine slaughtering for an "unofficial" market. The new Five Year Plan sets as an objective the removal of these controls, but the GOM has not to date implemented this decision.

The removal of these controls is considered to be an essential element in the effectuation of the GOM's sector strategy for livestock which, if not enacted, or revoked without an alternative, would be an important constraint to the realization of the strategy. On the other hand, since price policy is an extremely sensitive issue for the GOM, it was felt that making decontrol a condition precedent in the Grant Agreement would be highly counter-productive. We therefore recommend that language be included as a Covenant in the Grant Agreement to the effect that the removal of these controls was an important justification to AID participation in the program and that if it is not accomplished, or if it is revoked without satisfactory alternative, the U.S. would need to review again with the GOM the efficacy of its continued participation in the program -- especially if little has been accomplished by the time of the in-depth evaluation which is to take place at the end of the second year. This will put the GOM on notice in respect to the importance we attach to price reform, but will leave some flexibility in regard to the timing of such reform (see Annex 6, Conditions Precedent and Covenants).

4. Range Management. There has been considerable discussion in regard to the role and need for legal institutional arrangements related to the Sahel grazing activity to protect the area from overgrazing. As you will note from the program paper, in this component of the project the Malians have emphasized herder training and education programs, herder participation with government in establishing grazing principals, communal self-regulation and the introduction of extension and marketing

services to reduce the risk of overstocking and environmental degradation. This approach, which is very much in line with Congressional emphasis on promoting active participation of the poor in economic development programs, is in contrast to the more structured and regulated range management approach, supported by legal sanctions and penalties, that has been attempted elsewhere in West Africa but with only limited results. It was agreed to proceed with the approach proposed in the paper, at least during the first three years of the program. However, the need to supplement and support acceptable grazing practices with a compatible legal and regulatory framework was also recognized. Therefore, the institution of such framework will be discussed with the Malians during the first phase although we do not anticipate its introduction until the second phase when the results of the cooperative effort with herders can be used to construct this framework.

5. Other Issues. Discussions between the Africa Bureau and ourselves have resulted in a number of adjustments in the design of the program which we believe will strengthen its effectiveness. These include (a) an improvement in the actions (including training and further research) to be taken to avoid adverse environmental consequences of the program, and the elimination of Dieldrin for tsetse fly eradication, (b) greater attention to the role of women in the program, and in the training aspect of proposed activities, (c) the conduct of an educational requirements and space utilization study as a basis for refining the planning for the proposed training and education program, and (d) the preparation with the GOM of firm scopes of work and budgets for the various complementary activities that are proposed -- mostly research, technical assistance and training. These modifications will, of course, have to be discussed and agreed to with the GOM prior to the signing of a grant agreement but the Bureau for Africa does not anticipate any serious difficulties.

6. Risks and Opportunities. You can appreciate from the foregoing discussion that, even with these changes, it is clear that the various undertakings proposed for financing under this grant represent an unmistakable degree of risk due to (a) the innovative and experimental nature of the sub-projects and (b) the inherent problems of program execution in a country with the logistic and administrative limitations that characterize Mali. I must also point out that the execution of the program is going to require the assignment of very superior U.S. and technical talent to Mali (both AID and contract) as well as considerable backstopping and coordination in Washington.

Nevertheless, we believe these risks and challenges are worth taking. The proposed program represents a significant, collaborative effort to benefit the group in Mali hardest hit by the drought, the migratory pastoralists, and to help them to recover from their losses while making their situation less vulnerable to future droughts. Some 50,000 people would benefit directly from the Sahel grazing activity while the new lands activity looks toward providing new grazing opportunities

for at least 50,000 additional migratory and sedentary herdsmen, farmers and families in higher rainfall areas. With its emphasis on small, low-income cattle raisers, this program should be highly responsive to our Congressional mandate.

C. Procurement

It is my view that compliance with normal A.I.D. procurement rules, i.e., restriction of procurement to U.S. sources, would, in the circumstances of this project, constitute a serious restriction against providing timely and beneficial assistance to the people of Mali. Section 639A(b) of the Foreign Assistance Act of 1961, as amended (which specifically authorized the funds with which this project will be carried out), expressly provides that assistance to the drought-stricken nations of Africa may be provided "notwithstanding any... restriction contained in this or any other Act."

The situation in Mali parallels that in the other Sahel states: with commodity imports entirely from France and the other EEC countries, U.S. equipment and commodities cannot be serviced or repaired in the event of breakdown. Spare parts are not available, and Africans are not trained in the maintenance of these items. Audits and inspections of A.I.D. projects in this area which have included the provision of large amounts of U.S. equipment have been sharply critical of the difficulties of host governments in maintaining this equipment after project phase-out. An additional factor to be considered if procurement were to be restricted to the U.S. is the lead-time of up to one year for the delivery of commodity orders.

On the basis of the above circumstances, commodity procurement from Geographic Code 935 (Free World) is requested for this project. Nevertheless attempts will be made prior to and during project implementation to maximize U.S. source and origin procurement.

In regard to services, most of the technical assistance to be provided under this grant will be rendered by U.S. personnel, direct hire, PASA and U.S. firms (private companies and/or universities). However, in certain specialized skills (glossinology, sociology of nomadic herding communities, tse-tse eradication techniques) it may be necessary to engage African or European specialists. As noted in the Project Paper, while much of the participant training will be conducted at U.S. institutions, some essential training will be required in Africa (e.g. Nigeria and Upper Volta). In regard to construction services for the education, new lands and Sahel grazing activities (buildings, access roads, fire breaks, watering facilities, fencing, etc.), these will be carried out entirely by contracts with local firms. The construction to be financed hereunder consists of several discrete activities involving small sums of money and spread out over 400,000 hectares. It would not be economically or logistically feasible for a U.S. contractor(s) to undertake these services. Thus

it has been determined that requiring utilization of U.S. contractors would be a restriction to providing timely and beneficial assistance under this project.

D. Congressional Notification

Section 113 of the Foreign Assistance and Related Programs Appropriations Act of 1975 does not require Congressional notification prior to Agency authorization of the use of FAA Section 639A(b) funds.

Recommendations:

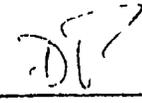
1. That you approve the attached sector grant paper and authorize for immediate obligation (subject to the conditions precedent and covenants to the grant agreement specified in Annex 6) a livestock sector grant in the amount of \$7.0 million.

APPROVED 

DISAPPROVED \_\_\_\_\_

DATE 3 VI 75

*subject to the availability of resources, funds,*  
2. That you approve the authorization of an additional \$3.5 million for a tsetse clearing and livestock development site, the obligation of this funding being subject to the completion to the satisfaction of AID, of the necessary socio-economic, technical and ecological studies, the preparation of detailed plans and cost estimates, and GOM preparation of an acceptable scheme for the management of the site.

APPROVED 

DISAPPROVED \_\_\_\_\_

DATE 3 VI 75

Attachment:  
Sector Grant Paper

Clearances:

AA/AFR:SCAdams, Jr. ACW  
GC:CLGladson CL

Other Clearances:

AFR/CWR:DShear (draft)  
AFR/CWR:JPatterson (draft)  
AFR/DP:RBluesmann (draft)  
AFR/DS:PLyman (draft)  
AFR/GC:TBork (draft)  
PPC/DPR:ROdell (draft)  
PPC/DPR:AMandly (draft)  
SER/ENGR:PStearns (draft)

Drafted by: AFR/DS: J. J. Plym art:wdd 5/15/75

**I. PROJECT IDENTIFICATION**

1. PROJECT TITLE <b>Mali Livestock Sector Grant</b>		APPENDIX ATTACHED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
2. RECIPIENT (SOCIETY) <input checked="" type="checkbox"/> COUNTRY <b>Mali</b> <input type="checkbox"/> INTERNATIONAL		3. PROJECT NO. (M.O. 1095.2) <b>688-12-130-203</b>
4. LIFE OF PROJECT BEGINS FY <u>75</u> ENDS FY <u>80</u>		5. SUBMISSION <input checked="" type="checkbox"/> ORIGINAL <b>May 21, 1975</b> (DATE) <input type="checkbox"/> REV NO. (DATE) CONTRACT NO.

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

A FUNDING BY FISCAL YEAR	B TOTAL \$	C PERSONNEL		D PARTICIPANTS		E COMMODITIES \$	F OTHER COSTS \$	G. PASA/CONTR.		H. LOCAL EXCHANGE CURRENCY RATE \$ US _____ (IF OWNED)		
		(1) \$	(2) MM	(1) \$	(2) MM			(1) \$	(2) MM	(1) US GRANT LOAN	(2) COOP COUNTRY JOINT	(3) BUDGET
1 FROM FUND ACTUALLY												
2 OPEN FY 1975	7,000	2,733	564	286	327	1,737	2,244					422
3 12 1976												
4 FUND 12 1977	3,500	1/										
5 FUND 12 1978												
6 BUDGET TOTAL	2,500	2/										
7 ALL	13,000											

- I.D.A. credit for livestock development in the Niger Delta area \$13.3 million
- European Development Fund, subsidy to offset cattle tax, cattle breeding proj. \$4.7 million
- F.A.C. (French); UNDP; feasibility studies & tech. asst. N/A

**III. ORIGINATING OFFICE CLEARANCE**

Myron Golden	<i>[Signature]</i>	Desk Officer, AFR/CWR	DATE 5/22/75
David Shear	<i>[Signature]</i>	Director, AFR/CWR	DATE 5/22/75

**IV. PROJECT AUTHORIZATION**

1/ Amount to be authorized at this time for Tsetse Test Site. Actual obligation of these funds will be subject to the GOM fulfillment of necessary conditions precedent. (See pg. 3 para. 4 of attached Action Memo.)

2/ Amount required for total 5 year program (not to be authorized at this time).

Based on Section 639A(b) of the Foreign Assistance Act of 1961 as amended by the Foreign Disaster Assistance Act, of 1974, Code 935 procurement is authorized for the project. (Pg. 6 of attached Action Memo)

FOR OFF	SIGNATURE	DATE	FOR OFF	SIGNATURE	DATE
AFR/DS	J. Blumgart <i>[Signature]</i>	5/21/75	AFR/DP	R. Huesmann <i>[Signature]</i>	5/22/75
GC/AFR	T. Work <i>[Signature]</i>	5/22/75	AFR/DS	P. Lyman <i>[Signature]</i>	5/22/75
PFC/DPF	A. Handly <i>[Signature]</i>	5/22/75	DAA/AFR	D. S. Brown <i>[Signature]</i>	5/22/75
	B. C. Adams, Jr. <i>[Signature]</i>	5/23/75		Daniel Parker <i>[Signature]</i>	5/23/75

Assistant Administrator, Bureau for Africa

FAO LIVESTOCK SECTOR GRANT

PROGRAM PROPOSAL

May 1975

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**I. SUMMARY AND RECOMMENDATIONS:**

A. GRANTEE: The Government of Mali.

B. AMOUNT : \$10.5 million (of which \$7 million would be obligated in FY 1975).

C. PURPOSE: Provide assistance to the Government and people of Mali directed toward the post-drought recovery and medium-term expansion of the livestock sector and consequently upon the food supply and quality of life of those dependent upon the livestock sector for their livelihood.

D. PROGRAM OBJECTIVES:

1. To aid in the reestablishment of the livestock sector particularly as a source of food and income, and to initiate measures necessary to avoid subsequent herd losses or damage to range/pasture resources;

2. to improve human resource capacity of Government personnel and of herdsman, and to increase communication of information and exchange of ideas with persons dependent upon livestock for their mode of survival; and

3. to assist the Government of Mali (GOM) to carry forward their five-year development plan for the livestock sector while providing the means by which they may refine and improve their program, enhance their financial ability to support the program, evaluate proposed and ongoing efforts, attract additional external support.

E. The proposed livestock sector grant complements an earlier \$3.4 million grant by AID to the GOM which was primarily directed at cattle production and marketing activities in the proximity of Bamako-Segou (Mali Livestock Development Project). The present sector grant is for activities directed to more distant herder groups in Western Mali, the development of new areas of potential livestock production, and the expansion of the Malian capacity to deal with the growth of the livestock sector. This sector grant is a new approach

for the transfer of resources to Mali which incorporates:

1. Considerable scope for the integration and for planning the execution of activities will be possible following signing of the grant;
2. modification of Malian Governmental institutions which will facilitate the development and delivery of inputs to less-populated and more remote rural areas through a major training and rural education effort, and
3. a common AID/GOM fund administered in Bamako with an agreed cost-sharing formulation.

F. THE LIVESTOCK SECTOR AND DEVELOPMENT STRATEGY:

The agricultural sector (agriculture, livestock, fisheries, forests) constitutes Mali's principal resource and is the occupation of about 90 percent of the population. The value of agricultural production in 1972 was \$188.7 million or about 43 percent of the GDP. Of that total, the value of animal production was estimated to be \$34.5 million, or roughly 41 percent.

With a per capita GDP of about \$70.00, Mali is one of the poorest countries in Africa and one of the world's least developed countries.

In 1970 there were an estimated 5.5 million cattle in Mali and 11.8 million sheep and goats. Although the effects of the drought are not yet fully known, the cattle population is believed to have been reduced about 30 percent\* to perhaps 3.9 million and the sheep and goat populations roughly 20 percent to 9.2 million.

The GOM's strategy focuses on production of cattle for export while assuring adequate meat supplies for local needs. Emphasis is on increasing the degree of stratification in the sector with the Sahelian Zone providing the source of immature stock for growing out and feeding in higher rainfall areas. The principal modes are: (a) to make improvements within the Sahel tending to increase efficiency of use of total forage resources; (b) to open new lands to cattle from

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\* The authors of this paper believe actual losses were closer to 10-15% but this difference in estimates in no way affects the conclusions of this paper.

which they are now excluded by risk of Trypanosomiasis (sleeping sickness spread by tse-tse flies); and (c) to organize feeding activities, i.e., intensive forage production and feedlots, in intermediate rainfall areas or in association with agricultural production. The Mali Livestock Development Project was directed toward the latter strategy element while the presently proposed sector grant addresses the first two.

G. THE PROPOSED LIVESTOCK PROGRAM

There are three principal activities and several subsidiary activities. The program is to be accomplished over five years; financing for the first three years is included in this livestock sector grant:

1. Sahel Grazing Activity: Selective interventions in a defined project area within the Sahelian Zone and programs to increase communications with livestock owners and obtain their cooperation on phased modifications of rangeland use. The area agreed upon by the Ministry of Production for this activity is the Dilly area in the Western Sahelian Zone;
2. Training and Communications: Through in-country training programs, assure that well-trained Government personnel are available for livestock sector activities to meet needs over the next several years; also sensitize herder groups and train select herder group leaders, especially as a means to facilitate execution of the Sahel grazing activity. Considerable participant training is also included; and
3. New Lands Activity: Through tse-tse fly eradication and land use management, open new lands to cattle production. In a two-phase program: (a) develop Malian capacity in tse-tse fly survey and eradication and aid in the completion of initial ecological and land use planning studies and; (b) financial and technical assistance in tse-tse eradication and land development of an area to be selected in the higher rainfall zone. Funding for the first phase is included in the present Project Paper <sup>and</sup> would be

iv.

obligated upon conclusion of the Grant Agreement. Funding for the second phase is recommended for authorization in the Project Paper with obligation (by means of an amendment to the Grant Agreement) subject to the completion of the necessary technical and socio/economic studies and the preparation of detailed plans.

4. Complementary Activities, Comprising:

- a. Modest additional assistance to the Central Veterinary Laboratory to permit it to support the new lands activity;
- b. strengthening the capacity of the Malian Office for Meat and Cattle (OMBEVI) in sociology and economics;
- c. support for applied animal feeding, nutrition, and selection of local stock research for Sahelian livestock production areas;
- d. improvements in the collection and dissemination of market information and investigation of alternative marketing channels between Sahelian livestock producers and the modern sector;
- e. language training, follow-on studies, design work and evaluation;
- f. modest fund for unanticipated needs, experimentation and promotion of new opportunities.

H. FINANCIAL REQUIREMENTS FOR THE LIVESTOCK PROGRAM:  
(\$000)

Activity

New Lands Activity, Phase I.....	1,442
Phase II.....	3,500
(test site)	
Sahel Grazing.....	2,791

Activity

Training and Communications (excluding participant.....1,542  
training (see below):

Complementary Activities:

CVL*.....	89	
Sociology & Economics.....	300	
Research.....	500	
Marketing.....	50	
Participant & Language Training, Studies.....	408	
Fund for unanticipated needs & experimenta- tion	300	<u>1,647</u>
	TOTAL	<u>10,922</u>
Malian Cash Contribution (other than salaries, use of facilities, land, etc.)		<u>(422)</u>
		<u>10,500</u>
Recommended for authorization and FY 1975 obligation.....		7.0 million
Recommended for authorization only (includes test site).....		<u>3.5</u> million
	TOTAL RECOMMENDED FOR AUTHORIZATION.....	<u>10.5</u> million

I. INSTITUTIONAL ARRANGEMENTS:

The Sahel grazing activity will be organized as an "operation", i.e., semi-integrated rural development activity for a specific geographic area, but based on single principal discipline (livestock). The New Lands Activity will be under the administrative responsibility of the CVL;\* CVL will conduct all the fly eradication-related activities while land use planning and development will be organized between the Malian Office for Meat and Cattle (OMBEVI) and the Rural Economic Institute (IER) --- research and planning

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\*Central Veterinary Laboratory

arm of the Ministry of Production. Training and communications will be primarily under the direction of the Sotuba Research and Training Center. All of the above organizations are part of the Ministry of Production.

J. OTHER DONOR SUPPORT:

Several aid agencies are assisting in the development of the livestock sector. Major donors are AID, the World Bank (IBRD/IDA) and the European Development Fund (FED). The IBRD/IDA has recently provided a \$13.3 million credit which aims at the rational use of land and water in the Fifth Region (Mopti) and will help about 100,000 pastoralist families. FED is beginning a project for the selection and distribution of N'Dama cattle for tse-tse infested areas and intends to finance a fattening ranch at Niono in Mali's Fourth Region and perhaps a mixed farming scheme emphasizing cattle feeding in the Mali south area.

In addition, the International Livestock Center for Africa (ILCA) is expected to establish an outreach and research center at the Niono Research Station (\$1.5 million) which will conduct research on stratification and will provide supportive research information for the Sahel grazing activity.

K. MALIAN CAPACITY TO CARRY OUT THE PROGRAM:

Competent Malian personnel are available but not in sufficient numbers. Provision has been made for a major effort to train additional personnel for projected needs of the sector for the next several years.

A joint financing formula has been proposed to assure availability and ease in administration of funds. The financial plan calls for graduated increases in the levels of Malian financial contribution over the life of the program. The objective is to institutionalize an increasing flow of GOM budgetary funding for the operating and service costs of activities begun in this and other programs in support of sector development. The GOM will be assisted in the review and revision of

sector policies as they relate to taxation and user charges with a view to increasing the revenue base of government as productivity increases. In the event planned studies of the GOM's projected public sector capacity shows serious financial shortfalls in the early years of the program, consideration will be given to other means --- such as PL 480 generations --- for bridging any such initial shortfalls.

L. AID'S MANAGEMENT OF THE PROGRAM:

Overall AID's management responsibility in the field will be exercised by the senior AID official in Bamako, the Country Development Officer. Day-to-day monitoring of program operations will be the responsibility of the senior livestock officer, the project manager, who will carry out his functions in collaboration with the principal Malian operating officer, the designee of the Minister of Production. Joint management arrangements will also be concluded with respect to the administration of the joint fund.

Actual implementation of the program will be carried out through host country and US contracts. Technical assistance and procurement operations will be carried out by US firms, African companies and individuals, and the construction of facilities and infrastructure by local firms. Program management will therefore involve the close monitoring, coordination and supervision of several contracts.

An essential tool for planning the management of the program will be the preparation of the annual work plan which will be developed jointly with the GOM. The basis of the work plan will be the Project Performance Tracking System (PPT) of the Bureau for Africa's Management Information System (which is similar to the system recommended by the PEAR Task Force) under which each program activity, both individually and in their interrelationships, is plotted out over time and key implementation events clearly identified. Installation of this system in conjunction with the initiation of the program will provide the basis for identifying critical performance indicators and for the program's reporting and evaluation requirements.

M. RECOMMENDATIONS:

1. That AID approve this program proposal and authorize for immediate obligation (subject to the conditions precedent and covenants for the Grant Agreement noted in Annex 6), a Livestock Sector Grant in the amount of \$7.0 million.

2. That AID approve the authorization of an additional \$3.5 million for a test tse-tse clearing and livestock development with the obligation of this sum subject to the satisfactory completion of the necessary socio/economic, technical and ecological studies and the preparation of detailed plans and cost estimates.

11. MALI LIVESTOCK SECTOR, COM STRATEGY AND PROPOSED AID ASSISTANCE

A. ECONOMIC SETTING AND LIVESTOCK SECTOR:

1. Introduction:

Geography and Demography: Mali's 465,000 square miles of territory stretch from approximately 10° north latitude, where it borders the Ivory Coast, to approximately 25° north latitude, where it borders Algeria (Map 1). Road and rail facilities to neighboring countries are very limited.

The Niger River flows 1,070 miles from the south-east corner of the country through the northeast central region. Portions of the River are navigable for part of the year. Each year the Niger and its tributaries overflow their banks and create a vast interior delta where cultivation and grazing is possible during the dry season. The River is an abundant source of fish and provides a large irrigation potential which is largely untapped.

About 5.5 million people live in Mali. A majority are of Mande or Peul origin. The Moslem religion predominates. The population, increasing at an annual rate of about 2.0 percent is predominately rural; less than ten percent of the population is urbanized.

Agriculture and Livestock Sector: The agricultural sector (agriculture, livestock, fisheries, forests) constitutes Mali's principal resource and is the occupation of about 90 percent of the population. The value of agricultural production in 1972 was \$188.7 million, about 43 percent of GDP. Of that amount, 49 percent was from cultivated crop production, 40.5 percent from livestock, 5.2 percent from fisheries, and 5.4 percent from forestry. With a per capita GDP of about \$70.00, Mali is one of the poorest countries in Africa and one of the world's least developed countries.

The livestock industry occupies a significant place in the agricultural sector and in the economy of Mali. In 1972 the value of animal production was estimated at \$34.5 million.



2. Livestock Numbers, Output and Exports:

Official estimates of livestock numbers more than doubled in the post-war period and during the period 1960-1968, the annual rate of increase was almost 6 percent per annum <sup>1/</sup>. During this period, rainfall was unusually favorable, disease control improved and water development (wells and dams) somewhat expanded the area which could be used for grazing. In 1970 there were an estimated 5.5 million cattle in Mali and 11.8 million sheep and goats. Although the effects of the drought are not yet fully known, the cattle population is believed to have been reduced about 30 percent to perhaps 3.9 million and the sheep and goat populations roughly 20 percent to 9.2 million <sup>2/</sup>.

The age/sex composition of herds in Mali is similar to that of other countries of Africa where milk is an important component in subsistence production and income. The herd composition for migratory herds, can be seen from the numbers in the area of the pastoral zone activity of this project. These are estimated to be the following: \*

Dilly Area: Herd Composition by Age and Sex:

<u>CATEGORY</u>	<u>NUMBER</u>	<u>PERCENT</u>
<u>Females</u>		
Cows	36,000	36.0
Heifers (1-4 yrs)	22,500	22.5
Heifer Calves	<u>7,300</u>	<u>7.3</u>
Sub-Total	<u>65,800</u>	<u>65.8</u>
<u>Males</u>		
Bulls	3,600	3.6
Males (2-5 yrs)	21,300	21.3
Steers, 5+ yrs.	3,300	3.3
Bull Calves	<u>6,000</u>	<u>6.0</u>
Sub-Total	<u>34,200</u>	<u>34.2</u>
GRAND TOTAL	<u><u>100,000</u></u>	<u><u>100.0</u></u>

<sup>1/</sup> The Rinderpest Vaccination Campaign is believed to have resulted in better estimates of cattle numbers. Actual growth rate was probably 2.4 percent per year.

<sup>2/</sup> Mali, C.N.P.E.R., Plan Quinquennal, 1974-78, Programme Retail - Viandes (Bamako, June 1974). More recent estimates suggest cattle losses of 15-20 percent

\* SOURCE: IBRD/IDA, Appraisal of a Livestock Project, Mali (Jan. 10, 1975), Annex 12, Table 1.

Roughly 66 percent of the herd are females and 35 percent males. The composition of the herd could be categorized as "healthy", from the standpoint that few, if any, surplus males remain in the herds. \* Because of the high proportion of cows and heifers, there is a high potential for rapid herd growth during favorable rainfall and grazing years such as occurred during the pre-drought period (see above). Members of the DAP team in November 1974 reported an unusually high percentage of calves with cows because of good rainfall in 1974 and possibly because of the reduction in grazing pressure from drought-related losses and sales.\*\* Also of interest is that there are significantly more female than male calves presumably because female calves are allowed a greater share of the dams' milk because of their greater future economic value as milk and calf producers.

Livestock's share of the GDP declined from roughly 20 percent in 1969 to 17 percent in 1972 mainly due to drought losses and probably declined further in 1973. In 1970, total net meat and offal production was an estimated 146,000 tons including 84,000 or 60 percent from cattle, milk production for human consumption --- from cattle, sheep, goats and camels --- was an estimated 360 million liters.

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\* The largest share of steers over 5 years of age, some 3.3% of herd numbers, are pack oxen used for transport of goods during migration and for cash hire.

\*\* H. Cooper, personal communication.

a. Nomadic/Migratory Production Systems -  
Sub-Saharan and Sahelian Zones.

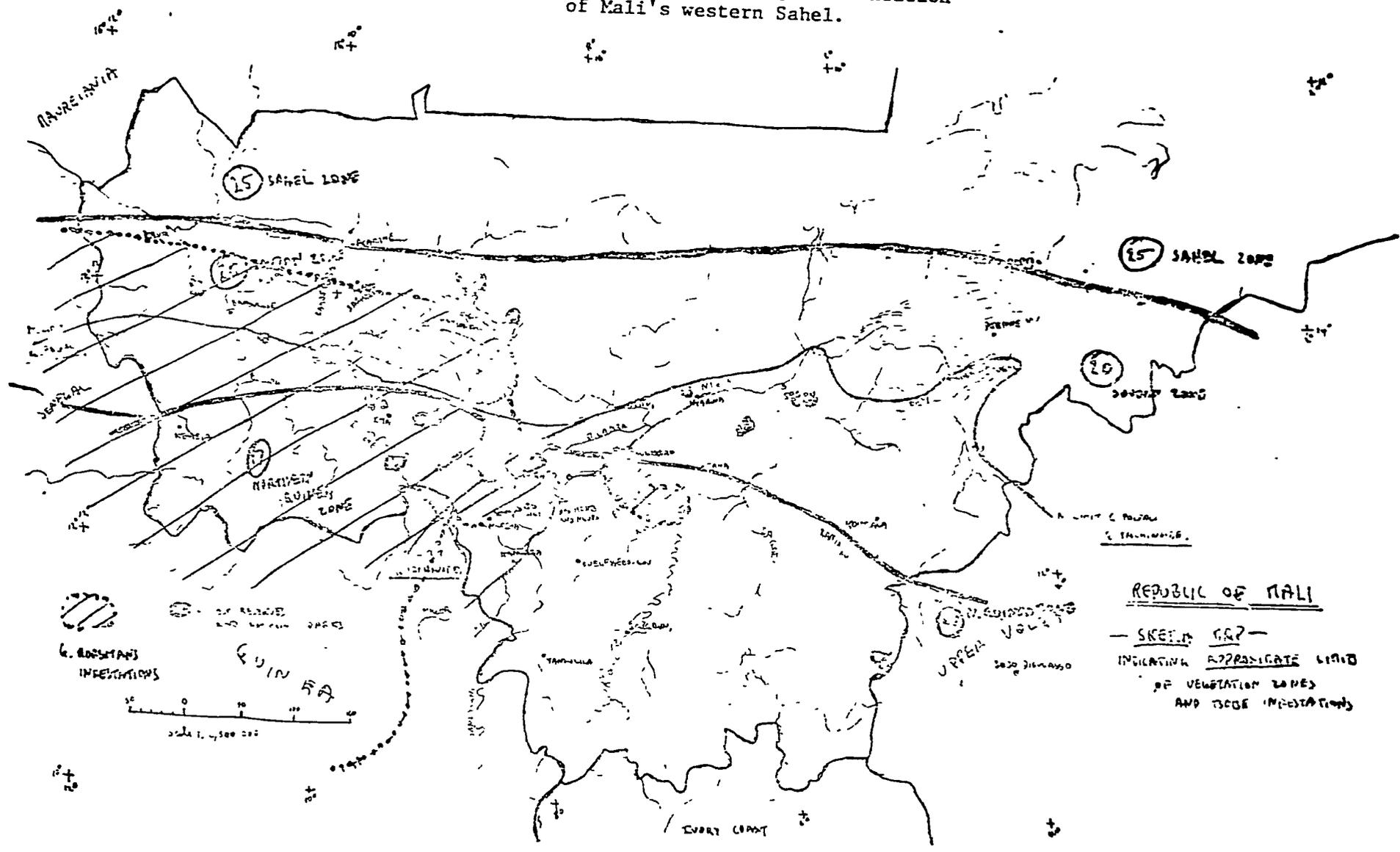
A majority of cattle in Mali are owned by herdsmen who could be described as nomadic or migratory producers. This system of production is associated with those areas where crop production is difficult or impossible, providing a low cost method of harvesting range pasture from extensive areas. The largest area of migratory land use are the Sahelian and Sub-Saharan ecological zones (see Figure 1).

The Sahelian Zone occupies 146,000 square miles or about 31 percent of Mali. Rainfall varies from 10 to 24 inches per year. There is a nine to ten month dry season from September to June. The Sahel covers large tracts between the desert to the north and the more humid woodlands to the south. Grasses in the climax vegetation are usually less than three feet high. There are no tse-tse flies in the Sahel and consequently no Trypanosomiasis. About 3.0 million cattle graze this area. Overgrazing is common where there is a good water supply (see Sahel Grazing Activity).

The Sub-Saharan Zone occupies 15,000 square miles or about 16 percent of Mali. Rainfall is from 4 to 10 inches per year and occurs only during a few weeks in the middle of the year. Vegetation cover consists of small, thorny shrubs and trees. Grass patches spring up during the short rains and some Zebu cattle are brought to this Zone for grazing at that time by migratory and nomadic herdsmen.

Cattle breed types in the arid zones are usually Zebu types and sheep and goats of one

Map #2 - NEW LANDS ACTIVITY  
 Physical and ecological condition  
 of Mali's western Sahel.



a. Nomadic/Migratory Production Systems -  
Sub-Saharan and Sahelian Zones

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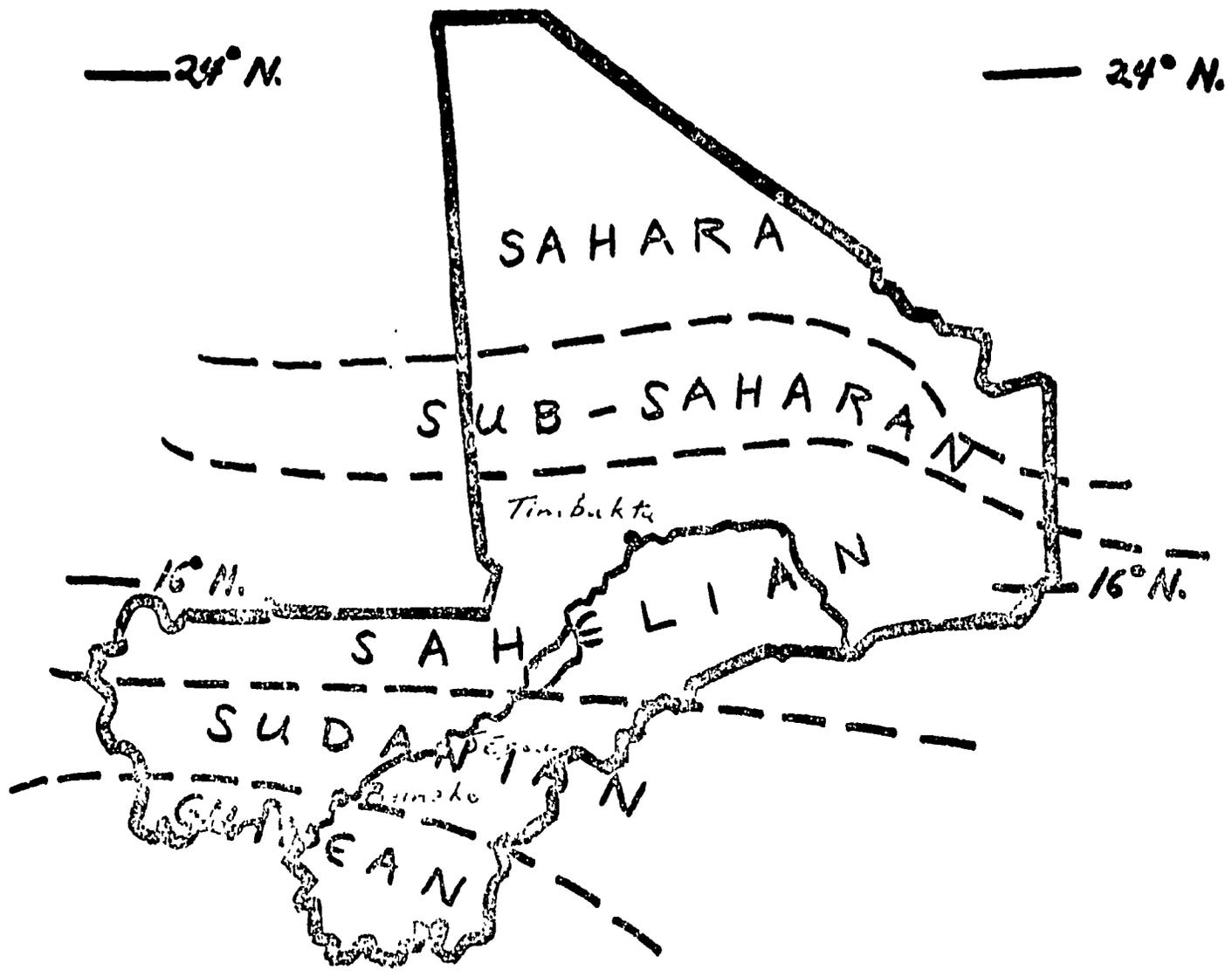


Figure 1.  
Sketch of Climate Zones

of the desert types. The composition of herds varies between zones with cattle being predominant in higher rainfall areas and sheep, goats and camels becoming more important in drier areas. Cattle tend to be managed in large family herds. Transhumance patterns sometimes are long and difficult and often exceed 200 miles. Households depend upon their animals for a major share of subsistence income from the consumption and sale or barter of milk and the sale of cattle. They purchase a major portion of staple food needs although women often grow millet and vegetables near rainy season camp sites.

Tribal affiliations include Tuareg and Arab groups in the Saharan and Sahelian areas and Fulani (Peuls or M'Bororo) in non-desert areas. There are three principal zones of migratory production in Mali: a western zone includes the adjoining areas of Mauritania with herdsmen moving cattle between semi-desert and Sahel rainy season grazing and the Sudan Zone dry season grazers north of the Senegal River; a central zone (north of the Niger) with herdsmen following a north-west to southeast pattern with dry season grazing in the Niger delta area; and a southeastern zone (south of the Niger) with rainy season grazing in Sahel and Sudan areas of Mali and Upper Volta and dry season grazing in the Niger delta. During the recent drought period, some herdsmen pushed as far south as the northern portions of Ivory Coast and Ghana where some are said to have remained in subsequent rainy seasons.

The GOM development strategy for the zone is to assist producers to utilize the fragile range resource more efficiently and to encourage producers to market animals at younger ages for growing out or fattening in association with agricultural production or on grass in higher rainfall zones.

b. Semi-Migratory Production - Sudanian Zone

The semi-migratory/semi-sedentary production pattern is associated with the Sudanian Zone in Mali where livestock owners are usually agriculturalists. This pattern predominates in areas where rainfall and soils permit crop production and Trypanosomiasis does not prevent year-round grazing.

The Sudanian Zone covers 68,000 square miles or 15 percent of Mali's total land area. Annual rainfall is about 24 to 40 inches. The dry season lasts six or seven months, from October to April. The zone is naturally tall grass savanna with many large trees.

Herds graze fallow lands in the rainy season, and because forage is limited, may be moved to nearby zones for dry season grazing. Transhumance distances are usually less than 50 miles. Milk is usually less important as a dietary and income source.

Cotton or groundnuts are usually the principal source of family cash income. Tribal affiliation is most commonly Fulani but includes Malay, Bambara, and Dogon farmers. The semi-nomadic pattern occurs in a belt across Mali that corresponds largely with the Sudanian Zone. In the cotton zone (south central Mali) ox-traction is well established and nearly 75 percent of cotton hectarage is plowed with oxen. In the groundnut zone (western Mali) nearly 50 percent of households own cattle and ox-traction is expected to increase.

The COM recognizes the economic value of animal traction and proposes to increase annual traction substantially. The GOM

also has plans to increase small holder feeding of both immature stock and expended work oxen within the Zone. Overgrazing near villages from sheep and goats is often severe.

c. Sedentary Production - South Sudanian and Guinea Savanna Zones

A sedentary production pattern is associated with high rainfall areas in the southern Sudanian and Guinean Zones. Some owners of oxen for plowing could be included in this category. More commonly owners inhabit zones with riverine species of tse-tse fly and therefore husband trypano-tolerant breeds such as N'dama or Zebu and N'dama crosses. There are an estimated one million cattle in Mali with some degree of trypano-tolerance.

The Guinean Zone covers 45,000 square miles or 10 percent of the country. Here annual rainfall ranges from 40 to 70 inches per year. There is normally a four to six-month dry season from about October to March. Tall grass savannah flourish in wide valleys and strips of evergreen forest fringe the streams. Settled and semi-migratory farmers keep fair amounts of cattle in the zone, although there is still year-round incidence of Trypanosomiasis.

The major developmental problem affecting livestock is that of Trypanosomiasis control. Also, issues remain as to the appropriate system of production to encourage with the alternatives including extensive grazing on a settled or seasonal basis as opposed to the expansion of livestock production by "sedentary producers" already resident in the zone (see New Lands Activity).

4. Marketing Patterns and Prices:

The commercial cattle marketing network linking herders or farmers with domestic and export markets is complex but efficient. It is capable of

gathering cattle in small lots over a vast area and moving them hundreds of miles to urban markets at low cost.

There are four principal cattle trade routes (Map 3). From the west, cattle are moved from Mauritania to the vicinity of Bamako. Some are sold for slaughter there while others continue south to the Ivory Coast. A second important route begins in eastern Mauritania and in the part of Mali northeast of the Niger River delta. Cattle are walked from those regions via Niono or Ke Marino either to Bamako or to the Ivory Coast. East of the Niger River delta cattle are walked to Upper Volta where they either continue on to Ghana or are shipped by rail to the Ivory Coast. Northeast of the Niger delta cattle are walked via Angoso to Niger. Some go on to Nigeria and others to Upper Volta and Ghana.

The livestock marketing industry has been considerably commercialized in Mali during the last 20 years. There are five large markets that deal with 25 to 100 thousand head of cattle per year, and many temporary markets of varying importance. Most of the markets have neither the pens nor the equipment needed to facilitate transactions and to control animals. In certain markets traders have corrected these deficiencies with precarious layouts that they have made or rented. Bank credit has played no role in the livestock industry or in the commercialization of cattle and meat in Mali. Private butchers and traders do have a semi-formal credit role, especially for working capital. The potential negative effects of such a private role has been mitigated by the FY 1974 Mali Livestock Development Project which has an \$800,000 credit fund to provide greater cash liquidity to the system at reasonable rates.

In contrast to the uncontrolled price of cattle on the hoof, the retail meat price at Bamako is fixed at 275 Malian francs per kilogram. This price is not in equilibrium with those prevailing

in external markets. This artificially low official price constraints the provisioning of such large urban centers as Bamako. The government is, however, aware of the situation, and revision of official prices is under study.

The drought has had varying effects on the prices of live cattle. The price of cattle destined for export increased more than 25 percent between November 1972 and November 1973. On the other hand, the price of the lean, meager beef that is most likely to be routed for domestic consumption or exported to Ghana has increased only 5 to 10 percent. The price of livestock incapable of reaching export markets declined.

West Africa has experienced a 10 percent average annual increase in the price of meat in recent years. It is possible that the increased purchasing power of coastal consumers, particularly of those in the Ivory Coast, Ghana, and Nigeria, will so accelerate the demand for meat that the drought-ravaged Sahel will not be able to satisfy it. If one assumes that the annual growth rate of real coastal consumer incomes will continue, investments to increase meat production in Mali including the Sahelian Zone would run neither a short nor long-term risk of not finding buyers for the increased output. The present and predicted future market for meat in West Africa is extremely favorable.\*

Increased government investments in the livestock industry are justified both for investment actions long assumed to be necessary (animal health, water points, firebreaks, applied research, professional training), and also for more intensive livestock production enterprises, the economic and financial viability of which have been marginal up until now because of low cattle and meat prices.

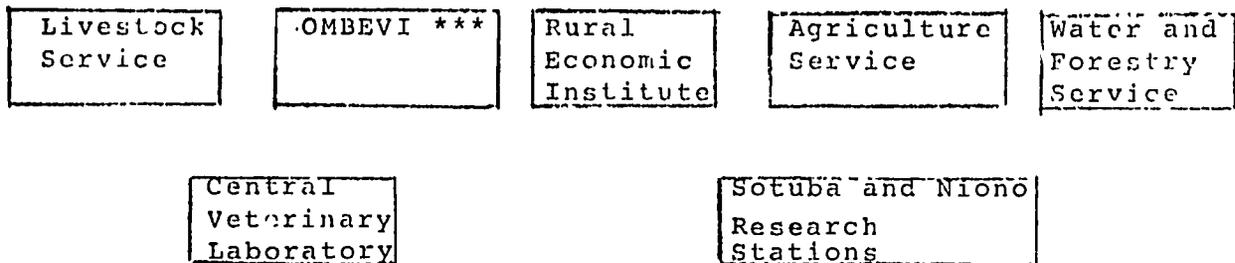
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\*As of March 1975 the price of cattle on the hoof has risen to 150 CFA (\$0.70) per kilo in West African markets.

5. Government Organization and Activities:

Ministry of Production: The Government of Mali has grouped within the Ministry of Production all operating organizations directly responsible for activities in the livestock sector. A simplified model of this organization is shown below:

MINISTRY OF PRODUCTION \*\*  
(Cabinet)



Other agencies that may be involved in execution of livestock programs are the Service Hydraulique (water development) and the Department of Public Works within the Ministry of Public Works and Industrial Development, and the Mali Development Bank.

Three services of the Ministry of Production: the Livestock Services, OMBEVI and the Institute of Rural Economy are responsible for planning and executing livestock programs together with important participation by the Central Veterinary Laboratory and the Sotuba and Niono Research Stations.

Livestock Service: The Livestock Service is responsible for animal health programs nationwide and for supervision of local marketing. The GOI

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\*\* Organization of the Ministry of Production.

\*\*\* Office Malien du Betail et de la Viande (Malian Livestock and Meat Board).

would like to expand the activities of local staff beyond that of providing necessary vaccinations to include control of parasitic disease, animal and perhaps human nutrition services and extension activities with producers. A "Service Pastoral" is planned which will take responsibility for extension of government livestock programs in specific regions. Staffing (including 30 veterinarians) is adequate for a purely epidemic disease control program but effectiveness is reduced by a shortage of funds for operating expenditures. As staff levels expand, the GOM plans to combine persons trained in veterinary service and animal husbandry into two-man local development teams.

OMBEVI: OMBEVI is a parastatal company with primary responsibility for cattle marketing development and is expanding into new kinds of cattle production activities with two objectives: (1) to increase producer incentives to produce and market cattle for meat, and (2) to introduce various schemes of intensive cattle feeding and production to expand meat production and serve as a model for modernization of the traditional sector. The company will be responsible for implementation of intensive cattle production operations within Mali. It is the parent organization for various Etablissement Public which will execute cattle production operations including feedlots and livestock credit to be provided by the Malian Development Bank.

Institute of Rural Economy: The Institute of Rural Economy is the planning, evaluation, and studies arm for all disciplines within the Ministry of Production. The Institute conducts project feasibility studies, evaluates work in progress, and is responsible for planning the development of new lands (areas of low population or with potential for irrigation).

Central Veterinary Laboratory: The Central Veterinary Laboratory (CVL) has very important

functions in the support of livestock development programs as the source of vaccines and diagnosis of disease. Although physical laboratory facilities are more than adequate, the CVL lacks certain equipment and facilities for holding animals required for testing of vaccines. It is expected that the activities of the center will be expanded to include tse-tse survey and fly control/eradication programs in the tse-tse zone. It has been proposed that the CVL might also be the implementing agency for "new lands" development projects following tse-tse eradication. It would also be the logical institution in Mali to develop links to the International Livestock Research Center for Animal Diseases (ILRAD) in Nairobi.

The Soluba Research Station, located near the Central Veterinary Laboratory, was formerly the principal livestock research station in French West Africa. Although a modest facility, it has the capacity for a considerable research program. It has also served as a post-graduate training center in animal husbandry and animal nutrition for graduates of the Katibougou Training School (see below) where facilities are insufficient. The GOM would like to upgrade the station by adding a full range of research, training and operational facilities.

The Niono Research Station is located north of Segou in the central Sahelian Zone. Its research programs includes studies of Sahelian range ecology, and the development of the Zone's livestock industry. The Niono Station will be developed as an outreach center in Mali for the International Livestock Research Center (ILCA) located in Addis Ababa.

An additional research center is located at Dilly in the western Sahel and is supported by the UNDP. Personnel are investigating livestock herding practices in the vicinity of Dilly (see Sahel Grazing Activity).

The quality of Malian managerial and technical personnel at these institutions is, on the whole,

very high. Most of the more senior officials have been trained abroad, often France, but there appears to be an increasing proportion of more junior personnel trained in the U.S. and elsewhere. On the other hand, the layer of senior talent is very thin and very overburdened indeed. There is a serious shortage of "second echelon" talent at these institutions for following up on the decisions and policies of the leaders. Although this group is growing, as Malians return from abroad, shortages at that level can be anticipated for some time to come as the responsibilities and functions of the livestock agencies grow. Further down the scale is a large body of GOM employees, mostly high school graduates, who lack the skills for the more technical and operational activities which are involved, but have the basic knowledge (literacy, basic sciences, French) to constitute a rich, potential, trainable resource (which is now often wasted) for implementing new programs.

#### Education and Training

Formal Training: One of the development priorities of the GOM is the increase in the number of government service employees which are required for specific development activities and to improve their effectiveness by assuring that they are properly trained for these activities. A related priority is to increase the level of knowledge and skills of rural people through formal and non-formal education which will enable them to become more productive citizens.

The GOM's educational system is described in some detail in the Mali Education and Manpower Sector of the CWR DAP. Two schools that provide cadre for veterinary service and livestock development projects are discussed here.

The Rural Polytechnic Institute (IPR) at Katibougou (40 miles from Bamako) provides training to the "Ingenieur" degree at university level (4 years post baccalaureate) and is the main training facility for agricultural technicians (a four-year program at the secondary level - post grade 9).

The IPP also has administrative responsibility for the "Ecole Infirmiere Veterinaire", a training center offering grade 6 graduates a three-year course leading to the rank of veterinary nurse.

Specializations offered in the university level program and the expected number of graduates in each subject in 1974/75, 1976/77 and 1978/79 are as follows:

<u>SPECIALIZATION</u>	<u>PROJECTED GRADUATES</u>		
	<u>1974/75</u>	<u>1976/77</u>	<u>1978/79</u>
Agriculture	29	36	42
Livestock	13	30	39
Veterinary	-	4	11
Water and Forests	12	11	12
Rural Engineering	<u>-</u>	<u>-</u>	<u>12</u>
	<u>54</u>	<u>81</u>	<u>116</u>

Assuming that financing is forthcoming for projected development projects, the GOM has estimated the manpower needs for the livestock sector to be 250 additional persons trained at the technician or veterinary nurse level and 100 at the engineer level during the next five-year period. The existing training institutions should provide roughly 80 percent of projected needs during this period. There appears to be a need to devote greater emphasis on applied subjects particularly animal husbandry, range management, economic subjects and sociology/extension would better equip graduates for projected activities.

In the short-run, there is a need to upgrade the training of existing staff in these subjects and to strengthen practical field training elements of the program. In addition, technical assistance personnel are required to provide the necessary mature expertise during the startup phase of most projects. Participant training at the graduate level in specialized subjects will be required for the indefinite future (see Training Activity).

For the longer run, the GOM has requested AID's assistance in organizing multi-donor financing of improvement of training facilities and faculties for training livestock cadre.

While the emphasis on expanding the government's cadre must be commended and effective numbers will be doubled in the next few years, it must be noted that this will add to the financial difficulties of the GOM and effectiveness is likely to remain low because of the insufficiency of recurrent operating budgets.

Non-Formal Training:

The GOM has initiated a number of imaginative programs of adult literacy, practical training for rural families, and community development with the objective of increasing the levels of skills and knowledge of rural citizens. These are being linked, whenever possible with integrated rural development projects such as the Dilly development office. Programs specifically for cotton, groundnut, rice and millet farming and for fishing areas have been initiated (see Sahel Grazing Activity).

B. MALI NATIONAL PLAN AND STRATEGY FOR LIVESTOCK AND MEAT PRODUCTION - 1974/1978:

The Government of Mali has developed a fairly sophisticated development strategy and program for livestock and meat production which it is seeking to implement during the current five-year plan, 1974/1978. It is based upon an appreciation of the different land use patterns in different parts of the country, the concept of zonal specialization and an appreciation of the limits of GOM's administrative capacity. However, the economical, fiscal and ecological implications of the strategy require additional refinement.

1. The Mali Plan: The Development plan states the following program objectives governing choices of programs for the sector:

- a. In coordination with other West African countries secure the best possible position in the market for meat, in West Africa first but also in North Africa and eventually Europe.
- b. Reconstruction of the national herd to the 1972 level of 5 million head by the end of the Plan period in 1978 \*. It is noted in the Plan that prior to the drought some rangelands were overgrazed and provides the estimate that 10 percent of the losses were due to overstocking. However, it is considered to be a "national imperative" if domestic and export demands are to be achieved, to facilitate the rapid growth of livestock numbers. This would require the implementation of the entire development program, particularly in range areas.
- c. Development of feeding out and fattening, particularly by mixed small farmers, thereby "priming" the demand for young and thin animals from Sahelian range areas. The goal is to fatten up to 120,000 head per year by the end of the period or about 20-25 percent of national offtake. In order to encourage feeding of cattle, by-product feed prices are to be subsidized.
- d. Assure the satisfaction of the full requirements of work oxen for agricultural production. Work oxen are expected to expand from the 1971 level of 140,000 to an estimated 288,000 by 1978 and to 700,000 by 1988. Farmers are to be encouraged to turn over their oxen teams every two-four years, complementing feeding activities. Most oxen will be required for specific rural development project areas in food and export crop zones.
- e. Implementation of the first group of seven integrated hydro-pastoral project zones which include some 40,000 square kilometers of

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\* See evaluation of this objective in section on "Evaluation of Strategy" below.

rangelands (of which the Dilly area grazing activity is one).

f. Encourage the production of substitutes for beef which have less per unit value as export products (mutton, goat, poultry, etc.) in order that exports of beef can be expanded.

g. Open new lands to grazing by Zebu cattle by the control or eradication of Trypanosomiasis in Sudanian and Guinean Savanna Zones.

h. Undertake studies, trials and experiments necessary for evaluating current programs and planning future directions.

2. Evaluation of Strategy: The GOM strategy is, for the most part, a satisfactory one from the standpoint of AID's program objectives. Possible weak points in the strategy are that the profitability of feeding and fattening within Mali is yet to be proven and, strategy and programs for the fragile Sahelian rangelands may not be adequate to prevent overgrazing and range deterioration. The central development problem is the threat of deterioration of forage resources as the result of increased numbers of animals on the Sahelian rangeland and of excessive concentrations on select dry season grazing zones. The drought which reduced cattle numbers by perhaps thirty percent, offers an opportunity for action.

The need is to determine what changes ought to be introduced into the migratory pastoralist system and how one interfaces with that system to encourage desired results. The system affects efficient harvest of forage within certain restrictive parameters. At the same time, the absence of cost to the herder in his use of grazing lands is a significant disincentive to land use improvements within the zone. If cattle numbers build up beyond carrying capacity of the range, the migratory pastoralist system gradually, and with astonishing uniformity, degrades the range.

The key medium to long-term programs to preserve the land resource and improve incomes must include a combination of three kinds of actions to encourage more favorable conditions over time:

- a. Within the Sahel, improve management of the available forage resources;
- b. in higher rainfall zones, open opportunities which will shift a large portion of the cattle feeding burden to these more productive areas; and
- c. provision of markets and extension education to obtain herder cooperation by providing motivation and incentives to modify traditional management patterns. The Mali Livestock Development Project and this present proposed sector Grant are designed to contribute directly to these key programs.

3: Public Policy Constraints: Marketing and macro-economic constraints are important limitations on expectations from the sector. Prices for meat and cattle and consequently farm level profitability is the single most important constraint to modernization of the sector. As an inflation control measure, the GOM maintains price controls on major food commodities including meat. This has encouraged non-regulated cattle exports and resulted in seasonal supply deficits in domestic markets. The national development plan calls for the removal of price controls on beef but proposes to retain them on other animal proteins in order to encourage their consumption. The net effect, if implemented, should improve the economic viability of activities supported under the proposed project. For example, deregulation will initially strengthen the domestic market for beef and thereby increase producer incomes. It will remove the economic basis for the present "unofficial" market and the clandestine slaughter of animals. Over the longer-term

it will establish a healthier, more positive relationship between the GOM and the livestock industry and thereby encourage and facilitate access to the utilizers of government services. Also, by allowing beef prices to rise, deregulation will encourage consumption of other protein sources as their comparative price advantage increases.

Second, chronic budget and balance of payments deficits, in part the result of the drought-related decline in tax revenues and requirements for increased food importations, have handicapped government services to all sectors. Taxes on livestock and export taxes on cattle provide an important, and necessary, source of local government and national tax revenue respectively.

Third, the GOM is modifying the institutional framework for livestock production operations so that the operations will not be dependent upon underfinanced administrative services (see Sahel Grazing Activity). There needs to be considerable effort to revise tax levies for the sector with a view to expanding the revenue base as productivity and asset value increase. User charges should be instituted both as a source of revenue (which might be retained by livestock production operations to offset a portion of operating costs), as means for valorizing services which are to be extended to herder groups, and as an incentive for rational use of land and water resources on the part of herder groups.

From the GOM/AID discussions on public policy constraints it appears that the GOM is taking measures that are now timely. The Ministry of Production has been receptive to use of A.I.D.'s technical assistance in reviewing ways in which the revenue base may be extended and revenue increase maximized as investments in livestock production expand livestock resources. The Ministry of Finance has accepted a financing scheme for the sector grant which will require

GOM's contributions to increase. Through these two initiatives, and continued collaboration with the GOM, it is hoped to bring about a more favorable allocation to the sector of revenue gains from livestock production.

4. External Assistance to the Livestock Sector:

AID and other external donors are playing a growing role in financing the development of the Malian livestock sector. Such assistance is facilitated by the planning and coordinating role of OMBEVI which serves as the GOM's principal liaison agency with external donors and has helped to assure the complementarity of their inputs.

a. A. I. D.

AID/s most notable contribution, prior to the recent drought, was an earlier \$1.95 million loan for the construction of a modern vaccine production and research laboratory, the Central Veterinary Laboratory (CVL). Having commenced operations in 1972, the CVL provides the major vaccines for the Malian Livestock Service as well as carrying out vaccine and entomological research. In FY 1974, AID approved a PROP for follow-on technical assistance and training for the CVL in the amount of some \$200,000 per year over a five-year period. FY 1974 also saw the initiation of three emergency relief and rehabilitation projects related to the livestock sector totaling \$1.1 million (urgent supplies and equipment for the CVL, livestock activities at Kayes, and emergency medicines and supplies for the Livestock Service).

In addition, in August 1974, AID and the GOM signed a \$3.4 million Grant Agreement to implement the Mali Livestock Development Project. This project addresses the expansion of livestock production and marketing in the intermediate rainfall areas of Western

Mali through: (a) dry season intensive feeding operations at Segou and near Bamako to finish cattle for internal and export markets, (b) encouragement of livestock raising operations on the part of sedentary farmers at Koulikoro and Douna, (c) introduction of a range development and rotational grazing scheme southeast of Segou (Doukoloma) to encourage improved dry season grazing on the part of both sedentary and migratory herdsmen, (d) a livestock credit program to provide short-term operating capital for the foregoing activities. Thus, the Mali Livestock Development Project will seek to implement a major aspect of the GOM's strategy for livestock development, namely, the stratification of the industry by strengthening marketing operations and by developing the role of the intermediate rainfall areas for growing out cattle for slaughter.

b. I. B. R. D.

The World Bank has recently made a \$13.3 million IDA credit available for improving dry season forage resources in the inland Niger delta region. Since the Niger delta floodplain is the major dry season forage resource in the central Sahel and one of a limited number of areas with permanent watering points, it was severely abused in the drought years. In addition, land available for grazing is being reduced by competitive land use for rice production. The project will seek to slow down the seasonal migration of cattle into the delta by providing outlying watering facilities and will aim at better control of grazing around watering points in the delta. The Bank has also been asked to consider an integrated development project for the Upper Valley of the Niger; this project would have a major livestock component.

c. European Development Fund:

The European Development Fund (FED) provided \$4 million in CY 1973-74 to the GOM to help the latter offset revenue losses when it suspended the cattle tax to assist the herding population during the drought. FED also provided medicines, vaccines, nutrition supplements and support equipment in the value of about \$700,000 in 1974. In addition, the FED is financing a project for breeding Ndama cattle at Yanfolila. Ndama are a local breed of cattle with a tolerance for Trypanosomiasis. The objective is to produce quality Ndama for work and reproduction and milk stock for mixed farming areas in Southern Mali. FED's financing of agricultural production in the Fana area also provides for introduction of work animals and village milk herds. FED has also financed studies for a feedlot and ranch at Niono and for an integrated livestock scheme for southern Mali. The former is presently receiving serious consideration.

d. F. A. C.:

The French Foreign Aid Agency (FAC) has financed a number of studies which have later led to investments (the Yanfolila breeding station and the Niger delta project) and has supplied the Malian Livestock Service with vaccines, supplies, and equipment on a limited basis. In addition, a three-year animal nutrition and parasite treatment test study was started in 1972 in the region of Dire-Goundam.

e. U. N. D. P.:

The UNDP has financed several small studies in Mali but its principal activities is a technical assistance project (FAO being

the executing agency) to provide OMBEVI with personnel to assist with planning and analysis work, to conduct studies, and to train Malian replacements. The research station at Dilly was launched in the context of this project.

Also to be noted is the probable creation of a research sub-station of the International Livestock Center for Africa (ILCA) at Niono to study means to encourage the stratification of livestock production. This investment may amount to \$1.5 million and would add considerably to the infrastructure of the Niono du Sahel Station.

C. RATIONALE FOR THE PROPOSED SECTOR GRANT:

1. Basic Sectoral Approach:

The program proposed has several features new to our programming in the Sahel. It is designed to enable the US to transfer resources for discrete activities of direct importance to those affected by the drought while at the same time focusing on problems and policies which go beyond individual activities to basic sectoral policies of a long-term nature.

The sector grant approach is appropriate to this program for the following reasons:

- a. The GOM has developed a livestock strategy for the Five-Year Plan which contains an integrated approach to zonal specialization and to production, finishing and marketing factors. The Plan represents a major achievement and, compared to the state of sector planning two or three years ago, provides a basis for policy level and sector-wide discussion, and for evaluation of discrete input. This was not the case when the Mali Livestock Development Project (1974) was conceived and planned.

b. The proposed program is characterized by a series of discrete activities. However, taken together with Mali Livestock Development Project and other AID's assistance to the sector, it provides for an ensemble of activities touching upon most key elements of the Malian strategy. By managing this program, and other AID inputs, in an integrated fashion, it facilitates AID focus with the COM on the sectoral significance of these activities rather than as separate, area or problem - specific activities. The GOM also sees the program in this light, i.e., as testing approaches needed to implement the overall strategy.

c. The major element of strategy not dealt within the GOM's Five-Year Plan is solving the financial constraints to investment in the sector, and the economic and social constraints to modernizing the Sahelian production system. Some of the problems associated with these matters are sensitive issues and go beyond the livestock sector in their implications, i.e., pricing, future of nomadic groups. However, through the sector grant --- especially in the Sahel grazing and joint fund aspects of this program --- AID would be able to help the GOM think through and find solutions to them.

By a sector grant approach, it is meant that the several activities supported under the grant will be administered in respect to their effect on, and contribution to the GOM's capacity to plan, finance, and implement an overall sectoral program in livestock. Certain elements of the program --- training, research, land use planning, consultative services on finance, etc. --- will be provided not only in relation to the discrete areas and activities of the field sites under the project (Dilly and the Trypanosomiasis belt), but in relation to developing the COM's overall capacity as relates to livestock. Key issues that have formed and

will form the basis of discussion between AID and the GOM in planning and executing the program will include sectoral issues of overall concern, i.e., financing of the sector, herder/farmer participation in decision-making and land-use control. Further contributions to the program in years 4 and 5 will depend not only on success in the individual activities but on an evaluation of progress in overall sectoral programming and rationalization of policy, particularly those key constraints discussed in Section B(3) above.

This approach also stresses maximum emphasis on GOM's leadership in design, detailed planning, execution and evaluation. In no other way can the activities impact upon the GOM's planning and capacity. The major elements of this program were proposed by the GOM, and the design of individual activities done in full collaboration between the GOM officials and foreign technical specialists. The style of execution must similarly stress the GOM's leadership in executing and evaluating the experimental methods herein supported. AID's representatives will therefore need the flexibility to refine the design and implementation plans of the program on the basis of close GOM/US collaboration within reasonable limits. These annual plans will provide the basis for evaluating progress in design and execution as well as the basis for each year's exact budget.

Finally, the sector approach implies reaching toward coordinated donor efforts in Mali. The primary responsibility for this coordination must come from the GOM, which has heretofore been reluctant to bring donors together. The sector approach however inevitably touches upon issues of importance to all donor programs in Mali. Already, FAC, UNDP and UK

personnel have participated in the design of this project with the GOM's approval and sometimes initiative. As lessons are learned from the program, the value and path to coordinated livestock planning by the GOM with all donors will hopefully become clearer and more acceptable.

2. Objectives of this Grant:

a. To help reestablish the livestock sector, particularly as food source, and to initiate measures necessary to avoid greater losses to herds or damage to pastureland;

b. to improve human resource capacity of government personnel and herders, and to increase communication of information to and exchange of ideas with persons dependent upon livestock for their mode of survival;

c. to aid the GOM to carry forward their livestock program pursuant to their Five-Year Plan, while providing the means by which they may improve their strategy, evaluate ongoing efforts and encourage further external support.

3. Background to Sector Grant Proposal:

The initial Mali Livestock Development Project (grant of \$3.4 million for cattle production activities in proximity to commercial outlets) was conceived in early 1973, and obligated in August 1974.

Livestock was identified as the focal point for initial medium-term Sahel assistance to Mali. A design team visited Mali in April-May 1974. There was a constructive dialogue, but important areas where a consensus was not reached. The full range of program possibilities was reviewed by AID/W in early August and a revised program proposal was prepared for consideration of the GOM. Concurrently, the Deputy Administrator approved on November 7,

1974 a memorandum authorizing an AID negotiating team to undertake discussions with the GOM on the policy program and financing issues involved in the grant proposal and to seek agreement on them. These negotiations began November 13 and a full consensus on all aspects of the proposed program was reached in a plenary session chaired by the GOM Minister of Production on December 2\*.

A revised project paper was prepared and reviewed within AID in January and was approved for transmittal to the Deputy Administrator at an AFR Executive Committee for Project Review meeting on January 25, subject to a number of points raised at the meeting (see attached covering memorandum to the Deputy Administrator for details). The paper was further revised on the basis of these and a number of related points, and is now ready for final consideration.

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\*The discussion actually occurred in two contiguous phases with senior AID management personnel participating in initial discussions which established the conceptual outlines of the program, the details then being completed by the Design Coordinator, the Country Development Officer and their staffs.

### III. PROPOSED PROGRAM

#### A. INTRODUCTION

The proposed program is designed to provide assistance to the Government and people of Mali directed toward the post-drought recovery and medium-term expansion of the livestock sector and consequently upon the food supply and quality of life of those dependent upon the livestock sector for their livelihood.

Activities and sub-activities are centered upon improving the productivity and output of two of the principal rangeland areas, the Sahel and Northern Sudanian Zone and the Southern Sudanian and Guinea Savanna Zones of Western and Southern Mali.

The new lands activity is the first attempt to open new areas of livestock use through eradication of tse-tse fly, to evaluate the risks of such intervention and of alternate means to expand land areas which may be used for cattle production. It represents both an enlargement of and a complement to the Sahelian Zone for cattle maintenance and growth. The Sahel grazing activity seeks to test first, the extent to which modalities can be developed for modifying rangeland use over a very large area, and second, the complementary activities which may create opportunities for or influence decisions by Sahelian herders. The two activities together are initial efforts to measure how one moves toward a more efficient use of overall land resource opportunities for livestock production. The training and communications activity is to facilitate influence on human factors related to accomplishment of the principal and other activities. The complementary activities provide for needed institutional support, further studies and design work, applied research, evaluation of work in progress and funds for meeting unanticipated needs or for approaching new opportunities.

#### B. NEW LANDS ACTIVITY

##### 1. Objectives

The objectives of the new lands activity in a two-phase program are to develop the survey and tse-tse control/eradication capability within Mali necessary

to make full productive use of zones infested with tse-tse fly, the vector of Trypanosomiasis (Phase I). The second phase would be to test through a suitable demonstration project, the cost, benefits and proper phasing for opening new areas to improved livestock and agricultural utilization. Opening new lands areas will require the control or eradication of the Trypanosomiasis vector and maintenance of the cleared zone complemented by physical improvement of the zone pursuant to a land use plan.

## 2. Significance

Opening or expanding the use potential, of the tse-tse zone, has a high priority in the Malian Livestock Development Strategy which would reduce the grazing pressure within existing range areas and would contribute to stratification of production. Areas to be opened may have potential for agriculture (crop) as well as livestock development potential and human sleeping sickness is an important human health hazard in some fly-infested areas. There are an estimated 60,000 square miles of fly-infested area in Mali or roughly 20 percent of the land area.

The scope of the tse-tse problem in Mali is (determined by Map 4), the physical and ecological condition of Mali's Western Sahel. Trypanosomiasis limits permanent livestock production south of the 13th parallel to trypano-tolerant breed types. The riverine species, *Glossina tachinoides* and *G. palpalis* which inhabit the Guinea Zone, are found well north of the 13th parallel along water courses where vegetation permits. *G. morsitans*, a savanna specie, severely limits all forms of livestock production in a belt north and east of Bamako stretching to the Senegal boundary, and along the Niger River, east of Bamako. Fly species result in the transmission of *T. congolense*, *T. vivax* and *T. brucei* in cattle and *T. gambiense* in humans.

At the present time in Mali there are no control operations for *G. morsitans*. However, there is a 30 square kilometer tse-tse free area maintained around Bamako. Beyond this area the incidence of human sleeping sickness is endemic and in the village of Bankouman it was found that an average of 40 to 50 new cases of human sleeping sickness are reported every month for a population of 15,000 persons,

### 3. Phase I Activities

Phase one activities may be summarized as follows:

- a. Conduct general fly surveys and map location of the different fly species and associated vegetation conditions;
- b. conduct studies of fly ecology, identifying preferred habitat and feeding and breeding patterns in order to identify the most suitable technique of eradication, prevention of reinfestation and surveillance to assure sites remain fly free;
- c. develop land use plans and estimate cost of fly control/eradication and those of necessary physical improvements;
- d. select initial site for test operations, conduct detailed site survey and develop plans including cost estimates and feasible analysis for the test site.

Activities a and b will be carried out by the Entomology Section of C.V.L., activity c jointly by OMBEVI and IER and activity d in a collaborative fashion between the three agencies and AID.

An important aspect of the preparatory work related to the planning of a test site will consist of the plans and preparations carried out by the GOM for the management of the site after it has been developed. Such plans will, of course, be based in part upon the results of the surveys and the physical planning of the project. In addition, however, the GOM will need to address such questions as the utilization of the site as between livestock and crop production purposes, which ethnic groups will be eligible to utilize the sites, pastures and land and in what manner, how the site will be administered, including the participation of communities themselves, and what incentives, facilities and regulations will be required to protect the newly opened areas from overstocking and environmental degradation. The GOM will be informed prior to the signing of the grant agreement that such planning will need to be completed in a form satisfactory to AID prior to AID consideration of a GOM proposal for funding the test site, and that the implementation



of such plans (necessary legal, budgetary or administrative actions) must be completed prior to initial disbursement of Phase II funding.

4. Phase II: Test Control/Eradication Activity

Three alternative test sites within the tse-tse zone have tentatively been identified. They are indicated in Map 3. The first site is located northeast of Bamako on both sides of the Niger River.

The first seems quite attractive from the standpoint of ease of fly eradication but less clear is how to appraise the economic benefits of eradication in a populated area. However, it is expected that there could be considerable further southerly migration of Zebu cattle and the introduction of more intensive forms of cattle production near the Daminga River.

The second site, a morsitans zone northwest of Bamako is attractive because of its size, proximity to Sahelian rangeland, and relative ease in fly eradication as it is the northernmost area of infestation. Feasibility as a site depends in part upon verification that land use, particularly agriculture, to the southwest of the site provides an effective barrier against reinvasion from the G. Morsitans belt in the higher rainfall area southwest of the site. The principal drawback is the presence of the National Wildlife Park. The exclusion of the Park from land use could undermine the economic justification and provide a reservoir of fly and disease.

The third site is an enlargement of the studied Siby-Narena site, south and west of Bamako. The forest reserve north of that site and some surrounding areas would be added and a barrier on the north side would need to be retained and controls established along the Niger River to protect against reinfestation through river commerce.

Order of magnitude cost estimates can only be made for the fly eradication operations. Therefore, it is recommended that the land use planning element of the new lands activity be organized as quickly as possible and begin its effort by appraising potential land use improvements in order to accelerate the selection of the choice of initial test site.

An order of magnitude cost estimate of \$3.5 million for the test phase is based upon the choice of site alternative #1. This represents \$1.5 million for fly eradication operations; \$1.5 million for the initial land development improvements and \$500,000 for post-preparation operating costs, inflation and contingencies.

A corollary to the test eradication will be whatever other phase 2 actions are demonstrated to be warranted using chemotherapy or trypano-tolerant cattle in zones not covered by the eradication test action.

It is recommended that funding for Phase II of the new lands activity be authorized as part of the sector grant with the proviso that a decision to proceed into Phase II and the obligation of the additional funds involved (by amendment of the Grant Agreement) would be subject to the usual AID project design criteria and a positive AID/GOM determination that the Phase I studies justified such an investment and that the GOM's planning for site management was adequate. The authorization of such funding in advance by AID would, however, demonstrate AID's seriousness of purpose and provide an assurance that funds for the actual development of a new lands test site would be available if the preparatory work was satisfactory.

An appraisal of the "spread effect" and benefits of such a project must at this point be necessarily quite speculative. Assuming the first site (approximately 400,000 hectares) is chosen, it would be capable of supporting about 50,000 people under conservative assumptions -- i.e. that the area would be used for seasonal grazing only. However, it is already clear that certain stretches along the rivers might be suitable for more intensive forms of cattle production and that certain areas would be suitable for crop cultivation. Development of those areas for such purposes would permit greater density of human usage. These questions will be addressed by the detailed land use plan which will be prepared for whichever area is selected. The land use plan will also need to provide assurances that principles of fairness and equity are followed in the selection of those who are given an opportunity to utilize the area.

In addition to the direct effect of the project on the welfare and income of those utilizing the project area, there will be indirect benefits in the form of increased taxes to the GOM, increased incomes to livestock traders and butchers who distribute and process the cattle, and increased foreign exchange earnings accruing to the GOM over what would have been the case without the project.

##### 5. Management/Organization of the Activity

The institutional link for the Trypanosomiasis control eradication sub-activity will be through the Central Veterinary Laboratory (CVL). Basic fly surveys have been conducted by the Entomology Section of the Laboratory. It is proposed, under this project to strengthen the capability of the Entomology Section in both the detailed surveys necessary for planning control eradication scheme activities and to add a capability in tse-tse eradication. This will give to the Laboratory an extensive, operational role which heretofore it has not played. The question has been raised as to whether the Laboratory should be the logical recipient of recurrent financial support for such an activity when it has been unable to implement an effective diagnostic outreach to complement veterinary actions provided by the Livestock Service. A corollary question is whether the advantages of CVL taking on this task outweigh the disadvantages of burdening the Laboratory with a heavy operational responsibility in a specialized area in support of livestock operations, when there are many research tasks which will be added to its responsibility.

It has been agreed that the advantages of this linking outweighs the disadvantages. First, it would tie the research and technical expertise necessary for successful control/eradication activities directly with operations. Second, there is a core of trained persons attached to the CVL who can provide the nucleus for the activities and for training. Third, the basic office laboratory and storage/repair facilities are already in place.\*

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\*The GOM will review in the future whether creation is warranted of a separate institution grouping the human (Service des Grandes Endemies) and cattle trypanosomiasis eradication and maintenance capabilities.

Also, CVL should have more of an outreach to animal health operations in general and the proposed activity offers a select and interesting start.

Parallel to these activities will be investigation and analysis of the use of prophylactic treatment of cattle (trypanosides), the measurement of residual drug effects on cattle in intermediate rainfall zones, and the introduction of trypano-tolerant cattle will also be appraised. The objective will be to identify the appropriate method for the control/eradication of Trypanosomiasis for specific sub-zones based upon economic feasibility and ecological conditions.

Detailed land use planning will be the joint responsibility of IER and OMBEVI as well, as will project design and economic feasibility studies. Specific responsibility for development activities will depend upon their nature as livestock, crop and infrastructure developments may be included in area development activities. It is anticipated that a land use planning unit will be established in the IER (see below).

The GOM originally proposed that the Entomology Section oversee the entire new lands program although OMBEVI/IER would have responsibility for post-eradication development. The GOM is currently reviewing whether the CVL or another agency will have the principal coordinating role, probably IER.

The proposed management formula will strengthen existing Malian institutions and provide the necessary integration of multi-disciplinary activities to be practical and workable.

An important element in the planning of the new lands activity will be the planning for the institution of user charges for livestock owners and agriculturalists who are given access to the test site after it has been developed. As indicated in Annex VI, the GOM will use its best efforts to introduce such a system of charges for both the new lands and Sahel grazing activities (see below), thereby beginning to generate revenues for the maintenance and operation of both sites. AID will be prepared to provide, upon request, technical assistance addressed to the economic and technical issues

which such a system might raise, and alternative solutions.

#### 6. Environmental Considerations

The new lands activity, if implemented, will have a beneficial effect on the area to be cleared and developed. The area is now infested with three types of tsetse flies, two of which, *G. Tachinaides* and *G. Palpalis*, are riverine species which serve as vectors for human sleeping sickness (Trypanosomiasis). The third, which thrives inland in savanna habitats, is the *G. Moristans* that attacks and infests cattle. Thus, the new lands activity will rid the area of an environmental hazard that is deadly for both humans and animals and is presently severely limiting its productive use.

A second beneficial environmental effect of the new lands activity will be the land use and range management plan that will guide the development and utilization of the area after it has been cleared of tsetse infestation. These have already been referred to in sub-sections 3. and 4. above. The plans will involve a system of incentives, practices and legal measures, accompanied by appropriate infrastructure, to prevent overgrazing of range lands or ecologically harmful agricultural practices (slash and burn). AID will assist the GOM in the formulation of such plans through the technical assistance to be provided to the Land Use Planning Unit. The detailed land use plans which will precede the funding and implementation of Phase II of the new lands activity, i.e. the test site, will also contain guidelines and procedures for making adjustments in land use patterns as population increases or as land values grow. One must also bear in mind that 20% of Mali's land area in the Sudanian/Guinean zone that is presently unutilized (because of disease-bearing insect infestation), offers a potential resource for relieving population and land use pressures over the long term, if the development of the test site is successful.

Another major environmental consideration involves the use of insecticides for eradicating the tsetse fly in the test zone. As indicated in Annex IV, Environmental Considerations, great care will be

be planned to avoid adverse environmental consequences to fish, birds, wildlife, domesticated animals and humans. No shear clearing or wild game destruction is proposed. The plan is to use a single application of insecticides (DDT) in moderate quantities with hand sprayers along the rivers for the riverine species of fly and back from the rivers for up to three kilometers for the savanna. In addition, select vegetation in recognized testing and breeding areas will also be treated. Additionally special formulations of DDT will be developed to reduce adverse environmental effects and to maintain the deposit on the testing sites. The opinion of leading experts who have visited the area, and the findings of the West African Institute of Trypanosomiasis Research (WAITR) both support the ecological integrity of the proposed approach. A more detailed discussion of environmental considerations is included in Annex IV.

The treatment, to be effective, would need to be accompanied by a program of surveillance and spot treatment to prevent reinfestation. The planning and organization of such a program would, of course, be part of the technical assistance to be rendered to the CVL. Adequate GOM financing for the surveillance and control program would be sought through the user charge system and cattle taxes.

In addition to the foregoing, which applies to the actual clearing and development of a test site, (Phase II), Phase I of the new lands activity will emphasize environmental considerations in the training programs for the Malian staff of the Entomological Section of the CVL (see section 8 below) which will have responsibility for the clearing and spray operations.

#### 7. Relation of New Lands Activity to Land Use Capability Inventory

Mali's land use capability inventory, a proposed separate AID project, has two principal objectives: provide basic soils maps for Mali based upon land use capability for each soil type and, strengthen the land use survey and planning capability in Mali. The proposed link institution for this activity will be the IER.

It is expected that the soils mapping will be conducted under a PASA agreement with the USDA Soil Conservation Service. It will be phased in such a manner to provide necessary general land use, range inventory and land use potential for both the new lands activity and the Sahel grazing activities on a priority basis, facilitating the choice of the specific site of the new lands activity and subsequent potential additional project zones (see discussion below on Land Use Planning Unit).

8. Staffing, Technical Assistance and Training

(a) Entomological Section of CVL:

The sector grant will facilitate the expansion of staffing for the Entomological Section of the Central Veterinary Laboratory to include 3 supervisory personnel plus operations people, as follows:

1. One senior tse-tse officer, who will be the Malian official directly responsible for coordination of all aspects of the new lands activity;
2. one tse-tse research officer, who will be responsible for supervising fly surveys and fly ecological studies as well as for parasitology, drug resistance trends and other elements of laboratory research and;
3. one survey and ground spray operations officer who will be responsible for leading field crews on survey work and for conduct of eradication, maintenance, and surveillance operations.

There will also be 12 tse-tse fly surveyors, who must be capable of differentiating species of fly, plot and identify fly habitats, plot fly captures, report on vegetation, livestock and human habitation of individual zones. Some of the fly surveyors will also be trained as ground spray operations personnel.

A modest number of additional spray operations personnel will need to be trained in advance of the test operation; when the eradication method

is determined, the number of permanent operations personnel can then be estimated and additional staff trained.

Three technical assistance personnel are suggested for the Entomological Section:

1. A Glossinologist/Entomologist. This person will advise on research, planning and operations. Since such persons are few in number, it may be necessary that the individual be a non-US technician and it is likely that he will have modest field experience. Therefore, it is suggested that in addition a consulting arrangement be worked out with an experienced glossinologist to assure that quality of experience is brought to the Mali program;
2. a protozoologist researcher specialized in cattle trypanosomiasis. It is assumed that this individual would be obtained through other donor assistance and he is not included as a cost to the project. In addition to protozoa research, he will be adviser in evaluation of drug use efficiency and residual drug resistance, and will help assure balanced evaluation between comparative benefits/costs of eradication and prophylaxis approaches;
3. a tse-tse eradication operations officer who will advise and assist in logistics, planning, and operating techniques for field surveys and operations.

Participant training is advisable for all three Malian supervisory personnel (phased) and for the 12 tse-tse surveyors. Training will include adequate consideration of environmental factors, both with respect to avoiding harmful consequences of spraying operations as well as to the surveillance and control program which is to follow.

The senior officer may receive brief training at the Muraz Center in Bobo Dioulasso, Upper Volta, and should visit ongoing eradication operations in Nigeria during the period from December to March. Subsequently, it may be desirable for him to receive more extensive field training in

an Anglophone country with eradication operations (Nigeria, Tanzania).

The research officer should be trained for at least 6 months to one year at the Nigerian Institute of Trypanosomiasis Research after a brief introductory training in Bobo Dioulasso.

The survey and ground spray officer may be given direct application training at the tse-tse and trypanosomiasis division of the Nigerian Federal Ministry of Agriculture and Natural Resources.

The fly surveyors should be trained for about six months at the Muraz Center in Bobo Dioulasso.\* It may also be necessary to provide in-country training related to G. Morsitans eradication by use of a short-term expatriate specialist.

(b) Land Use Planning Unit:

The Land Use Planning Unit will require multi-disciplinary staff to accomplish:

- (1) surveys of current land use, range inventories and land use classification and potential (separate AID project above);
- (2) land use planning, for both agriculture and livestock, for specific project areas;
- (3) design and cost estimation for physical improvements; and
- (4) economic analysis of area development plans including an appraisal of socio-cultural aspects of land use development.

A multi-disciplinary staff is required for: (1) appraisal of physical condition and land use potential; (2) land use planning and physical improvements; and (3) economic and social analysis group.

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\*Discussions have begun in December 1974 between the French and the Germans on establishment of a training center in Bobo Dioulasso for livestock operations personnel for tse-tse fly eradication programs. Therefore, one may anticipate that eventually a complete training service could be obtained at a center in Bobo Dioulasso.

Staffing will consist of four Malian soil and land use planning personnel including one senior land use planner, three Malian range management technicians, and three Malian economists or sociologists.

US technical assistance will be provided through a PASA with the Soil Conservation Services (S.C.S) of the U.S. Department of Agriculture which is also being considered as the technical assistance agency for the land resource inventory. (See Section D above.) The S.C.S. would plan its work in two phases, the first relating to the land classification, range inventorying and land use activities being financed by the proposed sector grant, and the second relating to the broader land resource inventory task, assuming funding for the latter project is approved.\* Throughout both phases, the underlying objective will be to assist the GOM to establish and develop the competence of the Land Use Development Unit to perform the various functions noted above. The S.C.S. would provide, either from its own ranks, or under contract, expertise in soil and land classification surveys, range management, land use planning and socio/economic analysis, and would supervise the training of Malian personnel in these fields.

The first phase of the survey and resource inventory work would focus on the areas under consideration in the new lands and Sahel grazing (see below) activities. Reconnaissance-level soil and land classification surveys would be carried out at each of the proposed sites. Following site selection based on the results of the surveys, a detailed appraisal would be prepared of the proposed site (as noted in Section B-3 above) including economic/social analysis, cost estimates and land use plans for the development of the site.

Participant training for land use planning and range management personnel should, where practicable, be in arid land areas of the US. The senior land use planner should receive at least one full-year of academic training in a US institution complemented by a series of extracurricular practical training experiences. Two additional personnel should receive training in rotation for at least 6 months at US institutions,

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\*The validity of utilizing the S.C.S. for this purpose does not, however, hinge on approval of the broader mapping project. In the absence of such approval, the S.C.S.'s role would simply be limited to work discussed in this paper.

Cost Summary

Phase I

	1	2	3	1-3	4	5	1-5
Local Personnel Costs	24,488	24,488	24,488	73,464	24,438	24,488	122,400
Training Costs	116,000	50,000	12,000	178,000	-	-	178,000
Technical Assistance	315,000	337,500	277,500	930,000	172,500	97,500	1,200,000
Plant, Commodities & Equipment	76,150	10,000	-	86,150	-	13,000	99,150
<u>Recurrent Support</u>	11,975	15,560	15,638	43,173	16,728	15,817	75,718
TOTAL excluding Contingencies	543,613	437,548	329,626	1,310,787	213,716	150,805	1,675,300
Add 10% Contingency*				131,000			168,000
Total				1,442,000			1,843,300

\* Contingency includes both unanticipated costs and provision for inflation.

Phase II Activity Cost

	<u>Eradication</u>	<u>Land Use Improvements</u>
Site I*	\$1.5 M	to be determined
Site 2	\$2.0 M	to be determined
Site 3	\$1.0 M	to be determined

Plus other costs and contingencies of \$500,000 for a total of \$3.5 million.

(11) 11

while the others might be trained at West African institutions. At least, one economist and probably one agricultural engineer should receive supplementary training in the US.

C. SAHEL GRAZING ACTIVITY .

1. Concept and Objectives:

The objective of the Sahel grazing activity is to develop modalities for modifying rangeland use in the Western Sahelian Zone of Mali which will increase production and producer incomes working through, as much as is possible, herder institutions and society and which will protect the fragile land resource for future generations. The site for the activity is centered on Dilly (see map). The activity will focus upon improving the migratory and semi-migratory production systems while retaining extensive land use patterns.

The GOM proposes an extensive approach rather than intensive, i.e., a relatively light spread of physical and management inputs over a large area. The GOM proposes this because it feels that Sahel states do not have the administrative capacity to institute all the facets of an intensive range management system (fencing, grazing control, rotational systems, etc.) over areas of significant size. Smaller, "pilot" projects would thus create only islands of prosperity, not replicable or relevant. Furthermore, intensive systems as used in the U.S. would require a radical change of life and economic support system for the semi-nomadic groups that dominate herding in the Sahel. This may so disrupt the livestock industry as to destroy it, or at a minimum create major dislocations. Instead, therefore, the GOM is proposing to develop systems which are administratively feasible but which at the same time would establish the basic principles of improved range and herd management through a cooperative effort of government and herders, utilizing education, moderate improvements in health, watering and other facilities, and better finishing and marketing activities outside of the Sahel. Provision of such services would be done in direct relationship to the development of agreements on stocking rates, range use, etc.

The zone selected is large enough to encompass a socio-economic unit, i.e., encompassing the full or nearly complete scope of herd migrations of the people concerned. Therefore, it should be possible to prevent "outside" groups using the land and to obtain full cooperation for the type of range control desired. On the other hand, it is small enough to be manageable. For this reason, a semi-nomadic, semi-sedentary area was chosen rather than one crossed largely by long-distance nomadic groups. The level of improvements will be consistent with the pattern of land use and not so intensive or complex as to be beyond GOM and herder management capacity. They will be selected in consultation with the people using the land.

The detailed planning and implementation phase will include obtaining insights and ideas from the herder groups themselves such that the series of sub-activities or inputs will provide the necessary incentives to modify present systems of production and land use.

While the activity has traditional project elements of physical improvements, distribution of commodities; provision of technical assistance and training, including efforts to sensitize the herder groups, its particular distinction lies in its dependence upon the herders to work out the planning and management of human and land use elements for accomplishment of the activity.

This is admittedly a difficult activity to plan and execute. The area being isolated, costs are higher, management more complex, and benefits hard to quantify by traditional yardsticks. However, the activity is a key element in the strategy for the sector proposed by the GOM which includes conversion of the Sahel to a zone for breeding and rearing young stock to be fed out in higher rainfall zones. The activity will directly affect the migratory pastoralist, whose income opportunities we are concerned about. It permits a measure not only of how one may contribute to his survival, but also of how one may improve revenue producing opportunities for him.

The economic justification for the activity must be measured by its potential impact on the overall live-stock production sector, beyond the incremental expansion of kilograms of meat and liters of milk in user herds.

Quantification of the impact will be difficult. The proposed site represents the most favorable conditions available under which to test the viability of the concept and to measure results. (See sub-section 3.)

2. Problems of the Approach:

Problems anticipated are of two kinds:

Technical - what is the extent of underutilized forage resources, when and within what limits can they be used? How can watering points be planned to permit harvest of these resources? What complementary installations (firebreaks, access roads), commodities (salt and minerals, vehicles and fuel) and services (extension as well as other means to improve communications) are warranted? Within what parameters may modest restoration of rangeland take place and forage resources gains be made?

Human - can we learn enough about how the herder uses rangeland and establish a level of communication with him which makes possible the planning of inputs? Can we adjust this planning to compensate for modifications to land use due to climatic variation (drought)? What are the social mechanisms through which control may be instituted against overstocking? How can adjustments in land use and institution of control be implemented without disrupting existing herder group interrelationships?

The problems enumerated reflect the difficulty of defining and implementing the necessary incentive package required to modify existing systems and patterns among highly independent and mobile pastoralists in an isolated area and for whom economic and social incentives are equally important.

It is therefore intended, as an important component of the process of planning for the Sahel grazing activity, that during the first six months following the signing of the Grant Agreement, base line socio/economic data be gathered as part of the detailed land capability and agrostological survey which will be the basis for planning site development. A considerable amount of such data has already been developed by the UNDP research station at Dilly and

this needs to be evaluated and supplemented. The objective will be to achieve a better understanding of the social dynamics of the herding communities of the area and to use this information for adapting the design of the various interventions to assure that equity considerations are observed as well as to measure, in the in-depth and annual evaluations, the social change which has occurred. Funds budgeted for economic and social studies, in the "Complementary Activities" section below, can be used for this purpose.

### 3. Selection of Site and Definition of its Perimeter

The Malians proposed three site alternatives in the Western Sahel (see Map #4):

- a. Dilly - an area to the southwest of Nara, characterized by more favorable rainfall (500-550 mm/year), important, under-utilized area due to lack of water; a heterogeneous population including many who make only small migrations, along trails across the area, and some pressure from farmer/herders to the south;
- b. Nara East - an area to the east of Nara characterized by low rainfall (450 mm/year), extensive underused range because of lack of water, and a migratory population with few herders based in the site area; and
- c. Kayes Nord - an area north of Kayes, with intermediate rainfall (650-800 mm/year), less extensive underutilized rangeland but most favorable long-term potential for rangeland improvement, and with more uniform population of semi-sedentary and semi-migratory herders.\*

These site alternatives are reviewed in detail (see Annex 3 B). The decision to implement the activity in the Dilly area in preference to the alternative ones include:

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\*Development of the Kayes Nord area for cattle production is also of keen interest to the GOM. Therefore, the land use capability inventory (see Section 6 above) will undertake a reconnaissance-level appraisal of the Kayes Nord site after work on the Dilly site and the new lands site has been completed. Funds for this purpose are included in the grant.



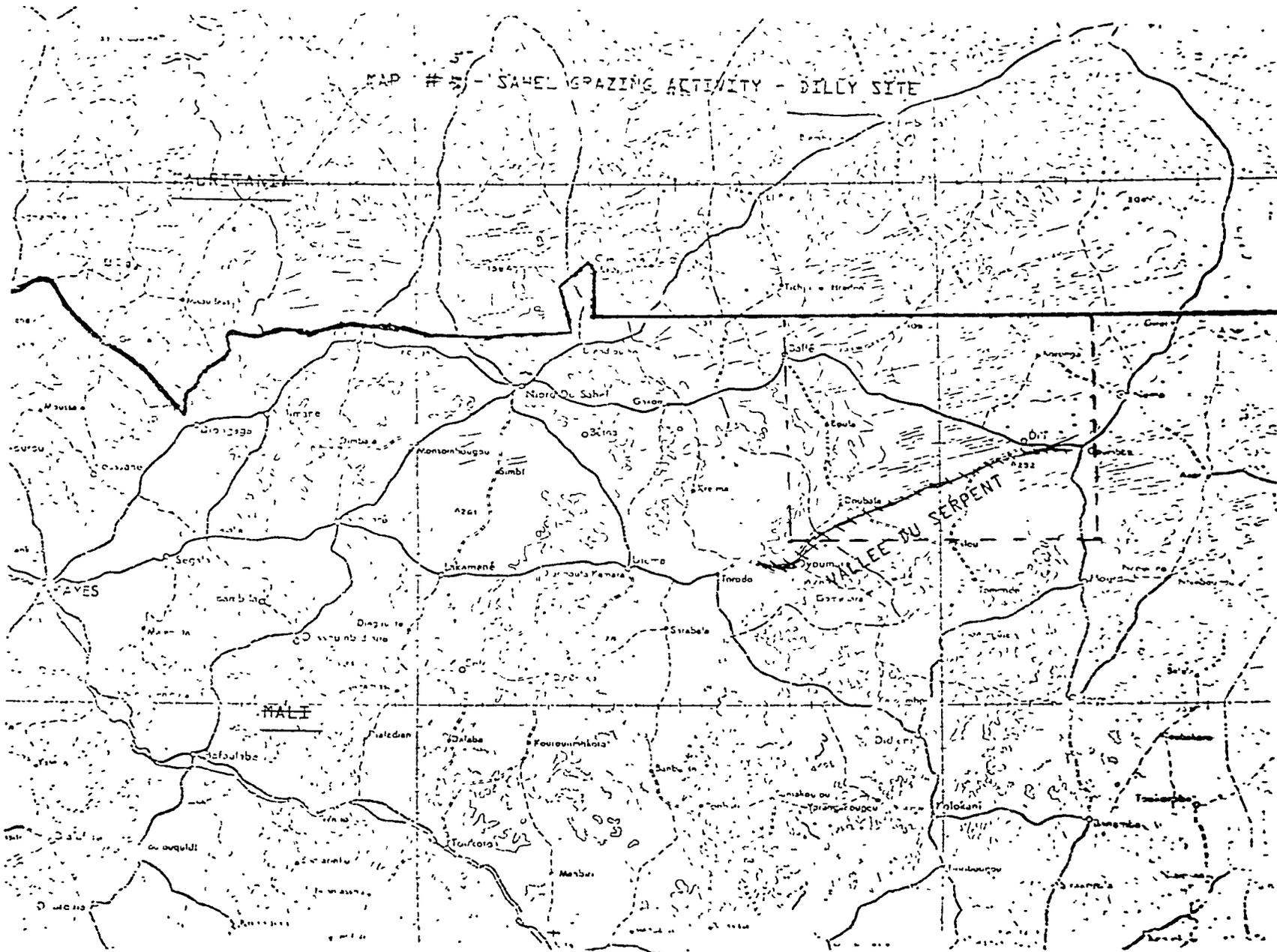
- a. The site is located within the Sahelian zone where grazing is the principal source of rural income;
- b. there is greater evidence of underutilized rangeland the fuller utilization of which can be developed by installation of watering points;
- c. the prospect that rangeland improvement can be made in a shorter timeframe;
- d. there is a better current understanding of local conditions as the result of two years of work in the area by the UNDP/FAO project 523 linked to OMBEVI;
- e. greater immediate potential for linkage to the modern sector because it is somewhat more accessible to Bamako and feeding zones; and
- f. the possibilities for integration of training, herder communications, marketing and research activities through the Dilly center.

The site perimeter includes the Dilly district and some surrounding terrain as approximately indicated on Map #5. Improvements are practicable on about half the zone. The wet season livestock population is estimated to be roughly 100,000 head of cattle and 200,000 sheep and goats. Both semi-migratory and nomadic groups graze cattle, sheep and goats in the area. Semi-migratory herdsmen, who have permanent settlements and whose families who grow crops in the rainy season graze their herds in the area about 6-7 months of the year and then move their cattle to the interior delta region during the dry season. Some cattle for family milk consumption remain near permanent watering sites in the "serpent valley" as do most sheep and goats. Migratory producers from dryer areas further north, migrate across the area enroute to dry season grazing and may remain 20-30 days if water and grazing conditions permit. There is also a small number of semi-permanent land users. The human population is estimated to be about 50,000.

#### 4. Nature of Improvements, Commodities, and Services to be Provided

In addition to watering points, firebreaks, and access roads, some administrative infrastructure, storage capacity, and maintenance facilities will be required.

MAP # 4 - SAHEL GRAZING ACTIVITY - DILLY SITE



Installations will be needed for training and communications efforts to be integrated into the Sahel grazing activity. Provision is also made for improvement of cattle markets of influence to the site area through enlargement of their utility and service capability, including provision of equipment. Trucks for transport of supplies and materials, all terrain vehicles and molyettes are included. Salt and minerals will be distributed and animal health protection must be assured. Extension services (Service Pastoral) will be the human link between the herders and the "operation".

It is estimated that about 14 shallow wells and about twenty water holding dams or ponds will be needed to prolong access to select rangeland. Cost estimates are based on this infrastructure.

It is likely that these facilities will provide only a modest prolongation of period of use. Parasite problems associated with installation of shallow ponds remain an important problem as one extends into the dry season when cattle are under-nourished. This problem is recurrent in all dryland range installations, where cost of installation and remoteness make more expensive alternatives difficult to justify. Experience with larger, permanent water installations has been unfavorable, partly because of cost, but principally because of degradation of rangeland surrounding the water point. It is proposed to undertake, as a test, installation of one permanent water source of a yet untried modality. The objective is to demonstrate firstly whether it is technically feasible to bring permanent water to a large zone without degrading the rangeland, and secondly to measure whether for the future, installation costs in more substantial range development schemes could be rationalized. The source proposed would be a single deep well from which would be extended a series of antenna of buried plastic pipe, such that from 5 to 10 watering points could be established. However, the number of water delivering points installed would be two-to-three times the indicated amount, such that water points could be rotated from year-to-year, or if necessary within a grazing year, to protect against over-grazing and permit restoration of forage grass around watering points. Cost estimation for this element is treated separately.

No provision has been made for reforestation or for planting of trees or shrubs which may contribute to dry season protein availability. This aspect will be reviewed in the research program, including work to be done at Dilly, and action in the future is not excluded.

About 300 km of firebreaks are provided for, generally along watershed divides for ease of maintenance. Emphasis will be on labor intensive means of installation, although a road grader is included to assure maintenance capability.

Access road installations will be kept to a minimum to avoid deterioration of range in their vicinity. However, it will be necessary to survey delivery alternatives for salt and minerals so that reasonable access can be assured while changing routes frequently so as to avoid creation of permanent trails. While maintenance of the principal road axis to Nara and then to Dilly is not included in the program, if maintenance is not assured, the cost of transport will effectively increase. The subject will be reviewed periodically with the GOM in the context of collaborative management of the program.

Salt and minerals will be provided and will be distributed to herders initially free or on a subsidized basis but with the intention that herders will eventually be asked to pay for these supplies which will be priced at a level which corresponds to the marginal value to the herder or at actual cost, whichever is lower.

The Livestock Service in the area will be replaced by a "Service Pastoral" within the "Operation". It will provide both health and animal husbandry services, and will be the central vehicle for the multi-faceted effort to improve communications with the herder groups.

5. Integration into Sahel Grazing Activity of Communications, Training, Marketing and Research

Implementation of the Sahel grazing activity will involve three parallel undertakings:

- a. Installation of infrastructure and delivery systems for the inputs;

- b. developing communications and herders; and
- c. evaluation of the effects of the activity on herder land use patterns and redesign of the approach, if necessary.

The communication and training elements of the program are the motor for the human aspects of planning the activity. The marketing and research elements focus on the benefits or incentives which may be brought to the herder. The integration of training, communications, research and market initiatives will be conducted at Dilly. Complementary actions to parallel the Sahel grazing activity include marketing as a link to the modern sector.

#### 6. Environmental Considerations

The Sahel grazing activity will have a number of important favorable environmental consequences. One immediate benefit is a reduction in the loss by fire of productive range land -- estimated in some areas of the Sahel as high as 60% -- by consequences of the construction of the firebreaks which are included in the activity. A second benefit is the more even and more beneficial harvesting of the forage resources of the project area by the provision of more balanced watering facilities which will tend to spread grazing patterns over wider areas. The design and placement of the watering facilities will be based on the detailed soil and vegetative classification and land use study that will precede the construction of the facilities.

Prevention of overgrazing will be a major objective of the education and training program that will be undertaken with the herders and their community leaders and the communal self-management rotational grazing practices that are to be worked out among and between the groups using the area. As indicated earlier, socio/economic benchmark studies will be conducted, drawing on the research already carried out at the Dilly station. The social dynamics of herding behavioral characteristics will be evaluated annually (and in depth at the end of three years) with a view toward instituting in the final two years of the program a legal and institutional framework which will reinforce and support the communally managed grazing practices. Thus it can be said that the ecological concerns which are implied by the Sahel grazing activity have been addressed and a series of

steps planned to monitor and to deal with problems of overgrazing and desertification.

As with the new land activity, there are longer-run environmental concerns which are a function of the general increase in the animal and human population of the area, should it occur. In this respect it should be noted that the replication of the new lands activity will serve to reduce or offset a tendency toward the over utilization of Sahel resources by opening new range resources to the south. A more detailed discussion of the environmental considerations related to the new lands activity is provided in Annex IV.

7. Cost Estimates

A more detailed outline of facilities, commodities and services, with cost estimates, is in Annex 2 B. A brief summary follows:

A. Infrastructure	1,038
B. Vehicles	272
C. Operating Expenses (including Technical Assistance)	1,016
D. Equipment Replacement	
<hr/>	
TOTAL - Excluding Contingencies	2,326
Contingencies @ 20% *	465
<hr/>	
TOTAL	2,791

8. Appraisal of Benefits to be Derived from Sahel  
Grazing Activity

The benefits include the utilization of additional

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\*Cost uncertainties are higher for this activity because of its remote location and extensive work zone. Contingencies include both unanticipated costs (and/or cost uncertainties) and provision for inflation.

forage which may be harvested by livestock and thereby be converted to meat and milk. The marketing and education activity should encourage the offtake of older animals resulting in an improved spectrum of breeding stock and young animals. The marginal value of forage resources may also be increased by assigning a higher economic value to weight gain by young stock than corresponds with actual market prices.

The calculation of benefits from the Sahel grazing activity is provisional in view of the imprecisions regarding rangeland conditions and improvements and of the untried nature of the activity:

- a. A thorough agrostological study would be required to accurately appraise the extent of underutilized forage resources;
- b. knowledge of cattle movements and their timing permits only reasonable estimates of the additional harvest when watering facilities are in place; and
- c. appraisal of the interrelationship between feed absorbed and contribution to an integrated livestock production sector can only be estimated.

If the desirability of testing an extensive grazing scheme in the Sahel is accepted the essential questions are:

- a. That the site and approach proposed for the activity are the most favorable possible and are consistent with the activity's objectives; and
- b. that benefits which are to be derived bear a reasonable comparability with costs for the activity.

The first point is addressed in subsections 3 and 4 above. For the second, the following analysis is offered:

- a. Reduction in mortality due to enlarge health services and better nutrition;
- b. increase in fertility and hence in the calving percentage and effective weaning rate;

c. increase in available forage through reduction of loss by burning;

d. increase in animal growth rate, and milk production and a decrease in average age of offtake due to improved nutrition;

e. increase in forage harvested due to extended periods of grazing areas otherwise limited by lack of water;

f. multiplier effect translating direct benefits to Sahelian herds into benefits of an integrated livestock sector; and

g. conservation of valuable range resources for the future through better control of stock numbers and better distribution of feeding and water points.

Numerous conservative assumptions were made to facilitate computations, with benefits, as follows:

Year	(\$000) Asset Value Benefits		Recurrent Benefits*		ABV less 10%	Total Reduced by 20% for unfavorable Climate Cycle
	Reduction in Mortality	Increased Surviving Calves	Reduction in Burning	Meat & Milk Gains from Extended Grazing	PLUS BB x Multiplier of 1.3	
1	-	-	46	105	196	157
2	104	9		134	335	268
3	211	36		181	517	414
4	320	86		188	669	535
5	431	172		191	851	680
6		291			958	766
7		393			1,049	839
8		471			1,119	895
9		514			1,158	927
10						

Expenses are: (\$million) 1.3, 0.9, 0.5, 0.4 and 0.5 respectively for years 1 to 5.

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\*Benefits from item 4 above are not qualified.

A benefit-cost comparison, assuming that expenses after year 5 remain \$0.5 million/year, results in an internal rate of return of 12%. Given the conservative assumptions and the demonstration nature of the investment, the return would appear to warrant going forward with the activity. The detailed analysis is in Annex 2D.

As indicated in the comments on studies and evaluation below, considerable attention will be given in the in-depth evaluation which occurs at the end of the third year to evaluating the degree to which these benefits will accrue to the herding population in the project area and their families. Measurement of increases in per capita welfare will be made in relation to the baseline socio/economic data that will be gathered in the Dilly area during the first six months of the program, building on the material already assembled by the UNDP group.

In regard to spread effect and equity considerations, it is expected that the Sahel Grazing Activity will benefit most if not all of the 50,000 persons who reside in the area plus, for more limited periods, those herders and their families who pass through on their way to dry season forage. Since the area is mostly used by semi-migratory and nomadic herdsman, the improvement of the area will benefit those who were generally hit hardest by the drought. It will facilitate their efforts to recover from their losses and will put them in a position of decreased vulnerability to future droughts. Through the increases in production made possible by the project, as estimated above, indirect benefits will also accrue to the GOM (tax receipts, user charges and foreign exchange earnings) as well as to other participants in the Mali livestock sector who market and process cattle for slaughter. As indicated in the earlier section "Problems of the Approach", special consideration will be given to furthering equity consideration in the final design of project components, based on a baseline socio/economic survey.

#### D. TRAINING AND COMMUNICATIONS:

##### 1. Training Objectives:

Two main forms of training are included. The first is to provide training for GOM livestock personnel who have already received basic technical training but who are not equipped to carry out the multifaceted responsibilities called for in extension services in the Sahel. Course of approximately 6 months will be developed in Mali to give these persons interdisciplinary skills and to integrate them into the principles and methods of the project as well as enable them to carry out similar programs elsewhere in Mali. Second, herders, traders and others in the livestock sector will be provided training either at centers or through field seminars related to environmental and animal improvement.

The training effort will be complemented by a program of communications with herders and others in the livestock sector. This program, to be carried out by field seminars and other means to be developed experimentally in the project (similar efforts are being carried out in Upper Volta and proposed for Senegal, Chad and Mauritania --- allowing for comparability of experience). It is a vital part of the project, because these seminars, etc. will seek to develop a bond of communications between herders and government by which herders will be able to state their perceptions of the sector, the problems they face and their proposals for training from the extension and technical people of the Government. Out of this exchange will hopefully come mutually agreed programs for control of grazing, range management and protection, stocking practices and marketing arrangements. This is one of the most important though difficult aspects of effecting an extensive program of range and livestock improvement.

The GOM and A.I.D. agreed from the outset to the desirability of working through existing and planned training institutional structures, rather than to the creation of a new institution.

2. Existing and Planned Training Facilities for the Livestock Sector:

a. School for rural development engineers and technicians at Katibougou (near Koulikoro, about 80 km. from Bamako). This school, under the Ministry of Education, provides a four-year curriculum and graduates the most highly qualified undergraduate personnel educated in Mali (engineers) and lower level qualified personnel primarily for field work (technicians). The school has disciplines complementing each of the services of the Ministry of Production (livestock, agriculture, water and forestry, rural engineering). It graduated last year 11 engineers and 17 technicians in livestock, but plans to increase the level to 50 to 60 graduates per year of which nearly half would be engineers.

b. School for Veterinary Nurses, Bamako. This is a three-year training institute attached to the Livestock Service, Ministry of Production. It currently graduates 25 to 35 veterinary nurses per year, who become the more skilled field personnel working for the Livestock Service. Plans are to increase this level to 60 graduates per year; and

c. Sotuba Research Station. This facility (in proximity of the Central Veterinary Laboratory) was the principal livestock research center in West Africa during the French colonial era. It has a modest, practical plant with capacity for considerable research. It has been used as a training facility primarily to provide complementary, post-graduate training for engineers from Katibougou.

Training is in practical applications, particularly animal husbandry and animal nutrition, wherein facilities at Katibougou are insufficient. The GOM is seeking to attract to Sotuba a range of research, training and operational facilities to upgrade the importance of this center.

It is also planned to establish a modest training facility at Dilly, to provide a point of applied training within the Sahel.

### 3. Training Requirements:

Training requirements are estimated with the uncertainty that one cannot predict the rapidity with which donor financing for the sector will be forthcoming. The Malians have projected completion of a number of sizeable livestock production projects, and it is reasonable to conclude that a major proportion of these are likely to be accomplished. Within this framework, the GOM estimates its manpower needs for livestock for the next 5 years to be about 350 additional persons of which about 250 will be at the technician or veterinary nurse level

and 100 at the engineer level. A rough estimate is that somewhat more than half of this number can be provided through the two principal training institutions. This fact, however, understates the training need, because there is a very large gap for persons trained in animal husbandry (and no one is being trained in range management) and because qualitative improvement in training is desired for many of the regular graduates and existing personnel, particularly in animal husbandry and range management. Added to this number must be the cadres from other Sahelian countries whom the GOM welcomes for training in this activity. A reasonable estimate, therefore, would appear to be about 100 persons of engineer level and 200 persons of technician level over the next five years (a higher ratio of engineer level to technician level trainees is assumed for other Sahelian countries than for Mali). One must expect, however, that training numbers will be highest during the first two-to-three years because of the pressing immediate demands for personnel, both for the project and for the sector as a whole.

Looking at the requirements qualitatively, the single most important need is for animal production and range management training for technician level personnel. Currently, field services are provided by veterinary nurses complemented by veterinary assistants (vaccinators - equivalent of agricultural encadreurs). The Malians wish to modify the veterinary nurse structure within livestock operations by two-man units consisting of a veterinary nurse and an animal production technician. Essentially the entire animal production cadre must be developed in the training activity. Animal husbandry, and range management training for engineers and responsible field senior personnel is the next clearest qualitative requirements. Other special qualitative requirements will become clear as one identifies the sources from which trainees will be selected.

There is reasonable basis for confidence that a sufficient number of persons with adequate level of education can be obtained. The GOM systematically

employs graduates from Mali training institutions and there appears to be reasonable numbers, even within the Production Ministry, of adequately educated people being underutilized for current lack of operating support.

For herders and other private individuals, there will be a series of short seminars and specialized training as well as selection of a few individuals for longer-term training exposure.

Prior to the initiation of the training program, AID and the GOM will jointly carry out the necessary final design work for the education and training program as outlined above. This will involve a more precise estimate of GOM's manpower requirements in the various disciplines and skills that are needed (both for grant-financed activities and for other activities required pursuant to the GOM's livestock plan) on an annual basis over the next three-to-five year period, and the additional teaching staff, physical facilities and equipment which will be required to meet these manpower targets. It is believed that such a "requirement analysis" can be completed in less than a month and would become the basis of proceeding with the execution of the program.

#### 4. Proposed Format for Training:

Training is to be accomplished through an expansion of the center located at the Sotuba Station complemented by a field training center at Dilly.

The Dilly Center will be integrated within the Sahel Grazing Activity which will serve as a point of practical demonstration for Sahelian livestock production and marketing. It will be used for practical field training seminars as well as for field study along particular themes.

The Center will be especially useful for seminars and training of herders and Sahelian cattle traders.

The Sotuba Center will offer a more permanent training structure. It will be both the central training

facility for cadre and the central facility for the communications efforts directed to herders and to the commercial livestock circuit (see sub-section 5 below).

Staff for the Sotuba Center will come primarily from senior livestock personnel in Mali. \* One U. S. technical assistance person competent in animal husbandry and range management with teaching skills will be provided to assist in assuring instruction needs. Rather than increase the permanent technical assistance complement, emphasis will be placed on bringing in persons with special skills for periods of up to several months, and appropriate funding is provided for this purpose. Participant training of Malian personnel who will subsequently become staff at the center must also be envisaged.

5. Communications Outreach:

This element will reach herder groups as well as those involved in livestock marketing. It is the human motor of the Sahel Grazing Activity as well as the precursor for a range of livestock activities in the production and marketing sub-sectors. The objectives are:

- a. Sensitize herder groups to the potential for use of information not now available to them and to advantages which may result from exchange of ideas;
- b. permit the GOM to adopt and accomplish a more favorable presence with the herders with a view to expanding its role in helping the herder to improve his opportunities for survival and for economic benefit;
- c. permit identification of the kinds of information which herders and traders would perceive as most useful and of the form in which it may

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\*The possibility of making use of U.S. and other technical assistance livestock personnel in Mali should also be explored.

be best used; organize the collection and dissemination of information;

d. make possible for GOM officials to obtain from the herders their perception of the situation, needs and modalities for addressing them; and

e. establish a continuous dialogue with a view to evaluating existing efforts and improving them and to organizing complementary activities.

A variety of tools are proposed. At the center is the Service Pastoral. Seminars, radio broadcasts, educational talks at cattle markets, cattle crossings, vaccination points are among them. Informal traveling seminars will be organized to visit herder groups; extension agents will visit villages during radio broadcasts and systematically bring back reaction and comments. And finally, the training facilities will be used to sensitize select individuals and to improve the quality of the dialogue with herder villages. Initially, the communications outreach to herders will be focused on the site for the Sahel grazing activity.

6. How Training and Communications Activities are to be Integrated:

In a programming sense, integration of these activities will be centered at Sotuba, where senior staff will plan and evaluate both the training and communications efforts. In practice, the integration will be most directly felt within the Sahel Grazing Activity wherein the combination is the core mechanism for interface between herders and the "operation". This makes necessary continuing dialogue between the "operation" senior staff and the Sotuba Center staff.

7. Facilities, Equipment and Technical Assistance Needs for Training and Communications; Cost Estimates:

a. The Sotuba Research, Training and Communications Center:

Existing physical plant can be utilized to considerable extent for training and communications. Zootechnical and animal nutrition laboratories exist, although lacking in equipment. Some office space plus storage, animal feeding, forage production and other practical facilities are in place.

The core need is for a training building comprising classrooms, auditorium, seminar and communications facilities. The size has been scaled to permit enough classroom space so that some classroom instruction for the Veterinary Nurse School could be conducted in the building. In addition, there will need to be dormitory and canteen facilities and a modest animal holding facility.

The training building will include:

- 2 classrooms of capacity for 60-75 students.
- 2 classrooms of capacity for 30-35 students which may be combined.
- 1 classroom for seminars.
- 1 library.
- 1 auditorium/conference room.
- 1 botany laboratory/herbarium (linked to the conference room).
- 1 room for all facets of communications preparation (linked to conference room).
- 2 offices.

A minibus and a vehicle (stationwagon or equivalent) will be provided. In addition, there will be equipment for the botany, zoo-technic and animal nutrition laboratories, teaching materials, communications

equipment, other equipment and supplies. Operating support will be provided. Also, there will be one full-time technical assistance person and considerable use of shorter term specialists.

Cost estimates for the Sotuba Research and Training Center are:

(1) <u>Training Structure:</u>	<u>(\$000)</u>
(Classrooms, auditorium, botany laboratory, communications unit, offices):	250
Dormitory and Canteen	100
Animal holding facilities and special installations	<u>40</u>
Sub-Total	<u>390</u>
(2) <u>Vehicles, Equipment Supplies:</u>	
Minibus, stationwagon, parts	22
Laboratory Equipment	10
Communications Equipment	15
Other Equipment	5
Supplies	8
Teaching Materials	<u>25</u>
Sub-Total	<u>85</u>
(3) <u>Operating Costs &amp; Technical Assistance:</u>	
Operating Costs for Training	100

<u>(3) Operating Costs &amp; Technical Assistance, continued</u>	<u>(\$000)</u>
Operating costs for communications	150
Resident technical assistance	225
Short-term technical assistance	<u>225</u>
Sub-Total	<u>700</u>
TOTAL	<u><u>1,175</u></u>

The Dilly Research Center

Physical installation at Dilly will include 2 classrooms and library, seminar/conference room, a communications room, and an office; modest dormitory and canteen facilities. One 4-wheel drive vehicle is to be provided. There will also be office furnishings, equipment, teaching materials, supplies, operating support. Technical assistance would be covered by the Sotuba budget:

	<u>(\$000)</u>
2 classrooms, library, seminar/conference room, communications room and office (modest installation)	70
Dormitory & canteen facilities	25
Vehicle & parts	8
Furniture & equipment	10

The Dilly Research Center, continued

	<u>(\$000)</u>
Teaching materials	5
Supplies	3
Operating Support	<u>45</u>
TOTAL	<u>166</u>

b. Total Training and Communications Costs:

	<u>(\$000)</u>
Total for training and Communications excluding contingency	1,341
<u>Contingency @ 15%*</u>	<u>201</u>
TOTAL FOR TRAINING & COMMUNICATIONS	<u>1,542</u>

8. Role of Women in the Program:

As has been noted earlier, the design of the program has been the product of GOM/AID's interaction with primary consideration being given to supporting Malian initiatives for innovative approaches for livestock development in the Sahelian and higher rainfall areas of the country. Admittedly, the dialogue from which this paper resulted did not focus specifically on the particular role and needs of women in the several activities which are to be undertaken. Yet it should not be difficult to strengthen this aspect, given the important role that women play in West African herding communities. For example, women are usually concerned with the production and sale of milk and milk products and an increase in milk production is one of the major benefits that is anticipated from the program. Women are heavily

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\*Includes both unanticipated costs and provision for inflation.

involved in the marketing of agricultural production of sedentary livestock communities and in the trade of grain for milk between migratory and sedentary pastoralists. Women are concerned with the nutrition of the children and with other aspects of their health. Women will therefore be playing a vital role in the herder training and communications program that is planned. Hence the sector approach offers a wide range of opportunities for introducing or adjusting materials courses, and training methods which are addressed to their needs and which could improve or increase the benefits that would accrue to them from the project.

It is therefore proposed that in the formulation of the first annual work plan, and in the subsequent annual work plans, that consideration be given to providing adequate opportunity for permitting women to play an effective role in the content of the program. Of particular importance, in this respect, will be the plans for the training program, both the technical programs to be conducted at technical institutions in Mali, those planned for higher level training at other African institutions, and those planned for training outside of Africa. It will be important to assure that training opportunities for women in each of these programs are recognized and dealt with.

In addition, consideration and recommendations on this matter should also be a principal initial function of the sociologist to be assigned to OMBEVI and of the graduate student field work which is to be carried out (see Complementary Activities section, below). This work (plus the field studies presently being carried out near Bamako and Segou under REDSO auspices) should provide a wealth of material for assuring that the role and needs of women are adequately reflected in the design and implementation of all of the activities which will be funded by the sector grant.

E. COMPLEMENTARY ACTIVITIES:

1. Support for the Central Veterinary Laboratory:

Modest support is required by the Central Veterinary Laboratory to facilitate its more effective contribution

to the implementation of the New Lands Activity. It involves some improvements in the CVL's physical plant so that it can better serve the entomological section of the CVL (\$50,000) as well as funds for relevant equipment and spare parts (\$39,000).

2. Added Capacity in Economics and Sociology for OMBEVI:

Excellent work in livestock economics and sociology related to Mali has been done by U.S. university personnel (Wilford Morris, Purdue; Dirck Stryker, Tufts; Robert Charlick, Cleveland State; Michael Horowitz, State University of New York). Such work represents a logical complement to the UNDP technical assistance to OMBEVI. Therefore, it was proposed informally to consider contracts with two French-speaking university professors, one in agricultural economics and one in rural sociology who would supervise graduate study and research work at their universities and in Mali and who would devote a portion of their time each year to field study work in Mali. The suggestion was made to use two U.S. graduate students and to accept two Malians for graduate work at each of the respective U.S. universities, the graduate programs being geared to conduct the research work in Mali. In addition, advisory services to OMBEVI in sociology on a full-time or intermittent basis would also be provided. These ideas were well received both by Malian officials and by the UNDP resident representative in Bamako.

Costs estimates for such contracts and advisory services for up to three years period are estimated at \$300,000. Disbursement will, of course, be subject to the preparation by AID and the GOM of firm plans, cost estimates and scopes of work.

3. Participant and Language Training:

a. Participant Training: \*

A large number of participants are to be trained in the U.S. and Africa under the Mali Livestock

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\*NOTE: Participant training costs for the New Lands Activity (\$178,000) are included within its cost estimates. Therefore, the total to be carried forward is \$108,000.

Development Project and the Livestock Sector Grant. For the latter, the number is only approximative, since training will need to be in phases so that the principal activities may be executed. The number of participants, place and duration of training are estimated as follows:

<u>ACTIVITY</u>	<u>DISCIPLINE</u>	<u>NO.</u>	<u>LOCATION</u>	<u>DURATION MONTHS</u>	<u>COST (US\$)</u>
Sahel Grazing	Animal Husbandry/ Range Management	2	US	12	24,000
New Lands	Entomologist	1	US	12	15,000
	Fly Research	1	US or AFR.	12	12,000
	Fly Operations	1	Africa	12	12,000
	Fly Surveyors	12	Africa	12	100,000
	Economist **	1	US	9	9,000
	Engineer	1	US	9	9,000
	Animal Husbandry/ Range Management	1	US	9	9,000
	Land Use Planner	1	US	12	12,000
Training & Communica- tions	Animal Husbandry/ Range Management	2	US	24	48,000
	Range Management	1	US	12	12,000
	Rural Animation/ Communications	1	US	12	12,000
Marketing	Marketing Econom- ics **	<u>1</u>	US	<u>12</u>	<u>12,000</u>
<b>TOTAL</b>		<b>26</b>		<b>315</b>	<b>\$286,000</b>
		persons		months	

b. Language Training and Interpreter Services:

The large number of U.S. technical assistance personnel in the Mali livestock programs creates a dependency on these personnel for early successful

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\*\*It is possible that one of these training items may not be necessary as a result of the training in economics to be carried out in connection with the construction of the Mali livestock analytical model.

implementation. Quality livestock specialists for permanent assignment in West Africa will be difficult to recruit in adequate numbers. It is believed that insistence upon French language speaking ability in recruitment will make the task unmanageable in the timeframe indicated. Therefore, French language ought not be a requirement. The means must be designed for Malians to work with U.S. technical assistance personnel on the assumption of sufficient communication in English.

Timing will preclude, at least in some instances, reasonable French language training for technical assistance personnel prior to their assignment to Mali. Therefore, several complementary actions are necessary:

- (1) French language training in Mali to the extent practicable (including outside Bamako);
- (2) English language training for Malian livestock personnel (this will also be important in relation to participant training);
- (3) some use of interpreters; and
- (4) French language training in the U.S. for a select number of U.S. technicians who may subsequently be added to or replace individuals in the program.

A reasonable talent base exists in Bamako of persons capable of teaching French and English, such that there is reason to believe that the major portion of this training can be accomplished at modest cost.

Cost estimate for language training and interpreter services for a period of 3 years in Mali and the U.S. is \$100,000

#### 4. Research Related to Sahelian Livestock Production:

Research is proposed for three key themes:

- (a) how to make modest practical gains in protein availability during the dry season to improve conversion of dry forage to energy;

(b) how to affect modest increase in milk production during the dry season to reduce calf mortality; and

(c) how to improve quality of local cattle breeds, via., Zebu Toronke.

Research is to be practical, applied research based on already developed technology. The objective is to determine what can be accomplished in the Sahelian environment in Mali given constraints of cost and remoteness.

Research on the first two themes is to be accomplished at Dilly. Modest research facilities and equipment will need to be added to the Dilly complex. Cost for three years is estimated at \$200,000. The figure is large enough to permit a margin to assure that research at Dilly may be coordinated with research at the ILCA\* sub-center on stratification to be established at the Niono du Sahel Research Station.

Research on improving the quality of Zebu Toronke cattle must be accomplished in the region north of Kayes, the habitat for this breed. The Zebu Toronke resembles the Zebu Gobra of Senegal. It has by far the best potential for improved meat production. A research station is to be created at Lake Magui, near Kayes. It will serve two functions: (a) permit station testing of quality selection, feeding trials, etc.; and (b) make possible a research outreach through herder participation, which will both improve quality of research and assure ease of application of research results. The Malian proposal for the center is somewhat larger than that which has been recommended for financing. For an initial three year program, a cost estimate of \$300,000 is proposed, comprising \$200,000 for physical installation and equipment,\*\* \$10,000 for vehicles and spare parts, and \$90,000 for operating expenses. No expatriate personnel are proposed for the center. A Malian manager will be named for the center. He is to coordinate his research

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\*International Livestock Center for Africa, Addis Ababa.

\*\*Anticipating high mobilization costs for this remote site, it has been necessary to plan for a complement of structures sufficient for several year future needs.

with the Sotuba, Dilly and Niono Stations, and to be under the direction of the Rural Economic Institute.

Prior to the initiation of these two research activities, the GOM will present detailed research plans and scopes of work for the research, to be undertaken, together with more refined and detailed cost estimates.

5. Marketing:

Marketing objectives are closely linked to the Sahel Grazing Activity. Three types of action are included:

a. Testing market linkage between the traditional and the modern sector. A small fund (\$50,000) is to be established to test means for organizing purchase of young cattle (up to 4 years) for finishing in the modern sector (activities of the Mali Livestock Development Project, Office du Niger, Niono and Dougabougou feedlots). The objective is to provide the herder with advance assurance of purchase of cattle of a particular quality, for a stated price during a stated time interval. The herder would then have the option to sell cattle through traditional market channels or respond to the offer. Success is predicated on the premise that a premium can be paid by the modern sector for assured purchase of cattle of sufficient quality in important quantity. The approach will test both organization of purchase by the Sahel grazing "operations" and by the modern sector. If successful, the experiment would be the forerunner to a large marketing intervention to link the Sahel grazing activity to the modern sector and to organized export marketing.

b. Collection, analysis and diffusion of information on cattle marketing. This intervention is wholly integrated into the communications activity. It is the marketing end of the communications efforts which will focus as well on herders in the Sahel Grazing Activity. Its cost is included in the Communications Activity.

c. Improvement to existing cattle markets. Only a modest scope of improvements is proposed, focused primarily on key markets for the Sahel Grazing Area, viz: Nara, Niono and Dilly. Funds are provided for select market improvements outside the area as well. Cost estimates are based on requirements for small, medium and larger rural markets. On this basis, \$200,000 is allocated within the Sahel Grazing Activity, for this purpose.

6. Studies, Design and Evaluation:

Further studies, design work and evaluation are an important part of the program. Key areas already identified are: studies of cattle offerings and of needs of the modern sector to determine within what limits stratification could be economically attractive to migratory herders, what price level the modern sector could offer for organized purchase of young stock, what numbers of young stock now offered in rural markets, could be collected for organized feeding; land use planning studies; marketing studies; and assistance to the GOM in reviewing ways to modify the tax structure to expand the revenue base as production gains are made in the sector \*. \$200,000 is included for studies, with the understanding that any important studies not here provided for will then be financed by the fund for unanticipated needs (see below). Evaluations will be held on an annual basis, jointly with the GOM, as a means of assessing progress and problems and for making adjustments in the following year's annual work plan. The second annual evaluation will give particular attention to the questions of meat price controls and user chargers as noted in the covenants on these matters in Annex VI.

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\*GOM/AID discussions on financial planning for the Livestock Sector Grant have established the need for a study to determine the baseline value of the Dilly area and subsequently the new lands test area so as to permit calculation of value added by the Sector Grant investments to national income.

In addition, at the end of first three years of the program, an in-depth evaluation will be held as a means of determining whether financing should be made available for the remaining two years. The in-depth evaluation will also consider the lessons learned from the Sahel Grazing Activity, including the adequacy of the communications and training program and the communal self-management of grazing practices, and whether these can be institutionalized through supportive, complementary codes or laws for the purpose of strengthening land management practices. If funding for Phase II of the New Lands Activity has not yet been obligated, the in-depth evaluation could also play a role in assessing the adequacy of preparations for implementing the test project. The third year's evaluation will also pay particular attention to seeking to measure the real net benefits that actually accrue from the Sahel Grazing Project to the herder and his family, and whether the herders perceive such benefits in a manner which affects their willingness to pay user charges or cattle taxes to help assure the revenues necessary to permit the continuation of such benefits.

It is expected that outside consultants would be drawn upon for part of the personnel of the in-depth evaluation group, and they may be used as well for annual evaluations, as determined by the CDO and the GOM.

Studies and additional design work will be based on firm plans, detailed scopes of work and itemized budgets.

7. Fund for Unanticipated Needs and Experimentation:

The Livestock Sector Grant is intended as a tool to assist the GOM to develop an organized, sequential program of investments in the sector, financed by a variety of donors, and responding to a strategy which will evolve with the program. The idea is to provide CDO/Bamako with the flexibility to make prompt, responsive decisions, in collaboration with the GOM. Therefore, an improvisation fund is proposed to permit the CDO to take action on needed studies, technical assistance, small purchases of equipment or training materials, testing of modest cost ideas, translation and duplication of documents for diffusion outside Mali or for use within Mali, etc. The amount included is \$300,000.

**F. COST RECAPITULATION (\$000):**

New Lands Activity, Phase I		1,442
Sahel Grazing Activity		2,791
Training and Communications		1,542
Subsidiary Activities:		
CVL	89	
Sociology and Economics	300	
Participant & Language Training	208*	
Research	500	
Marketing	50	
Studies, Design & Evaluation	200	
Fund for Unanticipated Actions	300	<u>1,647</u>
Sub-Total		<u>7,422</u>
Less GOM cash contribution (other than local salaries, use of facilities, land grants, etc. ) (5% of total)		<u>(422)</u>
SECTOR GRANT TOTAL		\$7,000
Plus New Lands Test Phase to be added during three-year period	\$3.5 million	
PROGRAM TOTAL	\$10.5 million	

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\*\$178,000 of participant training for New Lands Activity is included in the New Lands Activity.

IV. ORGANIZATION, MANAGEMENT AND EXECUTION:

A. INSTITUTIONAL CHANGES AND MANAGEMENT CAPACITY:

1. Malian Institutional Reforms:

The GOM has organized a commission to study the institutional problem in carrying out rural development programs. The commission's conclusions are not yet finalized, but are expected to be generally as follows:

a. Development services have been essentially single disciplinary agencies; emphasis is being shifted toward multi-disciplinary, integrated rural development agencies;

b. the institutional framework for most executing development projects has been through the centralized, single disciplinary services; these have been costly, but underfinanced; competent personnel could be organized but operating funds were so inadequate that they could not be effectively utilized; the objective now is to shift toward decentralized, multi-disciplinary, integrated rural development units capable of assuring an important part of their recurrent costs through auto-financing;

c. the proposed transition is too ambitious to be taken as a single, radical revision; the transition would be phased, shifting production activities first to "operations", i.e., to a series of single sector, decentralized production schemes; as a second stage, the other components would be integrated into the operations and eventually the administrative structure for geographic areas would be changed into autonomous or semi-autonomous integrated rural development agencies or offices.

The approach has merit. Two important hurdles to overcome are inadequate present budget resources and reluctance of the central government to relinquish control over sources of local revenue.

Within the proposed sector program, only the Sahel Grazing Activity is affected by the institutional reforms. It will be organized as an "operation", but consideration is being given to working into the operation a variety of modest initial steps aimed at facilitating integration of other rural development services.

2. Management/Administrative Capacity of the GOM to Undertake the Proposed Program:

The proposed Mali Livestock Program in its ensemble (including the Mali Livestock Development Project) represents financing for the sector much greater than that which has been previously available. The IBRD/IDA project in the Niger River delta is a second major investment. Other important investments will be forthcoming. Malian management personnel in key positions related to the livestock sector will be severely taxed by these activities. Notwithstanding, it is felt that the Malians have the human resources which can be allocated to the sector to permit initial start-up of the program. Provision is being made for the training of additional personnel to assure support of those operations in the future. An essential condition precedent to the grant agreement should be a plan for provision of personnel for operational positions and training for each of the proposed activities.

Emphasis in the program is given to supervised participant training, to technical assistance, and to in-country training. The major in-country training initiative is aimed at assuring personnel needs for all livestock sector activities through retraining and upgrading persons adequately schooled but who require training in livestock production, range management or other descriptions related to livestock production.

Annual work plans and the networking of implementation actions for the major activities (see below) will permit periodic joint GOM/AID evaluations of progress. It will thus be possible to anticipate which parts of the program may be in danger of suffering in execution from lack of management/administrative support. Some flexibility has been provided in cost estimates to permit further technical assistance should serious bottlenecks be foreseen.

An important complement of technical assistance personnel (see Annex 5) is included in the program. Frequent use will also be made of shorter term technical assistance in specific disciplines.

### 3. A.I.D. Management of the Livestock Program:

The Country Development Office in Bamako will have a livestock manager to hold consultations with the GOM on the ensemble of livestock programs. There is need for diversity of skills, since a variety of project's training, research, studies further design work and evaluations are contemplated as well as a continuing dialogue with the GOM on means to further productivity within the sector. The AID's livestock manager will be complemented by a livestock specialist. Other short-term specialists may be brought to Bamako as needed. These persons will be an integral part of the AID's Country Development Office in Bamako, although demands of the collaborative style might make advantageous that one or both of them be physically placed at OMBEVI.

Management of the livestock programs will require a variety of specialized inputs which CDO staff will not be equipped to provide. For the most part these will be provided by REDSO/WA, as they have been effectively provided during much of the preparation of this program. For some select important interventions, AFR/DS or other Africa Bureau staff and consultants will be called upon.

**B. FINANCIAL MANAGEMENT OF THE PROGRAM:**

Malian budgetary constraints pose particular problems for expanding external financing in the livestock sector. It is estimated that livestock revenue from all sources contribute between 5 and 6 percent of direct budget receipts, but that expenses for the sector are only about 1.5% of the budget outlays. While it is recognized that productive sectors must contribute to the support of non-revenue producing services such as defense, education, health, etc., the current low return to the sector casts doubt on the GOM's ability to make modest contributions in proportion to expanding livestock investments.

This problem will be treated in two aspects: (1) formula for financing of the livestock sector grant; and (2) means to enlarge livestock sector revenue base and to retain a more favorable share of revenue growth for the sector.

1. Cost Sharing Formula for the Livestock Sector Grant:

Objectives for a cost-sharing formulation are:

- a. Ease and rapidity of administration in Bamako;
- b. separation from financial constraints which seriously hamper government's service performance;
- c. agreement on scope of activities and on formula for cost-sharing so that minor financial management questions will not delay program execution and;
- d. demonstration of a means to facilitate transfer of resources, so that on the one hand, the GOM may take steps to improve implementation of production operations, and on the other hand, A.I.D. and other donors may appraise means to assist in alleviating

budgetary shortfalls based on sector analysis and the overall GOM's budget situation.

The approach proposed calls for creation of a joint fund with a modest initial Malian contribution. The Malian contribution is to be increased in graduated annual steps for the five-years of the sector program. The formula for determining contribution levels is to be worked out, but is to be a measure of potential increase in government revenues (an important portion of which should return to the livestock sector) resulting from: (a) the stimulus to the economy of the livestock sector program; and (b) the expansion of the sector's revenue base made possible by tax reforms and anticipated increase in productivity; and (c) institution of user charges for certain services or land use opportunities.

Ultimately, cost allocation for livestock investment in Mali such as this program should follow a cost-sharing formula based on rational partition of different kinds of expenses. Consensus was reached with the GOM that costs be broken down by categories and apportioned as follows:

a. Salaries of U.S. and Malian personnel, office expenses and overheads\* are excluded from the joint fund. Malian costs for those categories, however, are included in computing Malian contributions to the total program;

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\*Office overhead refers only to office rents and related utility costs to be applied to the sector activities which are in existence at signature of the sector grant agreement. Utility costs related to any facilities constructed or purchased during the sector program would be classed as operating expenses.

b. costs are divided into personnel costs (overhead costs and office expenses are also excluded from the joint fund), support operating costs, capital and equipment costs, training, research and studies, and miscellaneous operating costs. A separate formula is proposed for each category, being:

Personnel costs, research and studies costs: salaries, per diem and travel are paid respectively by AID/GOM for their participants. For research and studies costs the contributions are included in the fund;

support operating costs are those pertaining to operating physical facilities and the upkeep of some which are used by the GOM and USG for project development and implementation;

capital and equipment costs will follow the formula used for cost-sharing in capital projects in Mali, i.e., AID will finance foreign exchange and some local costs, but the GOM's contribution is expected to attain a percentage calculated at 5-10% of this item;

miscellaneous operating costs are mostly supported initially by A.I.D. but the objective is that 100 percent of those costs will be borne by the GOM by the end of the fifth year.

c. Training: The GOM will assume salary and family benefit costs; AID will make an exception from the normal participant training regulation and pay international travel as well as normal per diem and educational costs; for in-country training non-salary costs will be treated in the category of operating costs, eventually to be fully covered by the GOM.

Each year, the work plan established between the Ministry of Production and the AID/CDO will estimate the level of expenses, by category. From this and the formula for establishing GOM's support levels for the program, it will be possible to compute the amount of the GOM's contribution to the fund. The GOM's contributions to the fund will increase during the life of the program, with a view to eventually meeting the contribution formulated for the cost of the project.

In essence, there will be two parallel equations: one indicates what GOM's contributions should become; the other measures progress in the GOM's contribution, from a low base, based upon improved revenue expectations. There will be a gap between them which will depend not only on macro-economic factors, but also on rate of growth of investments in the sector.

There are two central objectives to keep in mind: (1) the working out with the GOM over time their assumption of a reasonable portion of the investment value of production programs (for which AID's legislation has proposed a general standard of 25%); and (2) assuring flow of budget resources for continuity of operation and service costs. The first equation is a practical yardstick for the first of these objectives. Its measure is to be realized as quickly and to the fullest reasonable extent, but the minimum acceptable negotiating position must call for institutionalizing GOM's financial support to fully realize the second objective.

2. To What Extent Must GOM/AID Collaboration on the Program Involve AID in the GOM's Budgetary Process:

AID is seeking to avoid any direct involvement in the GOM's budget decisions while influencing GOM's decision makers to return a substantial

portion of marginal revenues from the livestock sector for support of activities within the sector. The formal relationship will be limited to administration of the joint fund and negotiation of the annual work plan. There will also be technical assistance inputs related to improving revenue performance. AID's influence, therefore, will center around negotiation of the annual work plan and the furnishing of additional assistance outside the sector grant, if any, such as P.L. 480 imports, to generate local currency. It is also intended to establish as clearly as possible through preparatory work now being done in Mali followed by consensus with the Malians during negotiations on sector grant, expected Malian contributions in the future, such that negotiation of the annual work plan will not be viewed as an interference in Mali's internal budgetary process.

C. PROGRAM EXECUTION:

The proposed program will present a challenge to effective coordination, management and implementation, given the scope and complexity of the activities to be financed by the proposed grant. Full and active participation by responsible GOM authorities will be essential, and experience to date indicates that it will be forthcoming.

The joint formulation of the annual work plans will be a key management device for planning and controlling the implementation of the program and for monitoring contractor performance. The negotiation of the annual work plan will also be a means of forecasting program disbursements, the allocation of project costs, and the expenditures that will be required on the part of each government, both directly and to the joint fund.

An essential and major element in planning program implementation and the preparation of the annual plans will be the preparation of a Project Performance Tracking (PPT) system for the major activities in accordance with the concepts and principles of

the Bureau for Africa's Management Information System (which is similar to the system developed by AID's PBAR Task Force). Installation of this system will provide the basis for identifying critical performance indicators (key events) and an appropriate basis for the program's reporting and evaluation requirements.

It is recommended that the contractor which assisted the Bureau for Africa to develop the Management Information System likewise assist the Country Development Office in Bamako to develop both a summary PPT for the first three years and the first annual PPT for the activities to be financed by the proposed sector grant. This work should be carried out in conjunction with the preparation of the first annual work plan. Such assistance would greatly facilitate management planning as the contractor in question has already designed a PPT for the Mali Livestock Development Project. In addition, REDSO/WA or AID/W assistance may be in order during the initial design and installation of the PPT, given the scope and complexity of the program. Thereafter, it would be the responsibility of the CDO/Bamako, in collaboration with the GOM to maintain and update the system, perhaps with occasional TDY assistance. Further details on the preparation of the annual work plans and the PPTs are provided in Annex 7.

Given the number of technical assistance personnel and the diversity of contract services required, it will be important to arrive at a contract format to accomplish the program ensemble thereby facilitating GOM/AID's contract management. A contractor has just been selected for the cattle production operations of the Mali Livestock Development Project. It is recommended that contracts and PASAs be executed for the remaining activities of Mali livestock and all of the activities of the proposed program. Implementation will require bringing together traditional consulting expertise complemented by quite specialized technical skills particularly in animal production and range management, training skills, and research and study skills where university personnel have traditionally had most favorable experience. CDO working with REDSO/WA

will review with GOM's alternative means to structure solicitation of proposals and will organize the contract(s) with a view to balancing anticipated contractor performance capability and sound contract management. Given the frank and cooperative working relationship which the GOM officials have encouraged, it should be possible to address these problems in timely and routine fashion.

Allocation of Malian personnel to the various tasks and for external training will be a problem. Gaps may exist early in the program, while in-country training is being organized and participants are being prepared. Other means including additional technical assistance and use of Peace Corps personnel may be required to meet these shortfalls. (See Annex 8.)

The GOM has indicated that physical works would be accomplished through contracts with private firms. The remote location and dispersion of infrastructure for the Sahel Grazing Activity and for other lesser elements of the program may cause some escalation of costs. A similar cost risk relates to expatriate personnel who are being asked to live outside Bamako (early replacement, terminations, etc.). Finally, technical assistance numbers have been kept small with view to making fullest possible use of Malians. Need for additional full-time or temporary personnel may be required. A 10% contingency fund is therefore included for the above purposes.

Suggested conditions precedent and covenants are indicated in Annex 6.

## ANNEXES

- Annex 1. Macro-Economics
- Annex 2. Cost Estimates\* & Benefits Computation
  - A. New Lands Activity
  - B. Sahel Grazing Activity
  - C. Central Veterinary Laboratory
  - D. Benefits from Sahel Grazing Activity
- Annex 3. Site Comparisons
  - A. New Lands Activity
  - B. Sahel Grazing Activity
- Annex 4. Environmental Analysis
- Annex 5. List of Technical Assistance Personnel
- Annex 6. Conditions Precedent & Covenants
- Annex 7. Outline for Preparation of Annual Work Plan
- Annex 8. Possible Role for Peace Corps in the Program
- Annex 9. Logical Framework
- Annex 10. Activities for Early Future Consideration by A.I.D. or Other Donors
- Annex 11. A.I.D. Memoir of 12/4/74

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\* The estimates for the costs of the noted activities were prepared jointly with GOM officials by the medium term design team that visited Mali in April-May, 1974, and the follow on team that visited Mali in November-December, 1974

**ANNEX 1\*. MACROECONOMICS - BALANCE OF PAYMENTS, BUDGET**

**EXTERNAL COMMERCE**

**A. Commercial balance**

Coverage of imports CAF by exports FOB

1970	69,5%
1971	63,2%
1972	57,1%

Offset of the unfavorable commercial balance which intervened in 1970 has not been achieved as a result of:

- delay in the putting into operation of certain industrial units, the importation of heavy equipment having been cut off from 1970 to 1971.
- importation of cereals on account of drought
- increase in world primary product prices (sugar, flour...)

Deficit of the controlled exchanges.

-1966/67	19,3 billion MF
- 1970	10 billion MF
- 1972	16,7 billion MF

The real deficit, difficult to evaluate, is, in any case, clearly less important, clandestine transactions creating an excess evaluated at about 9 billion MF.

Because of large cereal imports and a light drop in exports of cotton and peanuts, the deficit risks again being enlarged in 1973 on account of the new textile factory (ITEMA) absorbing a portion of exportable cotton.

**B. Imports**

Imports represent about the 1/3rd of manufactured

\* Excerpted from "Dossier d'Information Economique, Mali 1972-73", Ministere de la Cooperation (March 1974), pp.20-23 and annexes.

GDP, which is characteristic of an economy greatly dependent on external commerce.

From 1964/65 to 1967/68, because of a lack of foreign exchange, imports diminished by 42%. After return to convertibility, they reached in 1971 33.7 billion MF, about the 1964/65 level.

Since 1970, beginning of drought and the worst harvest, a very marked increase in food purchases has resulted.

Necessary imports of construction equipment are irregular depending upon the availability of financing. Important stocks were constituted in 1966/67. Needs for equipment became apparent in 1969 with the construction of the cement works and, in the following years, with the textile complex ITEMA and the extension of COMATEX.

Also, the suppression in 1970 of licence requirement for vehicle imports resulted in a large increase in purchases.

The starting of large agricultural operations after 1970 brought about, as a consequence, an increase in the consumption of fertilizers which has inflated the statistics for chemical products.

In the inverse sense, purchase of textile and leather goods have decreased regularly with the putting in service of the textile complexes which substitute local production for imports.

### C. Exports

Exports controlled by customs (22.7 billion Malian francs in 1972) corresponded with the provisions of the plan as a result of the increase of the world market prices of cotton and peanuts.

Agriculture and livestock represented in 1972 66,5% of exports, still little diversified.

Peanut sales important in 1964/65, did not cease to decline until 1969, start of the "Operation Peanuts".

In spite of bad climatic conditions, peanut exports diminished only slightly in 1972.

Cotton fiber, which has not ceased to increase, represents itself 31% of exports of cottonseed, and oil and cake exports are increasing regularly.

Controlled livestock exports change in importance according to the more or less liberal conditions on export taxes.

As a result of restrictive measures taken by Ghana and Ivory Coast, sale of fish has decreased. Sales appear to be more stable in the traditional sector than in the modern sector.

#### D. Supplying and purchasing countries

France remains the number one supplier of Mali with about 44% of imports, the UDEAO countries come next with 23%. It is to be noted that an important diminution of imports from the clearing zone\*: 6.7 billion MF in 1970, 4.3 billion MF in 1972. On the one hand, certain products could not be furnished by the zone in 1972. On the other hand the countries composing the zone decline in number; Algeria, Bulgaria, and East German Republic <sup>were</sup> transferred to the commercial zone. The role of China in the import of rice could reduce this tendency without reversing it.

With 49% of exports (essentially cattle and meat), the UDEAO countries are Mali's principal clients but with an important part for transit. The 1973 statistics will permit a more precise definition of the reality, France comes next with 16.4%.

According to official statistics the clearing zone, clearly on the increase, represented 7.5% of exports of 1972 (3.4 in 1970). This evolution would not represent the reality, the real role of the clearing zone continues to decline.

\* Countries with whom exchange is regulated on the basis of bilateral agreements.

## B. Balance of payments

Three fundamental elements explain the evolution of the balance of payments:

- the balance of goods and services, and notably the commercial balance, has been seen to improve by 1970 in order to deteriorate thereafter, notably since 1972;

- external aid was particularly important from 1968 to 1971.

- movements of private capital; during the course of the first years of return to convertibility (1968 and 1969) important flights of capital intervened. Since 1970, capital influx has exceeded outflow with the balance doubling from 1971 to 1972 (2.2 to 4.4 billion MF).

Thus, the balance of payments first improved markedly from 1968 to 1971, the deficit passed from 9.6 billion MF to 1.1 billion MF. Then the deterioration became very rapid as a result of the needs to import large quantities of cereals, the loss of capital further aggravating the commercial deficit.

## F. Tourism

Mali had received since 1970 about 10 thousand tourists per year. This number has not increased because of lack of commodities. Since 1962, the Government has invested 6 billion MF in tourism; 3/4 of this sum furnished by Egypt, permitted the construction and equipment of the Hotel de l'Amitie.

A convention has just been signed by Mali and West Germany for equipping of the hotel and for its management by a German company, for the construction of two motels in the interior of the country, the total representing about 1 billion MF. The five year plan intends to focus on tourism with a total investment of 6 billion MF to put into service 1,000 hotel rooms .

## PUBLIC FINANCE

### 1. Budget

1970 marked a net improvement of the budgetary deficit declining from 5. billion ME in 1969 to 3.4 MF. The situation deteriorated again in 1972, the deficit having been more than 4 billion; 6 billion is projected for 1973.

This deficit results in a large measure, from the rapid increase in expenses and particularly personnel expenses which could not be compensated by an equivalent increase in receipts.

To this phenomenon of more or less permanent character came to be added, to the end of the period, the consequences of the drought which will make very difficult the recovery of traditional direct taxes.

#### a. Receipts

The Malian fiscal system is based very largely on indirect receipts, 62% of total current receipts (national and regional budgets) for the years 1970, 1971 and 1972).

Breakdown of indirect receipts: customs duties and taxes: 80% of which 70% import taxes; taxes on international transactions 20%.

The necessity to import massive quantities of cereals in 1972 and 1973 exonerated from import taxes, restrained controlled imports of taxed merchandise and consequently reduced this source of receipts.

The favorable market price of cotton fiber and peanuts on the world market, would permit partial compensation on the loss of import taxes, but the stagnation of production in 1972 and 1973 will reduce the impact of the increase of export taxes which would be imposed by the Government.

Direct fiscal receipts represent 38% of total receipts. They are imposed essentially on families (75% by traditional taxes and 25% by income tax on

salaries). The part of businesses scarcely represents 10% of the total mass of taxes.

b. Expenses

Breakdown of expenses:

- personnel expenses 60%
- supply expenses 20%
- contribution to international organizations, partial payment of external debt, and equipment expenses 20%

The annual rate of increase of personnel expenses, principal cause of the increased Government costs, is about 10%. The amount of these expenses has about doubled since the independence, all graduates who do not find positions in the private sector being engaged by the Government.

II. The Treasury

Because of the important budget deficit, the situation of the public treasury remains extremely difficult.

Financing the deficit is obtained in a large measure by foreign grants notably the French treasury (2 billion MF per year in 1971 and 1972)

Among the internal financial sources, one can cite the advances by the Central Bank (Malian Development Bank)

III. The Debt

The public debt is very large, especially with regard to the clearing zone.

The debt with France has been rescheduled in April 1973, cancellation of the FIDES debts and postponement of the postal debt.

Removed from the budget, the debt has been conferred to the Caisse Centrale d'Amortissement which has recently been created.

IV. REVENUES and EXPENDITURES FOR THE LIVESTOCK SECTOR\*

Table I

GOM Budgets in the Livestock Sector, 1970-73. (billions of Malian francs)

	<u>1970<sup>a</sup></u>	<u>1971<sup>a</sup></u>	<u>1972<sup>a</sup></u>	<u>1973<sup>b</sup></u>
Direction Elevage			76.5	82.5
Laboratoire Central			61.3	66.0
SOTUBA			5.3	18.1
OMBEVI			8.3	11.5
Regional Budgets	<u>182.6</u>	<u>195.1</u>	<u>233.8</u>	<u>270.0</u>
Total	264.6	290.6	385.2	447.1

a. "dotations" (official authorizations)

b. "previsions" (forecasts)

Table II

Main Livestock Tax Revenues, 1972 (billions of MF)

"taxe sur le betail" (head tax on cattle)	1,107
"tax d'exportation" (export tax)	<u>235</u>
sum	1,342

This data is taken from the report of James Brown, AID/PPC on "Financing GOM Livestock Activities" (Nov. 1974)

\* The source for IV is not the same as for preceding text.

TABLE I-A

M A L I

## EVOLUTION OF PRODUCTION AND OF GROSS DOMESTIC PRODUCT SINCE 1959

	AUX PRIX COURANTS					At Current Prices			
	1959	1954/65	1965/66	1966/67	1967/68	1969	1970	1971	1972
<u>Gross Domestic Product</u>									
- non monetized	25.0	30.6	32.3	35.3	44.5	45.2	50.7	52.7	54.8
- monetized	36.0	50.0	51.6	55.0	71.5	73.7	84.2	95.3	100.4
- total	61.0	80.6	83.9	92.3	116.1	118.9	134.9	147.0	155.2
- index for total with 1950 as base	100.0	132.1	137.5	151.3	190.3	194.9	221.1	241.0	254.4
Services by administrations & Families	6.3	9.8	10.7	11.7	14.4	16.5	17.7	19.0	21.2
<u>Gross Domestic Product</u>									
of which monetized	67.3	90.4	94.6	104.0	130.5	135.5	152.6	165.0	176.4
	42.3	59.8	62.3	67.7	86.0	90.3	101.9	113.3	121.6
	AUX PRIX CONSTANT DE 1969					At Constant 1969 Prices			
<u>Gross Domestic Product</u>									
- non monetized	37.3	41.3	43.5	45.5	46.7	45.2	48.0	50.0	51.9
- monetized	62.1	69.3	70.8	72.3	74.6	73.7	78.4	80.2	84.3
- total	99.6	110.6	114.4	117.8	121.3	118.9	126.4	130.2	136.7
- index (1959 = 100)	100.0	111.0	114.9	118.3	121.8	119.4	126.9	131.4	137.7
Services by Administrations & Families	10.1	13.4	14.6	14.0	15.3	16.6	17.7	19.0	21.2
<u>Gross Domestic Product</u>									
of which monetized	109.7	124.0	129.0	132.6	136.6	135.5	144.1	149.9	157.9
	72.2	82.7	85.4	87.1	89.9	90.3	96.1	99.2	106.0
Synthetic Index of price derived by comparison of monetized GDP at current and constant prices (1959 = 100)	100.0	124.3	124.5	132.7	163.2	170.7	181.0	193.6	195.0

Source: Statistical service, Planning Commission

TABLE I-B

M A L I  
BALANCE OF PAYMENTS

	(In Billion MF)								
	1964/65	1965/66	1965/67	1967/68	1968	1969	1970	1971	1972
<b>A. Goods and Services</b>									
Exports FOB	7 240	4 580	5 000	4 500	3 840	13 328	19 700	21 500	22 700
Imports F O B	-14 590	-11 000	-9 130	-9 100	-15 054	-19 909	-23 450	-27 200	-32 000
Freight & Insurance for Shipment	-3 580	-3 010	-3 320	-2 990	-4 632	-5 414	-5 800	-6 470	-7 400
Commercial Balance	-6 930	-9 430	-7 500	-7 590	-10 846	-11 995	-10 000	-12 170	-16 700
Technical Assistance Service associated with supplies	-2 430	-1 380	-1 000	-1 670	-3 920	-7 506	-4 550	-4 035	-4 550
Other Services (Transfer, Capital returns, etc.)	-980	-1 720	-1 430	-2 090	-3 606	-3 204	-3 110	-4 690	-4 150
Other Services (Pensions, Salary Savings)	-980	-1 050	-600	400	+2 490	+3 661	+3 617	+5 460	+5 500
Net Services	-2 410	-2 050	-2 450	-3 170	-4 927	-4 000	-4 019	-3 660	-3 200
Net Goods & Services	-11 340	-11 480	-9 950	-10 160	-15 773	-16 000	-16 109	-15 630	-20 000
<b>B. Development Aid - Grants</b>									
Equipment, Supplies, & Local Costs	3 000	3 180	2 220	1 570	+2 501	+2 450	+3 493	+2 517	+4 500
Technical Assistance, net of Government Contribution	1 250	1 500	1 550	1 550	+1 641	+1 450	+1 800	+2 130	+2 500
Other Grants	-	-	-	-	-	+3 600	+3 320	+3 370	+3 400
Loans									
Equipment, Supplies & Local Costs	6 160	3 970	4 320	3 220	+4 143	+4 811	+1 150	+2 405	+2 000
Technical Assistance	-	250	350	250	+750	+550	+600	+600	+600
Other Loans *	2 400	3 560	2 140	1 460	+4 711	-	-	-	-
Debt Reimbursement	-950	-930	-500	-610	-80	-3 250	-710	-510	-600
Net External Aid	11 810	11 330	9 850	7 580	+13 273	+9 011	+9 632	+10 416	+12 400
<b>C. Capital Transfers</b>									
Non-identified Capital & Capital Movements	-2 360	-130	-350	-2 010	-6 643	-1 450	+3 200	+2 203	+4 400
Net errors & omissions	-150	-130	-360	540	-495	-400	-1 430	-1 661	-900
Special Drawing Rights	-	-	-	-	-	-	+1 586	+1 307	+1 300
Global Balance of Payment, Excess or Deficit	-2 010	-150	-610	-4 050	-9 638	-6 000	-1 151	-3 373	-2 500
<b>D. Financing of Balance</b>									
I M F	2 450	-	80	-170	3	-100	-1 171	-518	-400
Commercial Banks	-	+100	-100	+1 160	-5 943	-200	-1 601	+742	+100
Central Banks	-1 640	+410	+1 380	+3 060	+15 583	+8 783	+221	+3 241	+2 800
Postal Debt	1 200	-350	-560	-	-	-	-	-	-
NET TOTAL	+2 010	+150	+910	+4 050	+9 638	+8 033	+1 151	+3 373	+2 600
	I M F = F O B				F O B = 2 IM				

\*. Until 1967/1968 The Postal Service covered Foreign Exchange Loans from the Clearing Zone.

TABLE I-C

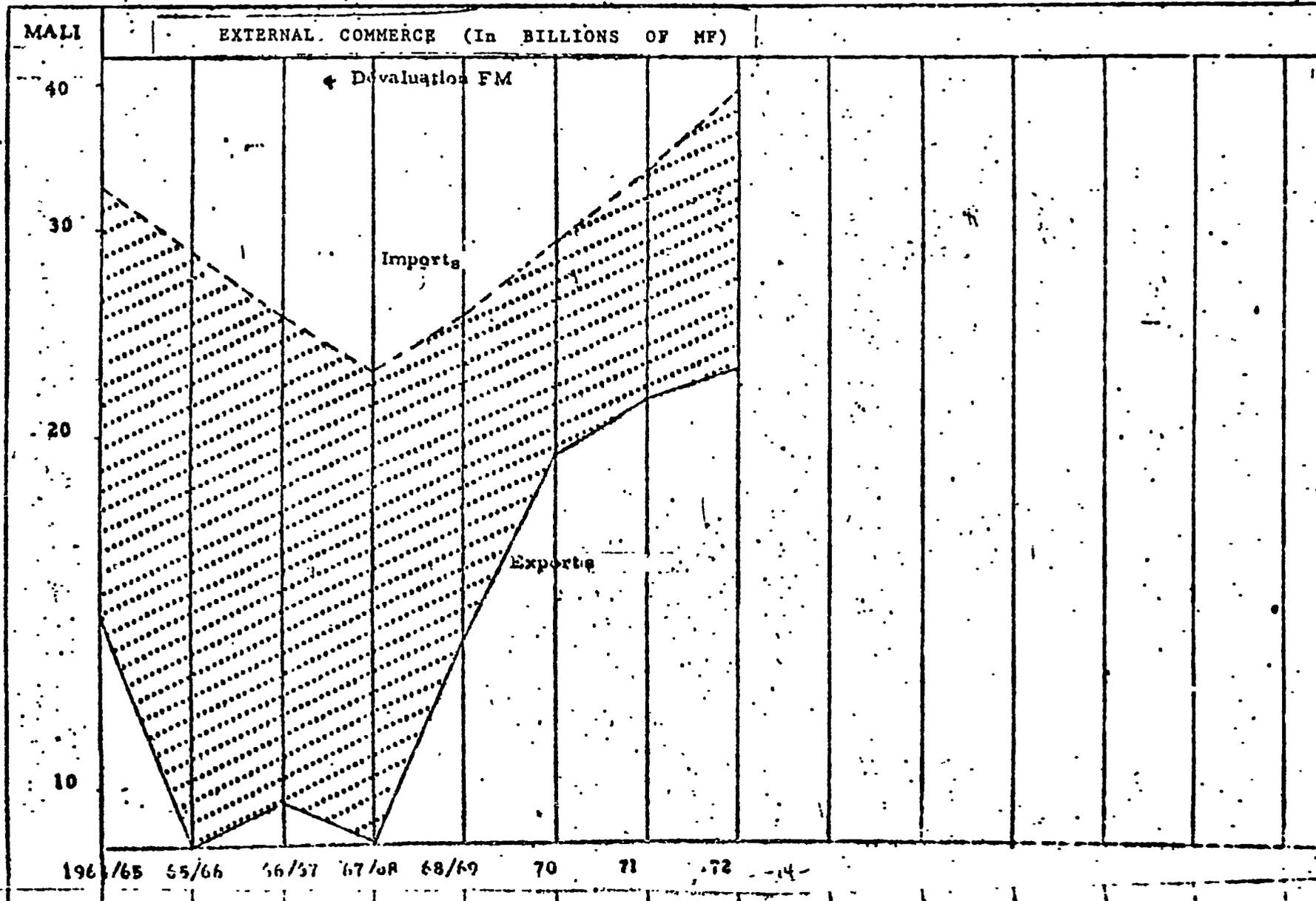
M A L I

## Balance of Goods and Services

(in billions, constant 1969 MF)

	1966/67	1967/68	1969	1970	1971	1972 (S)
Gross Domestic Product	117,8	122,3	118,9	126,4	130,9	136,7
Primary	60,5-51,4 %	62,0-51,1 %	58,7-49,6 %	63,3-50,1 %	64,7-49,9 %	67,5-49,4 %
Secondary	13-15,4 %	18,5-15,3 %	19,5-15,9 %	20,9-16,5 %	21,4-16,5 %	22,6-16,5 %
Tertiary	59,1-33,2 %	40,8-33,6 %	41,3-34,5 %	42,2-33,4 %	44,0-33,6 %	46,6-34,1 %
Salaries for Administrations & their Families	14,1	15,3	16,6	17,7	19,0	21,2
GDP	131,9	136,6	135,5	143,1	149,9	157,9
Imports	31,2	27,5	30,4	32,2	34,6	40,0
Total Resources	163,1	164,1	165,9	175,3	184,5	197,9
Household Consumption	99,8	100,6	97,5	104,1	105,8	110,3
Administration Consumption	20,4	21,2	22,3	23,8	25,3	27,7
of which: salaries	13,7	14,7	15,0	17,0	18,2	20,3
Goods & Services	6,7	6,5	6,3	6,8	7,1	7,4
Investments & Stocks	24,6	23,6	24,1	21,2	23,6	26,9
Exports	18,3	16,7	22,0	27,2	29,8	33,0
Utilization of Resources	163,1	164,1	165,9	176,3	184,5	197,9
Internal Savings	11,7	14,8	15,7	15,2	19,8	19,9
Commercial Balance	-12,9	-0,8	-0,4	-5,0	-4,8	-7,0

TABLE I-D



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M A L I

STATISTICS ON EXTERNAL COMMERCE

Controlled Exchange - Billions of MF

	64/65	65/66	66/67	67/68	68/69	1970	1971	1972
<b>Imports</b>								
Food & Beverages	6.6	7.0	5.3	5.8	7.3	10.9	11.5	14.7
Fuel	2.3	2.0	2.7	2.8	2.7	3.0	3.4	3.6
Construction Materials	3.4	2.2	4.2	1.6	1.2	1.3	1.0	2.1
Masonry, mechanical & Electric	4.3	1.0	0.8	2.0	3.5	4.1	5.0	5.4
Hardware	1.1	1.2	0.4	0.3	0.5	0.6	1.0	1.1
Vehicle spare parts	3.8	3.3	2.5	2.6	2.7	2.1	3.5	3.3
Chemicals, tobacco, soap	1.3	1.5	1.4	1.5	1.9	2.4	3.0	4.2
Textiles and leather	5.4	5.8	5.6	3.4	2.6	2.3	2.0	1.5
Other	3.5	2.6	1.3	2.8	2.3	1.6	1.7	2.0
<b>TOTAL Imports</b>	<b>32.4</b>	<b>28.2</b>	<b>25.2</b>	<b>22.8</b>	<b>25.3</b>	<b>29.3</b>	<b>33.7</b>	<b>39.4</b>
<b>Exports</b>								
Shelled Peanuts	4.0	1.7	1.7	0.7	0.8	1.6	2.7	2.4
Cotton Fiber	2.6	2.4	2.9	3.0	4.3	5.5	5.9	7.2
Oil and cake	0.1	0.5	0.5	0.3	1.0	1.1	2.4	2.1
Cotton Seeds	0.1	0.1	0.2	0.2	0.1	0.3	0.4	0.6
Meat	0.2	0.4	0.2	0.2	0.1	0.1	0.1	0.2
Textile	0.1	-	-	-	-	0.7	1.0	1.5
Other	0.7	0.2	0.2	0.4	0.3	0.2	0.3	1.1
<b>TOTAL Modern Sector</b>	<b>7.8</b>	<b>5.3</b>	<b>5.5</b>	<b>4.8</b>	<b>6.6</b>	<b>9.5</b>	<b>12.0</b>	<b>14.0</b>
Life Cattle	3.9	1.9	2.2	2.6	4.0	5.7	5.5	5.6
Fish	1.8	1.4	1.5	1.2	1.6	1.5	1.2	0.8
Other	0.5	0.3	0.5	0.4	1.1	2.5	1.8	2.3
<b>TOTAL Traditional Sector</b>	<b>6.2</b>	<b>3.5</b>	<b>4.2</b>	<b>4.2</b>	<b>6.7</b>	<b>9.7</b>	<b>8.5</b>	<b>8.7</b>
<b>TOTAL Exports</b>	<b>14.0</b>	<b>8.9</b>	<b>9.7</b>	<b>9.0</b>	<b>13.3</b>	<b>19.2</b>	<b>20.5</b>	<b>22.7</b>
<b>BALANCE</b>	<b>-18.4</b>	<b>-19.3</b>	<b>-25.5</b>	<b>-13.8</b>	<b>-12.0</b>	<b>-10.1</b>	<b>-12.2</b>	<b>-16.7</b>

Source: Economic Accounts - Correct Evaluations of the "DNPS"

TOTAL	M A L I					
	EXPORTS					
	66/67	67/68	69	70	71	72
Agricultural & Livestock Products	12 500	12 300	12 950	15 700	15 400	...
of which peanuts and peanut cakes	(1 430)	(700)	(815)	(1 830)	...	(2 970)
Live Cattle	(10 370)	(11 070)	(10 805)	(11 200)	...	(5 300)
Food Products	2 770	3 000	4 230	4 500	4 600	...
of which dried smoked fish	(2 500)	(2 400)	(2 740)	(2 500)	...	(917)
Primary Materials	3 000	3 200	4 250	6 200	6 500	9 023
of which Cotton fiber	(2 910)	(3 000)	(4 310)	(4 950)	...	(7 140)
Other	50	110	330	200	1 500	4 527
TOTAL	18 300	18 600	22 510	27 200	28 000	22 737

Source : Banque de Developpement du Mali  
(Malian Central Bank)

TABLE I-G

## M A L I

## NATIONAL REGIONAL BUDGETS

## Current Revenues and Expenses

	1965/66	1966/67	1967/68	2 <sup>o</sup> SEMESTRE 1968	1969	1970	1971 <sup>(6)</sup>	1972
<b>I - Revenues</b>								
<b>A. National Budget</b>								
Direct Taxes	2,33	2,07	2,25	0,91	1,53	1,93	3,36	3,15
Indirect Taxes	7,39	7,05	11,22	5,27	11,20	11,79	12,29	12,50
of which customs	(2,97)	(2,99)	(5,93) <sup>(1)</sup>	(7,03)	(5,40)	(6,57)	(6,15)	(5,65)
Other	0,92	1,10	1,25	0,14	0,35	1,00	1,14	0,72
Other	0,62	10,56	0,77	0,32	0,49	0,76	0,56	0,69
<b>TOTAL National Budget</b>	<b>11,26</b>	<b>10,78</b>	<b>15,49</b>	<b>7,64</b>	<b>13,97</b>	<b>15,53</b>	<b>17,35</b>	<b>17,07</b>
<b>B. Regional Budgets</b>	<b>1,77</b>	<b>3,16</b>	<b>3,27</b>	<b>1,33</b>	<b>3,15</b>	<b>4,01</b>	<b>3,30</b>	<b>3,32</b>
<b>Total Revenues</b>	<b>13,03</b>	<b>13,94</b>	<b>18,76</b>	<b>8,97</b>	<b>17,12</b>	<b>19,54</b>	<b>20,65</b>	<b>30,39</b>
<b>II - Expenses</b>								
<b>A. National Budget</b>								
- Recurrent Expenses	10,07	11,00	12,65	6,89	13,20	14,40	15,46	17,78
of which Personnel	(6,84)	(7,20)	(8,88)	(4,45)	(9,20)	(9,26)	(10,46)	(11,57)
Material	(3,23)	(3,80)	(3,97)	(2,44)	(4,00)	(4,34)	(3,50)	(6,21)
- Transfers	1,02	1,19	3,22	1,56	4,90 <sup>(3)</sup>	2,05	3,03	2,65
of which debts	(0,13)	(0,53)	(0,09)	(0,77)	(3,20 <sup>(4)</sup> )	0,55	1,20	0,60
- Supplies	-	-	1,66 <sup>(2)</sup>	0,71	0,80	1,53	0,57	0,60
<b>TOTAL National Budget</b>	<b>11,09</b>	<b>12,19</b>	<b>17,53</b>	<b>9,15</b>	<b>16,90</b>	<b>16,64</b>	<b>19,45</b>	<b>20,53</b>
<b>B. Regional Budgets</b>	<b>2,86</b>	<b>3,16</b>	<b>3,27</b>	<b>1,66</b>	<b>3,31</b>	<b>3,67</b>	<b>3,64</b>	<b>4,15</b>
<b>TOTAL Budget Expenses</b>	<b>13,95</b>	<b>15,35</b>	<b>20,80</b>	<b>10,82</b>	<b>22,21</b>	<b>21,91</b>	<b>23,09</b>	<b>24,58</b>
<b>III - Non-Budget Expenses</b>								
- Supplies	2,69	3,14	-	-	-	-	-	-
<b>TOTAL EXPENSES</b>	<b>16,64</b>	<b>18,49</b>	<b>20,80</b>	<b>10,92</b>	<b>22,21</b>	<b>21,91<sup>(5)</sup></b>	<b>23,30</b>	<b>24,58</b>

- (1) Since 1967-1968 export taxes are more important
- (2) Since 1967-1968 non budget equipment purchases have been integrated into the National Budget
- (3) International donations are included in transfers
- (4) The most important remittance is French Self-reimbursement for grant advances
- (5) only refers to years of real austerity
- (6) Reforme of minimum tax requirement
- (7) Transfer of the debt to the "Caisse Autonome d'Amortissement" of

TABLE I-B

## M A L I

## BUDGET

	(Billions in MF)								
	1965/66	1966/67	1967/68	23 quarters 1968	1969	1970	1971	1972	1973 <sup>(P)</sup>
Revenues	13 630	13 940	18 760	8 970	17 119	19 543	20 649	20 390	28 135
of which National Budget	11 257	10 700	15 490	7 640	13 969	15 533	17 343	17 074	
Regional Budgets	1 773	3 160	3 270	1 330	3 150	4 010	3 306	3 316	
Expenses	13 946	15 350	20 000	10 020	22 210	21 905	23 301	24 560	27 135
Deficit	-916	-1 410	-2 040	-1 050	-5 091	-2 362	-2 652	-4 190	
French Budget Support	-	-	1 000	1 000	5 000	1 500	2 000	2 000	
Other Resources	916	1 410	1 040	350	2 091	230	652	2 100	

Prevision: Direction Nationale du Plan et de la Statistique

M A L I

EXPORT TAX REVENUES IN THE BUDGET

	MF/Ton			
	1969	1970	1971	1972
Shelled Peanuts	24 900	9 150	4 050	4 050
Oil	48 200	12 000	12 000	12 000
Cotton Fiber	69 500	39 365	40 000	54 000
Seeds	990	100	100	100
Karite Kernels	2 900	2 900	2 900	2 900
Oil	39 000	10 000	10 000	10 300
Superior Kapok	46 500	46 600	10 000	exempt
Ordinary Kapok	45 000	45 000	10 000	"
Zebu Cattle	5 000	1 500	3 500	3 500
Crossbred Cattle	4 800	1 200	3 500	3 500
Sheep, Goats	500	150	150	500
Fish	41 000	41 000	41 000	41 000
Horse	7 000	7 000	7 000	7 000
Cattle Hides	61 500	exempt.	exempt.	exempt.
Sheep Hides	5 000	"	"	"
Goat Hides	9 000	"	"	"

TABLE I-I

TABLE I-J

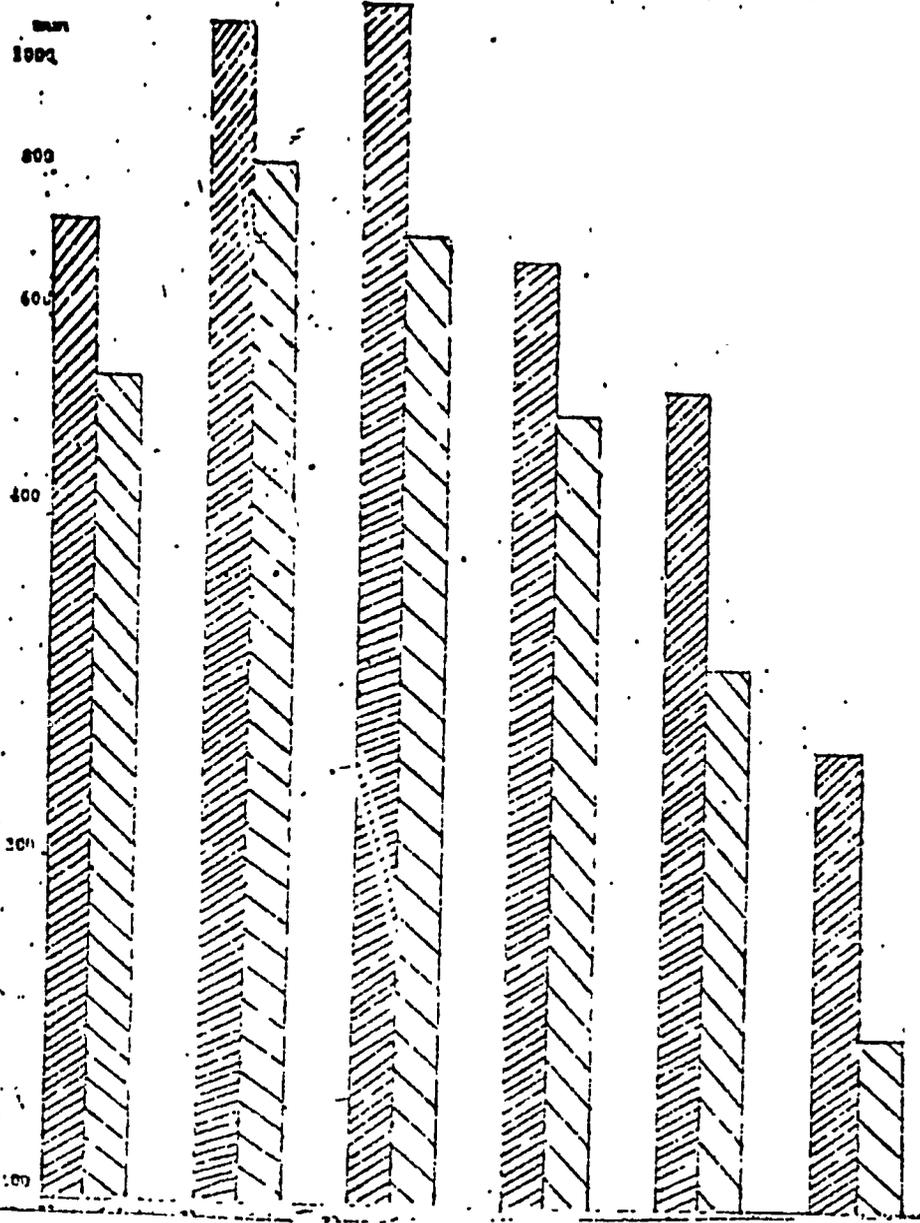
## EXTERNAL FINANCING DURING THE PLAN (1970 - 1972)

(In billions MF)

	Total	Agriculture	Industry	Energy	Transport	Infrastructure	Education	Health	Studies
Financing according to the Plan	60 807	17 974	13 364	1 531	12 537	6 206	3 457	2 222	3 435
F E D	21 950	11 190	-	-	6 603	2 156	37	1 508	360
I D A	9 013	3 530	-	-	3 564	1 542	-	-	-
F A C	7 262	3 700	168	649	070	514	370	680	695
Germany	6 206	2 564	2 224	49	1 347	1 022	-	-	-
China (PRC)	5 746	1 500	4 102	-	-	-	-	-	144
Unidentified Private Sources	5 601	-	5 601	-	-	-	-	-	-
United Nations	4 673	304	-	-	-	190	2 345	-	1 839
U.S.A.	1 180	-	-	830	-	-	350	-	-
Russia	1193	-	-	579	-	-	820	-	-
Bulgaria	021	531	-	-	-	-	-	-	200
Italy	574	-	-	-	-	574	-	-	-
East Germany	02	-	-	-	-	02	-	-	-
Great Britain	73	73	-	-	-	-	-	-	-
Canada	33	-	-	-	-	-	35	-	-
Other	1 393	-	1 269	-	39	-	-	-	-
TOTAL	65 510	22 408	13 364	1 901	12 641	6 300	3 457	2 222	3 436

Source: Service du Plan, FED, FAC, KFW

**MALI**  
**RAINFALL**  
**Total (in mm)**



1st Region 2nd Region 3rd Region 4th Region 5th Region 6th Region  
 Kayes Bamako Sikasso Segou Mopti Gao



Rainfall June-Sept. 30, 1973  
 30 years average  
 Sources: Bulletings MAC

TABLE I-K

**M A L I**

**PRINCIPAL AGRICULTURAL STATISTICS**

	1964	1966	1967	1968	1969
Area of Country in Km <sup>2</sup>	1 201 625	1 230 150	1 240 142	1 240 142	1 240 142
Total Population	4 483 000	4 654 100	4 740 800	4 905 600	4 923 000
Number of Cultivators	302 300	292 234	401 700	432 020	442 150
Number of Villages	9 029	9 594	9 498	9 474	9 475
Area Planted (ha.)	1 351 822	1 395 143	1 788 332	1 604 816	1 672 767
of which millet & Sorghum	661 044	829 901	881 939	880 767	845 764
rice	123 036	169 007	192 313	156 062	129 658
cotton	58 573	47 121	70 703	77 521	65 593
peanuts	140 203	122 326	125 231	101 437	95 631
corn	45 999	22 363	31 250	23 178	23 872
<u>Yields (Kg/Ha) :</u> millet	767	730	780	582	680
sorghum	1 034	989	901	743	967
rice	1 049	804	727	660	1 034
cotton	548	593	534	564	570
peanuts	948	1 234	835	775	1 217
corn	1 694	1 124	954	1 019	1 168

Source: Agricultural Survey

TABLE I-1

Thousands of Tons  
Price/Kg in MF  
Revenue in Thousands of MF

TABLE I-M

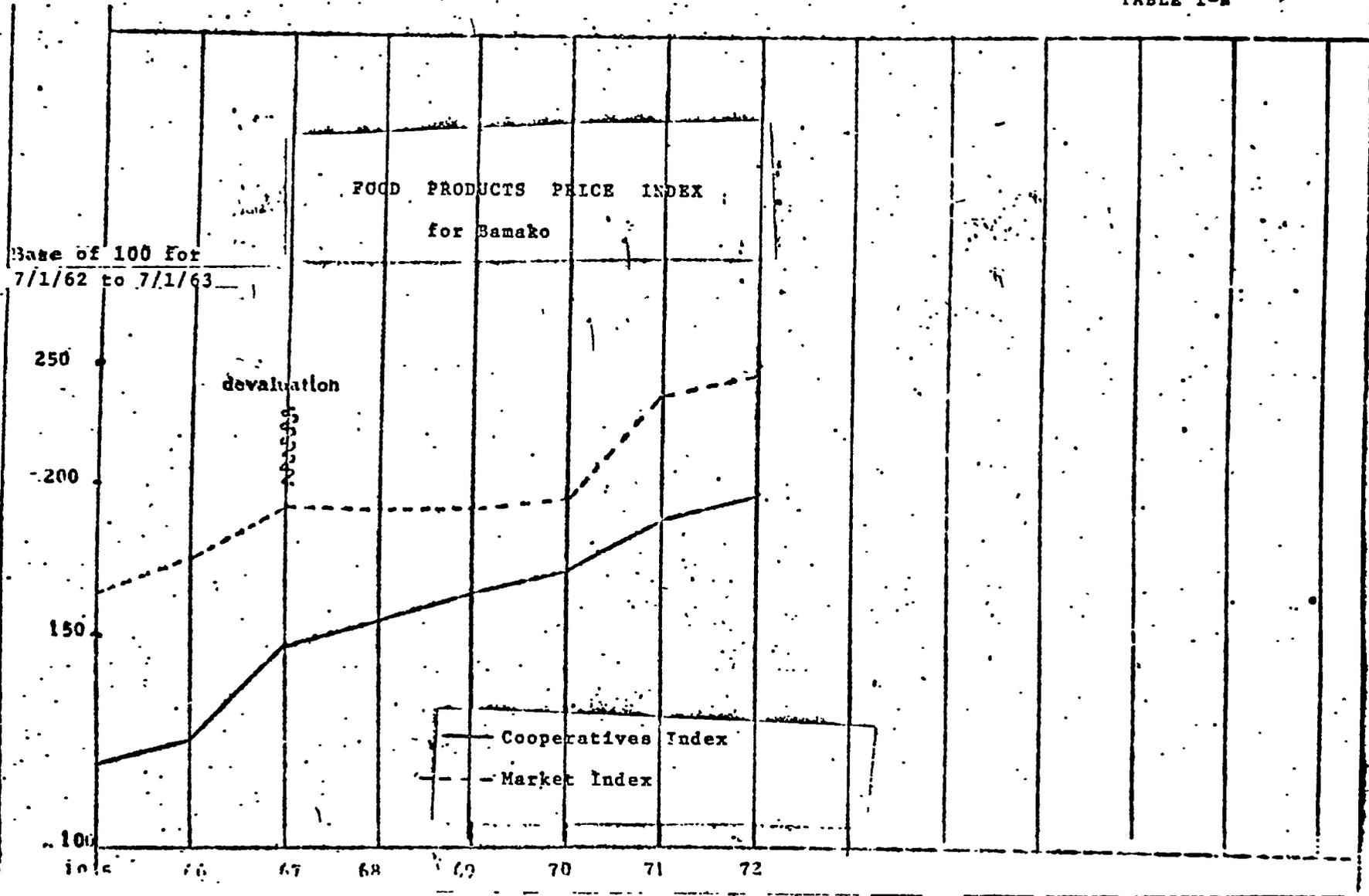
M A L I

AGRICULTURAL PRODUCTION AND MARKETING

	1961/62	1962/63	1963/64	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73
<u>Milliet and Sorghum</u>												
Production	827	867	863	651	721	738	830	353	650	715	750	516
Marketed	66,4	70,7	73,2	48,3	27,2	40,1	52,8	28,3	26,4	10,0	30,0	10,0
Price to Producer/Kg	10	10	10	11	11	15	16	16	18	18	16	20
Revenue to Farmers	664	707	752	537	299	601	845	453	475	180	540	200
<u>Paddy Rice - Production</u>												
Production	144,9	200,1	180,6	191,9	161,8	189,3	171,3	124,4	161,0	153,0	100,0	110,0
Marketing	23,8	27,8	30,8	27,3	26,2	32,9	36,4	23,3	30,9	35,5	50,5	70,0
(White Rice) Price/kg	8	11	11,5	12,5	12,5	16	18	18	25	25	25	25
Revenue to farmers	190	306	354	341	320	525	655	455	973	988	1 263	750
<u>Peanuts: - Production</u>												
Production	...	...	...	147,9	153,2	159,2	110,6	95,6	136,2	158,2	152,0	140,0
- Marketed	66,4	70,7	73,2	40,8	27,2	40,1	29,2	32,7	56,7	74,4	59,3	52,0
- Price/Kg	14	14	14	13	13	16	24	24	30	30	30	30
Revenue to Farmers	930	990	1 053	634	954	642	701	785	1 701	2 232	1 785	1 300
<u>Cotton Seed - Production</u>												
Production	7,7	8,5	10,8	53,7	23,4	31,5	38,6	50,4	51,0	59,5	74,0	72,2
- Marketed	12,9	20,0	25,1	29,2	18,5	27,9	32,6	44,0	44,9	52,0	63,0	65,2
- Price/Kg	34/30	34/30	34/30	34/30	34/30	34/30	40/35	40/35	45/35	50/35	50/35	50/35
Revenue to Farmers	...	...	...	...	...	...	1 290	1 736	1 980	2 530	3 250	3 178

Sources: Agricultural Service and Agricultural surveys

TABLE I-N



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## ANNEX 2A-1

NEW LANDS ACTIVITY      COSTS SUMMARY (\$)

	1	2	3	1-3	4	5	1-5
Local Personnel Costs	24,488	24,488	24,488	73,464	24,488	24,488	122,440
Training Costs	116,000	50,000	12,000	178,000	-	-	178,000
Technical Assistance	315,000	337,500	277,500	930,000	172,500	97,500	1,200,000
Plant, Commodities & Equipment	76,150	10,000	-	86,150	-	13,000	99,150
<u>Recurrent Support</u>	11,975	15,560	15,638	43,173	16,728	15,817	75,718
TOTAL excluding Contingencies	543,613	437,548	329,626	1,310,787	213,716	150,805	1,675,308
Add 10% Contingency*				131,000			168,000
				<u>1,442,000</u>			<u>1,843,000</u>

\* Contingency includes both unanticipated costs and provision for inflation.

## Local Personnel Costs (\$)

Position	No.	Rate lyr	1	2	3	1-3	4	5	1-5
Senior tse-tse Officer	1	4,800**	4,800	4,800	4,800		4,800	4,800	24,000
Tse-tse Research Officer	1	4,700**	4,700	4,700	4,700		4,700	4,700	
Tse-tse operations Officer	1	4,500**	4,500	4,500	4,500		4,500	4,500	
Field surveyors	12	400	4,800	4,800	4,800		4,800	4,800	
Drivers	3	360	1,080	1,080	1,080		1,080	1,080	
Mechanics	1	432	432	432	432		432	432	
Draftsman	1	480	480	480	480		480	480	
Laborers (special)	6	240	1,440	1,440	1,440		1,440	1,440	
(general)	6	192	1,152	1,152	1,152		1,152	1,152	
Watchman	1	192	192	192	192		192	192	
Clerk	1	480	480	480	480		480	480	
Warehouseman	1	432	432	432	432		432	432	
	35	24,488	24,488	24,488	24,488	73,464	24,488	24,488	122,440

\* No salary escalation is provided for ; cost increase will be covered by contingency and by margin indicated in (\*\*).

\*\* Based on experience in Nigeria, exceeds local scale in Mali.

NEW LANDS ACTIVITY

ANNEX 2A-3

Training Costs (\$)

Discipline	No.	Location		1	2	3	1-3
		duration	/months				
Entomologist	1	Africa and U.S.	12	3,000		12,000	
Fly Research	1	Africa and U.S.	12	12,000			
Fly Operations	1	Africa	12	12,000			
Fly Surveyors	12	Africa	12	50,000	50,000		
Economist	1	U.S.	9	9,000			
Engineer	1	U.S.	9	9,000			
Animal Husbandry/Range Mgt.	1	U.S.	9	9,000			
Land Use Planner	1	U.S.	12	12,000			
<b>Total</b>	<b>19</b>			<b>116,000</b>	<b>50,000</b>	<b>12,000</b>	<b>178,000</b>

## NEW LANDS ACTIVITY

ANNEX 2A-4

## Technical Assistance (\$000)

Job Title	1	2	3	1-3	4	5	1-5
Entomologist	50	50	50	150	50	50	250
Tse-tse Operations Officer	50	50	50	150	50	-	200
Land Use Planner	50	50	50	150	-	-	150
Economist	30	50	20	100	-	-	100
Short Term Personnel	30	25	15	70	15	15	100
Overhead (50%)	105	112.5	92.5	310	57.5	32.5	400
<b>Total</b>	<b>315</b>	<b>337.5</b>	<b>277.5</b>	<b>930</b>	<b>172.50</b>	<b>97.5</b>	<b>1,200</b>

## NEW LANDS ACTIVITY

ANNEX 2A-5

## Plant, Commodities and Equipment (\$)

	No.	Unit Cost	1	2	3	1-3	4	5	1-5
Plant (Senior Staff Office Staffing, clerical, laboratory, Field staff workroom)			45,000						
Truck	1	10,000		10,000					
All terrain vehicles	3	6,000	18,000					12,000	
Mapping equipment	1	2,000	2,000						
Survey equipment	1	1,500	1,500						
Tent equipment	4	450	1,800						
Camping supplies	4	250	1,000						
Generator	1	350	350						
Radio transceiver	2	1,500	3,000						
Laboratory equipment and supplies	1	1,500	1,500					1,000	
Portable housing	2	1,000	2,000						
<b>Total</b>			<b>76,150</b>	<b>10,000</b>	<b>-</b>	<b>86,150</b>		<b>13,000</b>	<b>99,150</b>

## NEW LANDS ACTIVITY

ANNEX 2A-6

Recurrent Support (\$)

Item	Basis	1	2	3	1-3	4	5	1-5
Fuel, operating, maintenance and parts costs for vehicles	year 1-3 all terrain; 2-3 trucks	7,500	11,000	11,000	29,500	12,000	11,000	52,500
Field and travel allowance	per diem based on existing scales for out of country travel from Nigeria	1,975	2,060	2,138	6,173	2,228	2,317	10,718
Other supplies		2,500	2,500	2,500	7,500	2,500	2,500	12,500
<b>Total</b>		<b>11,975</b>	<b>15,560</b>	<b>15,638</b>	<b>43,173</b>	<b>16,728</b>	<b>15,817</b>	<b>75,718</b>

**SAHEL GRAZING ACTIVITY COST SUMMARY (\$000)**

ANNEX 2B-1

<b>A. Infrastructure</b>					
Water Facilities	175	}			
Additional Cost for Deep Well Test	150		325		
Fire Trails			120		
Access Roads			150		
Cattle Related Installations			23		
Administrative, Storage and Residential			220		
Market Improvements			200		
SubTotal			1,038		
<b>B. Vehicles, Equipment and Supplies</b>			272		
<b>C. Operating Expenses</b>	1	2	3	3 year Total	5 year Total
Commodities, Supplies, Parts	92	93	98	283	533
Technical Assistance	225	225	203	653	967
GOM Personnel	26	27	27	80	134
Operating Expenses SubTotal				1,016	
<b>D. Equipment Replacement</b>					50
TOTAL excluding Contingencies				2,326	2,994
Add 20% Contingency *				465	599
TOTAL.				2,791	3,593

\* Contingency includes both unanticipated costs (or cost uncertainty) and provision for inflation

SAHEL GRAZING ACTIVITY - Cost Estimate (\$)

A. No.		<u>Unit Cost</u>	<u>Item Cost</u>	<u>Group Cost</u>
	<b>INFRASTRUCTURE</b>			
	<b>Water Facilities</b>			
14	Shallow wells	5000	70000	
10	ponds	4000	40000	
10	dams	6500	65000	175000
1	Additional cost to add deep well distribution system in lieu of some watering points	150000	150000	150000
	<b>Fire trails</b>			
	300km, 7 m trails	400	120000	120000
	<b>Access Roads</b>			
	Improve existing trails (150 km)	1000	150000	150000
	No improvement financed for Nara-Dilly road axis			
	<b>Cattle Related Installations</b>			
1	Corral fence	2000	2000	
1	Cattle squeeze	500	500	
1	Loading platform	1000	1000	
1	Scales	6000	6000	
8	Power hand sprayers	1000	8000	
4	Cattle squeeze chutes	1000	4000	
4	Forest guard houses	800	1600	23100
	<b>Administrative and Residential</b>			
	Warehouse and Storage		40000	
	Office and Plant		60000	
	Residential Housing		70000	
	Dormitory and Canteen		50000	220000
5-6	Market Infrastructure	30-50000	200000	200000
	<b>Subtotal</b>			<b>1,038100</b>

SAHEL GRAZING ACTIVITY - Cost Estimate (continued)

B. No.	EQUIPMENT	<u>Unit Cost</u>	<u>Item Cost</u>	<u>Group Cost</u>
.2	Trailer trucks	50000	100000	
3	4wheel drive vehicles with winch	6000	16000	
1	road grader	72000	72000	
1'	tractor-form type with front end loading fork and rear end blade	15000	15000	
2	Conveyor belt loaders	3000	6000	
1	Welding equipment, acetylene, and arc portable by pickup vehicle	6000	6000	
1	Motorized, pick-up camper	3000	3000	
12	Mobylettes	240	2880	
1	AC/DC portable generator	4000	4000	
24	Forks, shovels	15	360	
1	Survey instruments	4000	4000	
1	Machine and repair shop	8000	8000	
	Spare parts and tools	30000	30000	269240
	Office equipment and furnishings		3000	3000
	Sub-total Infrastructure and Equipment			1,310340

SAHEL GRAZING ACTIVITY - Cost Estimate

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Total Year 1-3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Total for 5 Years</u>
<b>C. No. OPERATING EXPENSE</b>							
Salt and minerals	35000	37000	37000	109000	46000	49000	204000
Vaccines & pharmaceuticals	20000	20000	20000	60000	25000	25000	110000
Fuel, oil, grease	30000	30000	30000	90000	40000	40000	170000
Repair operating expenses	5000	5000	10000	20000	7500	15000	42500
Aerial photo coverage	1000	-	-	1000	-	-	1000
Useable supplies	1000	1000	1000	3000	1000	1000	5000
Subtotal	92000	93000	98000	283000	119500	130000	532500
<b>Technical Assistance</b>							
1 Animal husbandry/range Mgt.	50000	50000	50000	150000	50000	50000	250000
1 Engineering service	50000	50000	50000	150000	20000	20000	190000
1 Other technical assistance	50000	50000	35000	135000	40000	30000	205000
OVERHEAD (at 50%)	75000	75000	67500	217500	55000	50000	322500
Subtotal	225000	225000	202500	652500	165000	150000	967500
<b>COM Personnel</b>							
1 Manager trainee	2400	2400	2400	7200	2400	2400	12000
1 Deputy Manager trainee	2200	2200	2300	6700	2300	2400	11400
2 Technician-Interpreter	3600	3600	3600	10800	3600	3600	18000
4 Operating technicians	4800	4800	4800	14400	4800	4800	24000
4 Veterinary assistants	3000	3000	3000	9000	3000	3000	15000
4 Animal production assistants	3000	3000	3000	9000	3000	3000	15000
1 Mechanic	1500	1500	1500	4500	1500	1500	7500
1 Mechanic-part time	700	700	700	2100	700	700	3500
1 Labor foreman	730	730	730	2190	730	730	3650
10 Workmen	2400	2400	2400	7200	2400	2400	12000
1 Contoller	1500	1500	1500	4500	1500	1500	7500
1 Secretary	800	800	800	2400	800	800	4000
Subtotal	26630	26630	26730	79990	26730	26830	133550
Operating Expense subtotal	343630	344630	327230	1,015490	10000	40000	50000
Replacement of equipment							
SAHFL GRAZING Total (without contingency)				2,325830			2,993890

ANNEX 2 C

COST ESTIMATES FOR THE CENTRAL VETERINARY LABORATORY

A. Spare parts	\$ 20,000
B. Operating support	54,000
C. Fund for diagnostic services	<u>25,000</u>
	\$ 89,000

## COMPUTATION OF BENEFITS FOR THE SAHEL GRAZING ACTIVITY

### A. Types of Benefits

1. Reduction in mortality due to enlarged health services and better nutrition;
2. Increase in fertility and hence in numbers of surviving calves;
3. Increase in available forage through reduction of loss by burning;
4. Increase in animal growth rate, in milk production; decrease in average age for off-take, all due to improved nutrition;
5. Increase in forage harvested due to extended grazing of areas otherwise limited by lack of water; and
6. multiplier effect translating direct benefits to Sahelian herds into benefits of an integrated livestock sector.

### B. Assumptions Used in Calculating Benefits

1. Mortality rate will be reduced from 14% to 10% over a 5 year period;
2. Fertility rate during this period will increase from 60 to 66 percent (the high initial rate of 60% is a conservative assumption for these calculations, it is based on statistics used in the SEDES study of the Mopti region);
3. The increase in the gain of liveweight per head during extended grazing of rangelands beyond November may average 100gm/day per animal unit for up to 3/4 of the time extended ; actually, more conservative criteria are used for calculations below;
4. Milk production will increase because of higher fertility and better nutrition. The maximum

anticipated increase would be from 42 liters (6 weeks) to 90 liters (3 months) per cow;

5. Fire losses represent an average of 20% of total available dry season forage in the area; these losses will be reduced by one-fourth through herder cooperation and installation of firebreaks;

6. Water sources will extend grazing beyond the end of November through March for shallow wells; February for dams; and January for ponds; each water source will extend use of a land area of 5km radius;

7. Initially planned charge on land will be limited to 1 A.U.\* for 10 hectares, to be increased gradually to a maximum charge of 1 A.U. per 6 ha.; the land areas where water sources are to be installed will have been lightly used such that the maximum charge may be attained in the third year (i.e. 10, 8, 6);

8. Areas for which grazing is extended are assumed to be only the 5km radius around water sources; these areas will be assumed to be grazed at constant charge throughout the period of extended use; water will be available in sufficient quantity to sustain the full charge during the period of extended use and will not be available thereafter;

9. Land will be grazed by cattle, sheep and goats, but calculations are based on cattle use only at the charge rate indicated (i.e., sheep and goats are converted into A.U. and the number of A.U. reconverted into fictive head of cattle); a steer of 250kg, corresponding to 1 A.U. is valued at 40,000MF or about \$90, i.e., 35¢/Kg. liveweight;

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\* 1 A.U. is measured by the consumption of 250Kg cattle and corresponds to about 6.25 Kg of dry matter/day. Weight gain will depend on the nutritive value of (ability to convert to energy) the food bulk absorbed.

10. Herd composition and size will change; the percentage of females will increase and off-take will increase; if an optimistic off-take of 12% initially is assumed ( a conservative assumption for these calculations); off-take during 5 years may increase to 14% and herd size increase by 4%, off-take will then approach 7% females indicating a relatively stable population; emphasis will be on increasing off-take of younger animals for feeding off the range; and reducing rate of growth in herd size such that herd size begins to stabilize with what little growth may occur being manageable through expansion in carrying capacity of rangeland; it is not presumed that this action, in itself, will induce a permanently stable pattern, but rather that growth in animal numbers may be kept modest and within increasing rangeland carrying capacity during the next several years; and

11. A multiplier for translating certain benefits to Sahelian herds into value for an integrated livestock sector has been set at 1.3; the multiplier is to estimate the real benefit to the livestock economy, wherein heretofore the traditional livestock herders have been a captive, exploited source of production and now must be induced to provide increased off-take for growing modern and commercial sub-sectors; the multiplier 1.3 is based on two factors (a) the level of incentive generally requisite for clear recognition in the rural development sector; and (b) an estimate of undervaluation of remuneration to the traditional herder in comparison with reasonable future market expectations.

### C. Computation of Benefits

The SEDES study of livestock in the Mopti region shows the following two estimates of herd composition:

	<u>Mopti (per 100 head)</u>		<u>National Survey</u>	
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>
Surviving calves	10	11	9	9
1 - 3 years	13	16	13	21
<u>Adults</u>	<u>15</u>	<u>35</u>	<u>12</u>	<u>36</u>
Total	38	62	34	66

Table 1

The livestock population of the Dilly site is about 100,000 head of cattle and 200,000 sheep and goats. Assuming the average cattle head to be 0.8 A.U. and that 8 head of sheep or goats average 1 A.U., there are about 115,000 A.U. in the grazing perimeter.

1. Asset value gains due to reduction in death loss

<u>Year</u>	<u>Death Loss(%)</u>	<u>Comparative herd size</u>	<u>Marginal Increase Value at in Surviving A.U. \$90/A.U.</u>	
1	14	100	-	-
2	13	101	1,150	103,500
3	12	102	2,346	211,140
4	11	103	3,553	319,770
5	10	104	4,784	430,560

Table 2

Note: It is assumed that a large part of this asset value gain will be realized as marketed off-take rather than increase in numbers.

2. Increase in number of calves would be:

a. Number of mature cows/100 head would increase from 34 to 36 as herd composition changed;

b. During this period, fertility would increase to 66% (largely due to distribution of minerals during the rainy season):

<u>Year</u>	<u>Fertility Rate</u>	<u>Mature Females/100 head</u>	<u>Births/100 head</u>	<u>Marginal No. of New Births</u>
1	60	34	20	-
2	62	34	21	1,440
3	64	35	22	2,875
4	65	35	23	4,310
5	66	36	24	5,750

Table 3

Provision needs to be made for death loss of infant cattle. As a conservative assumption, losses will be assumed to be 50%. At this rate, growth in herd size during 5 years will not increase significantly beyond 4% due to these additional units. The following table calculates the asset value of the new stock (no provision is made for early off-take) assuming the cattle will reach maturity in 5 years and will be worth \$20, 35, 50, 70 and 90, respectively for each year.

Year	Number of Additional Animals					Total Number of Additional Animals	0-1	Value of Animals				Sub-Total	Death Loss	Total
	0-1	1-2	2-3	3-4	4-5			1-2	2-3	3-4	4-5			
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	720	-	-	-	-	1,440	14,400	-	-	-	-	14,400	1,872	12,528
3	1438	720	-	-	-	2,158	28,760	25,200	-	-	-	53,960	6,475	47,485
4	2155	1438	720	-	-	4,313	43,100	50,330	36,000	-	-	129,430	14,237	115,193
5	2875	2155	1438	720	-	7,188	57,500	75,425	71,900	50,400	-	255,225	25,523	229,702
6	2875	2875	2155	1438	720	10,063	57,500	100,625	107,750	100,660	54,800	431,335	43,134	388,201
7	2875	2875	2875	2155	1438	12,218	57,500	100,625	143,750	150,850	129,420	582,145	58,215	523,930
8	2875	2875	2875	2875	2155	13,655	57,500	100,625	143,750	201,250	193,950	697,075	69,708	627,367
9	2875	2875	2875	2875	2875	14,375	57,500	100,625	143,750	201,250	258,750	761,875	76,188	685,687
10	2875	2875	2875	2875	2875	14,375	57,500	100,625	143,750	201,250	258,750	761,875	76,188	685,687

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Table 4

Assuming that only 3/4 of this value can be realized (early off-take, culling, slower than expected maturation), asset value benefits will be:

<u>Year</u>	<u>Asset Value Benefit</u>
1	0
2	9,396
3	35,614
4	86,395
5	172,277
6	291,151
7	392,948
8	470,525
9	514,265
10	514,265

Table 5

3. Computation of forage resource gains through reduction of burning; valorization of additional dry season forage resources. There will be three kinds of forage gains: (a) harvest in area where water sources already exist while water is available; (b) harvest in areas where use is extended by addition of water sources; and (c) forage not harvested but which contributes to restoration of rangeland condition.

The calculation will assume average range condition of 1 A.U./10 ha (conservative), yielding 780 Kg/ha of forage/yr. Assuming 90 days use with 5% gain and 100gms/day gain per A.U., this represents:

$$\left(\frac{780}{365} \times 90\right) \times \left(\frac{.1\text{Kg}}{6.25 \text{ Kg for.}}\right) \times (850,000 \text{ ha}) \times (.05) \times (\$0.35/\text{Kg}) = \$45,701$$

4. An increase in animal growth rate may be assumed by virtue of improved health services (vaccination for disease and treatment for parasites) and nutrition (mineral supplements, reduction of dry season grazing distances and probably some increase in dry season food quantity; an increase in milk production may also be anticipated because of higher fertility and improved nutrition. No account has been taken of these benefits, except where period of harvest has been extended through installation of water sources (5 below). This conservative approach is taken because it is difficult to speculate on the amount of gain in meat and milk production in an extensive system.

5. Computation of benefits gained through additional grass harvested: 34 water sources are assumed, 14 wells, 10 dams and 10 ponds. It is assumed that wells will extend use by 4 months, dams by 3 months and ponds by 2 months. The area added for each watering unit is 7,854 ha. Therefore, the following gains are contemplated.

14 watering points,	adding	109,956 hectares	for 4 months;
10 dams	adding	78,540 hectares	for 3 months;
10 ponds	adding	78,540 hectares	for 2 months,

with the following result:

<u>Year</u>	<u>A.U./ha</u>	<u>A.U.-Dec</u>	<u>A.U.-Jan</u>	<u>A.U.-Feb.</u>	<u>A.U. Mar.</u>
1	10	26,704	26,704	18,850	10,996
2	8	33,380	33,380	23,562	13,745
3	6	44,507	44,507	31,416	18,327
4	6	44,507	44,507	31,416	18,327
5	6	44,507	44,507	31,416	18,327

Table 6

If one assumes weight gains and milk production as follows:

	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar.*</u>
wt gain/A.U./day	100gm	80gm	60gm	20gm
Milk produced per lactating cow/day	1.0 liters	0.7 l.	0.4 l.	-

Table 7

\* Actually, it may not be possible to assure weight gains to March. More realistically, one will be reducing loss which might otherwise occur. There is important economic gain in reducing the size of the weight cycle and it is assumed that the above is a conservative measure of this value.

If one assumes that one adult cow consumes 2 A.U., that Av'g. consumption/head is 0.8 A.U., that the number of lactating females/100 head will be 20-24, per table 3, then one may compute meat and milk production gains as follows:

a. Meat Production

<u>Year</u>	<u>Kg. Mt. Dec*</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Total</u>	<u>Value at \$0.35/Kg live wt.</u>
1	86,100	64,080	11,310	2,199	157,689	55,191
2	100,140	80,112	14,137	2,749	197,138	68,998
3	133,521	106,817	18,850	3,665	262,853	91,999
4	133,521	106,817	18,850	3,665	262,853	91,999
5	133,521	106,817	18,850	3,665	262,853	91,999

Table 8

b. Milk Production

<u>Year</u>	<u>Liters Dec.</u>	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Total</u>	<u>Value at \$0.125/lit.**</u>
1	200,280	140,190	56,550	-	397,020	49,628
2	260,370	182,250	73,500	-	516,120	64,515
3	360,510	252,360	101,790	-	714,660	89,332
4	387,210	271,050	109,320	-	767,580	95,948
5	400,560	280,380	113,100	-	794,040	99,255

Table 9

\* Assumes 30 days/mo.

\*\* Market value of \$0.175/liter is assumed; it is assumed that 1/3 marketed, 1/3 used for human consumption by herders at 2/3 market value and 1/3 consumed by calves at 1/2 market value.

Combined Meat and Milk Production gains are:

<u>Year</u>	
1	104,819
2	133,513
3	181,331
4	187,947
5	191,254

Table 10

6. Having calculated individual, direct benefits, compensation must be made for two other factors: (a) duplication of benefits and (b) cyclical weather effects, particularly risk of drought. The multiplier effect must also be introduced. For conservatism, it will be applied only to recurring and not asset value benefits, i.e., 3, 4 and 5, but not 1 and 2.

Total direct benefits for 10 years may be summarized as follows:

<u>Year</u>	<u>Reduction in Death Loss</u>	<u>Increase in births</u>	<u>Forage Resource Gains through Fire Protection</u>	<u>Meat and Milk Gains through Extended Grazing</u>
1	-	-	45,701	104,819
2	103,500	9,396		133,513
3	211,140	35,614		181,331
4	319,770	86,395		187,947
5	430,560	172,277		191,254
6		291,151		
7		392,948		
8		470,525		
9		514,265		
10		514,265		

Table 11

Assumptions re duplication in computing benefits and effect of climatic cycles on projected benefits;

a. Asset value benefits should be reduced by 10% to compensate for any duplication with recurrent value benefits;

b. Total benefits should be reduced by 20% to compensate for one drought year and one to two unfavorable years per five year cycle. The result is:

Year	Asset Value Benefits	AVB Loss 10%	Recurrent Benefits	RB x 1.3	Sub-total sum of AVB less 10% and RBx1.3	Total (Sub-total reduced by 20%)
1	-	-	150,520	195,676	195,676	156,541
2	112,896	101,606	179,214	232,978	334,584	267,667
3	246,754	222,079	227,032	295,142	517,221	413,777
4	406,165	365,549	233,648	303,742	669,291	535,433
5	602,837	542,553	236,955	308,042	850,595	680,476
6	721,711	649,540			957,582	766,066
7	823,508	741,157			1,049,199	839,359
8	901,085	810,977			1,119,019	895,215
9	944,825	850,343			1,158,385	926,708
10						

Table 12

These benefits must be compared with expenditures of about \$3.5 million over 5 years, being approximately:

<u>Year</u>	<u>Expenditure (in \$million)</u>
1 .	1.3
2	0.9
3	0.5
4	0.4
5	0.5

Benefits and costs will be compared for a project life of 20 years, it being assumed that after year 5 expenditures will remain constant at \$500,000.

<u>Year</u>	<u>Benefit</u>	<u>Expenditures</u>	<u>Present work factor at 12%</u>	<u>Discounted Benefits</u>	<u>Discounted Expenditures</u>
1	156,541	1,300,000	1.0	156,541	1,300,000
2	267,667	900,000-	.8929	239,000	803,610
3	413,777	500,000	.7972	329,863	398,600
4	535,433	400,000	.7118	381,121	284,720
5	680,476	500,000	.6335	431,082	316,750
6	766,066		.5674	434,666	283,700
7	839,359		.5066	425,219	253,300
8	895,215		.4523	379,642	226,150
9	926,708		.4039	374,297	201,950
10			.3606	334,171	180,300
11			.3220	298,400	161,000
12			.2875	266,429	143,750
13			.2567	247,442	128,350
14			.2292	212,401	114,600
15			.2046	189,604	102,300
16			.1827	169,310	91,350
17			.1631	151,146	81,550
18			.1456	134,929	72,800
19			.1300	120,472	65,000
20			.1161	<u>107,591</u>	<u>58,050</u>
Total				5,384,026	5,267,820

The rate of return is shown to be about 12%.

### Sensitivity Analysis

The Sensitivity Analysis will be undertaken to consider the effect of modifying each of three parameters:

1. the asset value benefits, which become quite large by the 5th year and then grow rapidly, by reducing the rate of increase after the fifth year;
2. the assumed price of meat;
3. the multiplier.

1. If one assumes that the rate of increase after year 5 will decline by 10% each year, the following table would summarize asset value benefits.

<u>Year</u>	<u>Original AVB</u>	<u>Modified AVB</u>	<u>Modified AVB Reduced by 10%</u>
1	_____	_____	_____
2	112,896	112,896	101,606
3	246,754	246,754	222,079
4	406,165	406,165	365,549
5	602,837	602,837	542,553
6	721,711	709,824	638,842
7	823,508	791,262	712,136
8	901,085	845,566	761,009
9	944,825	871,810	784,629
10	↓	↓	↓

<u>Year</u>	<u>Net reduction in AVB</u>	<u>Total Benefits</u>
1		156,541
2	11,290	256,377
3	24,675	389,102
4	40,616	494,817
5	60,284	620,192
6	70,982	695,084
7	79,126	760,233
8	84,557	810,658
9	87,181	839,527
10		

<u>Year</u>	<u>Benefits</u>		<u>Costs</u>	<u>PW at</u> <u>10%</u>
1	156,541	156,541	1,300,000	1.0
2	256,377	233,072	818,190	.9091
3	389,102	321,554	413,200	.8264
4	494,817	371,756	300,520	.7513
5	620,192	423,591	341,500	.6830
6	695,084	431,578	310,450	.6209
7	760,233	429,152	282,250	.5645
8	810,658	416,030	256,100	.5132
9	839,527	391,639	233,250	.4665
10		356,043	212,050	.4241
11		323,638	192,750	.3855
12		294,254	175,250	.3505
13		267,473	159,300	.3186
14		243,211	144,850	.2897
15		221,047	136,650	.2633
16		200,983	119,700	.2394
17		182,681	108,800	.2176
18		166,058	98,900	.1978
19		151,031	89,950	.1799
20		137,263	81,750	.1635
		6,039,667	5,775,410	

Therefore, the rate of return is of the order of 11%. Conclusion leveling off of the asset value benefits after the fifth year does not have a major effect on the viability of the activity.

2. As simplifying assumptions it is concluded that:

a. 1/2 of recurrent benefits are proportional to meat price;

b. all asset value benefits are proportional to meat price.

$$\frac{2 \pm \% \text{ change in meat price}}{2} + \text{RB X multiplier X total AVB less 10\%} = \text{New Total Benefits}$$

Assume a  $\pm$  10% shift in meat price.

<u>Year</u>	<u>AVB-10%</u>	<u>Adj.up.</u>	<u>Adj.down</u>	<u>RVBX1.3</u>	<u>Adj.up</u>	<u>Adj. down</u>
1	-	-	-	195,676	205,460	185,892
2	101,606	111,767	91,445	232,978	244,627	221,329
3	222,079	244,287	199,871	295,142	309,899	280,385
4	365,549	402,104	328,994	303,742	318,929	288,555
5	542,553	596,808	488,298	308,042	323,444	292,640
6	649,540	714,494	584,586			
7	741,157	815,273	667,041			
8	810,977	892,075	729,879			
9	850,343	935,377	765,309			
10						

<u>Year</u>	<u>(up) Combined Total</u>	<u>(down)</u>	<u>(up) Combined Total</u>	<u>Reduced by 20%(down)</u>
1	205,460	185,892	164,368	148,714
2	356,394	312,774	285,115	250,219
3	554,186	480,256	443,349	384,205
4	721,033	617,549	576,826	494,039
5	920,252	780,938	736,202	624,750
6	1,037,938	877,226	830,350	701,781
7	1,138,717	959,681	910,974	767,745
8	1,215,519	1,022,519	972,415	818,015
9	1,258,821	1,057,949	1,007,057	846,359
10				

Based on the analysis for 1., benefits will be about 11% for the low case and 13% for the high case. Conclusion: So long as meat price variation is not major, project viability will not be in issue. A major shift (30 -50%) would have a significant affect on viability.

3. Modifications to multiplier

<u>Year</u>	<u>RB</u>	<u>RBX1.3</u>	<u>RBX1.2</u>	<u>Net diff reduced by 20%</u>
1	150,250	195,676	180,300	12,301
2	179,214	232,978	215,057	14,337
3	227,032	295,142	272,438	18,163
4	233,648	303,742	280,378	18,691
5	236,955	308,042	284,346	18,957
6				
7				
8				
9				
10				

<u>Year</u>	<u>Benefits</u>		<u>Costs</u>	<u>Present worth factor at 12%</u>
1	144,240	144,240	1,300,000	1.0
2	253,330	226,198	803,610	.8929
3	395,614	315,383	398,600	.7972
4	516,742	367,817	284,720	.7118
5	661,519	419,072	316,750	.6335
6	747,109	423,910	283,700	.5674
7	820,402	415,616	253,300	.5066
8	876,258	396,331	226,150	.4523
9	907,751	366,641	201,950	.4039
10		327,335	180,300	.3606
11		292,296	161,000	.3220
12		260,978	143,750	.2875
13		233,020	128,350	.2567
14		208,057	114,600	.2292
15		185,726	102,300	.2046
16		165,846	91,350	.1827
17		148,054	81,550	.1631
18		132,169	72,800	.1456
19		118,007	65,000	.1300
20		105,390	58,050	.1161
		5,252,086	5,267,860	

The rate of return decreases to only barely less than 12%. Conclusion: since the multiplier is applied only to recurrent benefits, its significance is greatly diminished. Even if a more modest multiplier than 1.3 were used, the effect on project viability would not be dramatic.

COMPARISON of SITE ALTERNATIVES

Annex 3A - Site Comparison for New Lands Activity  
Test Phase

Alternative No.1

Treat Niger River from Segou southward to Bamako. Treat Forest Reserve No.1; and Forest Reserve No.2 for Morsitans only (it being difficult to treat for riverine tse-tse in Forest Reserve No.2).

Eradication area is about 1,500 square miles.

Eradication cost estimate (spraying only) is approx. \$1.5 million.

Advantages

1. Eliminates all sleeping sickness foci.
2. Would permit southern limit of zebu cattle penetration (Dilamba) to move southward to the southern perimeter of the cleared zone.
3. Would permit livestock use for vacant land resources in Valley of Dilamba River (sizeable area which appears not to be grazed);
4. Would be most logical initial phasing for tse-tse fly reclamation work;
5. Ecological factors are favorable in that work begins at northernmost limit of fly infestation and moves southward ;
6. Existing human trypanosomiasis control around Bamako would be encompassed within larger tse-tse reclamation area.

Disadvantages

1. Zone is now subject to important use ;
2. One must determine if and how forest reserve areas can be "valorised" ;
3. There will be a perimeter requiring protection along the western edge of the zone ; weak point is at river crossing near Kangaba; also there is risk of reinfestation introduced by traffic on the river ; a river control point may be necessary ;
4. It is uncertain to what extent grazing lands along Bani River can be exploited without eradication.

Alternative No. 2.

Begin in upper ecological limit in western Mali, treat for area limited to southwest by dense population and land use and bounded to south by populations along northern perimeter of railroad axis from Kita to Bamako.

Cost estimate for spraying only is \$2,6 million.

Maximum area of zone is approx. 7,176 square miles (45,000 sq. Km)

1. Confirm that the population density and land use pattern on southwest perimeter is such as to isolate the test area by a wide enough corridor from the large, dense area of infestation to the southwest ;
2. It will be necessary to treat the whole area, which represents a very large test project ;
3. Government of Mali would have to make decision on intended land use for very large Baoule forest reserve, which is dominant element in land use planning for area.

Alternative No.3

Includes forest reserve to north of Siby-Narena, but excludes Bamako mango plantations.

Less likely to be satisfactory.

Cost estimate for spraying only is approx. \$1 million.

Disadvantages:

1. Barrier to north will be difficult to maintain.
2. Does not include Niger River area which may be source for reinfestation ; river control point(s) may be necessary ;
3. Does not touch Bamako and mango plantation human epidemic control problem ;
4. Should be linked with treatment of site area for alternative No. 1, otherwise there will be reinfestation risk from east.
5. Most difficult area from standpoint of techniques for spraying.

SITE COMPARISON FOR SAHEL GRAZING ACTIVITY

NARA EST

Advantages:

1. Accessible;
2. Forage is in best condition with water as limiting factor to its more efficient harvest;
3. Most readily realisable short term gain in conversion of forage to meat and milk;
4. Complements large livestock development scheme in Mopti and proposed livestock research center on stratification (ILCA) in zone;
5. Good linkages to modern sector and markets; proximity to forage production at office du Niger and Niono perimeters;
6. Easy linkage with training and communications outreach elements of program;
7. Reasonable knowledge of area already developed;
8. Ecology may provide some built in protection in event of drought;
9. Local variety of cattle (zebu maure) most favorable for milk production (but not for meat production);
10. Least burning this year of three proposed sites, at the time of visit. One reason may be that the trans-humants stock raisers have not yet come back from Mauritania. Another may be that the risk of accidental fires is reduced by the lack of automobile traffic in the area.

## NARA EST

### Disadvantages:

1. Most unfavorable from point of herder cooperation; wholly migratory use makes influence on user populations very uncertain;
2. Soils are sandy;
3. Low rainfall makes for fragile environment;
4. Limited long term prospect for gains (due largely to low rainfall and more modest soil conditions);
5. Low efficiency of labor utilization due to short use cycle;
6. Only surface water holding ponds and select small dams can be employed to extend period of land use; underground water is deep with poor yields; (outside the "fossé d'effondrement").
7. Unfavorable pathology -- surface water facilities encourage parasites, low levels of animal and human nutrition;
8. Transhumants/nomad population may not be easiest to work with;
9. Difficult to locate technical assistance personnel at the site;
10. No agrostological information.

### CONCLUSIONS:

Nara Est is least favorable of three sites and should be excluded from further consideration:

1. Most easily realized change in land use;
2. Best medium term response in terms of production gains;
3. Most difficult land use control problems;
4. Fragile environment;
5. Limited long term potential;
6. Close linkages to modern sector but most difficult herder group to influence.

## DILLY

### Advantages:

1. More heterogeneous population; both semi-sedentary and migratory personnel;
2. Substantial underused land in two distinct areas; but water resource development may prove difficult for one or both of these areas;
3. Favorable resource development alternatives in portions of zone;
4. Intermediate rainfall, but not as good as Kayes Nord;
5. Good forage condition, but for extensive burning this year;
6. Reasonably understood social mosaic, only area in which considerable work has already been done;
7. Commercial trail crosses through area; easy access to external markets;
8. Favorable pathological conditions;
9. Proximity to modern sector operations (Mali Live-stock I et al);
10. Proposed site for Sahel training center; easy linkage in parallel with communications outreach approach;
11. Reasonable proximity to ILCA research activity;
12. Location of existing and continuing UNDP practical, applied research effort;
13. Possibility of linking training, communications outreach, future commercial initiative (modern sector and marketing) and research;
14. Important local support will assist in project execution.

DILLY

Disadvantages:

1. Important agricultural zone across center;
2. Most heavily burned this year;
3. Difficulties in locating American technical assistance personnel;
4. Potential difficulties in developing water resources in some locations;\*
5. No agrostological information;
6. Multiple modes of land use may make some adjustments difficult;
7. Large migratory population which may prove difficult to influence.

\* as far as is known, is least favorable for development of water sources; heavier investment may be needed.

## KAYES NORD

### Advantages:

1. Potentially best pasture, but long term;
2. Highest rainfall;
3. Accessibility; evacuation route to Dakar, R.R. and plane to Bamako;
4. May be most feasible place to locate expatriate T A personnel;
5. Most favorable for influencing local personnel who are more sedentary;
6. Easiest approach to controlled land use by exploitation d'espace approach;
7. Priority area indicated in Plan;
8. Dynamic local administration; considerable interest already aroused by previous site visits;
9. Linkage with modernizing activities and with agricultural development zone in southern Kayes;
10. OMVS development potential;
11. Ease of development of surface water sources (ponds, catchments, dams);
12. Considerable water resource information may be available as result pre-office du Niger work;
13. Most favorable breed of cattle from viewpoint meat production; strong veterinary staff at Kayes;
14. Favorable human nutrition;
15. May be favorable for marketing initiative, but may be difficult also without major investment in infrastructure;
16. Ability to mobilize heavy equipment, transport, etc.
17. Potential for developing feeding operation associated with irrigation along the river. The Governor favorable to this.

## KAYES NORD

### Disadvantages:

1. Badly damaged pasturage around villages to west; extensive approach may be insufficient for important restoration except over very long term;
2. Risk of increased sedentarization; agriculture as misuse of land resource;
3. Least is known about social fabric;
4. No agrostological information;
5. Animal health problems in related zones are adverse, but may not differ seriously from other alternatives for site area itself;
6. Human disease problems in associated areas are most unfavorable, but may not be seriously different for site area itself;
7. Realization of gains is long term proposition;
8. Large parallel investments in other zones are needed to have activity in milieu of supportive development; e.g. cattle corridors, human and animal disease control, agricultural production;
9. No linkage with area where modern sector is now growing;
10. Most difficult from standpoint of training and communications outreach (as far as local teaching staff is concerned);
11. Success of linkages with marketing, modernizing sectors will depend on large investments outside the zone which cannot be insured, and which depend on decisions of Government Ministries other than the Ministry of production.

Environmental AnalysisProject Summary:

The project is composed of two activities.

The first, called New Lands Activity, addresses the problem of tse-tse fly control in order to reduce incidence of human and animal trypanosomiasis (sleeping sickness) in presently inhabited areas and to open new lands to productive use through control of the trypanosomiasis vector. Actions taken towards fly control will include fly surveys, fly ecological studies, analysis of eradication techniques and cost, establishment of methods for maintenance against reinfestation, and land use studies. Training of Malian personnel to undertake these actions will be the first step, and will be accomplished both through on-the-job training and foreign training (in other African countries and outside Africa) in established Trypanosomiasis Research Institutes. The second step will involve fly control procedures in selected areas. Fly control will be by selective spraying, primarily with DDT, using ground spray crews with knapsack type spray equipment.

The second activity, called Sahel Grazing Activity, is to study cattle herder uses of the rangeland, and with the understanding developed by that study determine what, if any, inputs in infrastructure, commodities and services would be possible to realize an increase in harvest from the land, both in terms of herds and forage resources. A selected area will be used for the study, presently narrowed to two sites with final selection to be made later, and a limited input in watering points, access roads, firebreaks and administrative infrastructure provided to the study area for study control and access.

Environmental problems identified:

The New Lands Activity has two important environmental implications:

1. use of chemical spraying to reduce and control the Tse-tse fly population; and
2. the myriad environmental implications in land use planning and the opening of new lands to rangeland and other agricultural uses.

The Sahel Grazing Activity has environmental implications similar to those under 2. above, as well as environmental implications related to the immediate installations that will be carried out to permit the study.

Use of chemical spraying:

Training of ground spray crews will be a first and very important step in control of chemicals used in the tse-tse fly control program. Planned technical assistance in this training is a glossinologist/entomologist, a protozoologist and an experienced tse-tse fly eradication operations officer. The method of application of the chemicals will be similar to that successfully and safely used in the past for fly control in regions of East Africa and is also recommended in West Africa by the Nigerian Institute of Trypanosomiasis Research. Sprayers will be trained in fly identification and habitat identification so that spraying may be used most effectively for the least amount of chemical used. Insecticides used will be so formulated to do least harm to fish, birds and the mammals in the area. For economic as well as for its relatively lengthy residual effect, DDT will probably be the insecticide first used. DDT also has the advantage that it, as well as its degraded products, are relatively less dangerous to mammals than most of the other long residual compounds.

Training in the use of DDT or any other insecticide which may be found to be more beneficial than DDT will consist in picking formulations which will minimize the danger to the environment. Following training spraying in moderation under the supervision of the trainer will be limited to selected areas, with surveillance and spot treatment at intervals if necessary, to determine the best techniques to be used for fly control over larger, expanded areas in the future.

Recent advancements in the formulation of DDT have reduced the evaporation into the atmosphere and solution in the rain water without affecting its effectiveness.

The tse-tse fly control program, therefore, is structured to do least harm to the environment while at the same time benefit both the human and animal population by control of trypanosomiasis to as low as level of incidence as possible.

Land Use/Planning and Sahel Grazing Activity:

Both of these activities, during the life of the present project, are structured for studying the environment of the fragile lands involved and the habits of the herder population presently using the land or expected to use new tse-tse free lands with the end-result of protecting the environment while obtaining maximum production from the land. The studies contemplated, while they may be called by some other name, will in effect be environmental studies aimed at protecting and enhancing the environment in the future. The project includes participant training for three Malian personnel in land use planning and range management, as well as at least one economist and one agricultural engineer. In all cases, their training will include courses in environmental protection. On-site or on-the-job training in land use planning and range management will be under the direction of U.S. technical personnel including a range ecologist/range management specialist/ land use planner, an economist and sociologist.

Alternatives:

The "no project" alternative would result in continued deterioration of the rangeland in this Sahelian area, and continued high infectivity rates due to Trypanosomiasis. The "no project" alternative, therefore, cannot be considered a valid alternative.

Alternatives to the approach of rangeland protection and environmental enhancement of the area will be identified and the best alternative selected during the course of the studies to be undertaken under this project.

List of Technical Assistance Personnel to be Financed  
under the Livestock Sector Grant

A. Personnel stationed in Mali

1. General

a. Sociologist

2. New Lands Activity

b. entomologist

c. fly eradication operations specialist

d. land use planner/range ecologist \*

e. economist \*

3. Sahel Grazing Activity

f. range management/animal husbandry specialist

g. probable second individual; similar disciplines

4. Training and Communications

h. range management/animal husbandry trainer

B. Use of Shorter Term Personnel

1. engineering design and construction supervisory services

2. university contracts in economics and sociology

3. senior entomologist consultation

4. water resource engineer/hydrologist

5. training and communications specialized personnel

6. technical specialists for studies and evaluations

7. specialized personnel for tax/fiscal matters and  
for addressing sector problems and public policy  
constraints.

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\* As indicated in the discussion of the new lands activity, the services to be performed by these experts may be carried out through a PASA with the Soil Conservation Service of the U.S. Department of Agriculture and integrated with the land use capability study which the S.C.S. may undertake for all of Mali.

## ANNEX 6

### Conditions Precedent and Covenants for the Livestock Sector Grant

#### A. Concept of the Livestock Sector Grant Agreement

The agreement is intended as a flexible financing instrument, under which execution of the livestock program will be accomplished in accordance with the following parameters:

1. Amount and Budget stated in the agreement. Amounts of up to 15% in the major budget categories of the budget shown on pp. iv and v. of the Program Proposal paper may be shifted to another major category in the budget as AID may approve in writing.

2. Program Description. The program to be financed consists of those activities summarized in Part I and described in detail in Part III of the Program Proposal paper entitled "Mali Livestock Sector Grant" dated May 1975 and authorized by the Deputy Administrator of AID on May 1975, obligation of funding for Phase II of the new lands activity being, however, dependent on the completion to the satisfaction of AID of specified additional actions.

3. Financing Plan. The plan will spell out the formula for cost sharing by categories of expense as set forth in Part IV of the May 1975 Project Paper and the A.I.D. Memoire of 12/5/74 which is attached hereto as Annex 12. In addition, annual financial plans will be prepared as attachments to the Annual Work Plan (see below) showing estimated AID and GOM contributions to finance the annual work plan and partitioning those into non-cash contributions and cash contributions to the joint fund. Persons responsible for management of the joint fund and the scope of their responsibilities will be spelled out.

4. Annual Work Plan. This is the key operating instrument for execution of the program. It will spell out elements of the program to be accomplished during the year, cost, manpower requirements, and steps to be accomplished in the implementation process. It is an operating document to be kept current; therefore, it is to be constantly revised as part of the collaborative process of program execution. Each year it will be renewed as the means of organizing financial resources and assuring resolution of problems surfacing during the year. See Annex 7 for farther details on the preparation of the Annual Work Plan.

5. Collaborative arrangement. A joint GOM/AID Management group for the program will be established in Bamako. GOM representatives will include management personnel of the principal livestock agencies plus officials from other key ministries (Finance, Malian Development Bank, possibly Public Works); A.I.D. management will be through project management personnel of CDO/Bamako. The use of personnel will be flexible so as to assure continued, effective collaboration as has been the experience of GOM/A.I.D. discussions in preparation of this program.

B. Actions to be accomplished prior to signing the Grant Agreement

1. Negotiation of the financial plan. This has been accomplished, but for the establishment of the formula for computing the graduated annual increases in GOM contributions to the program. This final step will be accomplished based on discussions in Bamako between GOM and AID personnel and the GOM will confirm its agreement to the formula in writing in a form satisfactory to AID. Consideration will be given to the impact that livestock sector grant disbursements may have on the Malian economy, especially as regards public revenue generation, and on improvements in revenue collection in the sector which may be realized through modification in the format for tax levies coupled with increased productivity in the sector as well as on the planned introduction of user charges.

2. Written assurances in a form satisfactory to AID that the GOM will make provision in its future budgetary processes of financing adequate to meet its contributions to the program, including cash contributions to the joint fund.

C. Conditions Precedent to Initial Disbursement

1. The standard legal opinion condition (similar to Article II, Section 2.1(a) of the Mali Livestock Production and Marketing Project Grant Agreement of August 30, 1974).

2. The condition pertaining to the names of the person or persons who will officially represent the GOM for the purposes of the project and specimen signatures (similar to Article II Section 2.1(b) of the August 30 Agreement).

D. Conditions Precedent to Disbursement of Funds other than for final design work, planning activities and selected advance training.

1. A detailed work plan and financial plan for the first year of the program prepared in accordance with the provisions of Annex 7 of this paper and in accordance with paragraph A(3) above, including:

- a. actions to be accomplished and timing, using PPT system;
- b. cost estimate, broken down by categories of expenses;
- c. personnel requirements for each activity; nominees;
- d. participant training opportunities; nominees;
- e. in-country training targets, identification of personnel to extent possible; identification of sources, screening procedure, etc.

In addition, the financing of the education and training activities discussed in Part III-D of the Project Paper will be conditioned on the completion of the "educational requirements" study described on page 57 of the Paper.

2. Arrangements between a U. S. and other contractor(s) and the GOM for technical assistance, supervisory/construction services and for construction for the program;

3. Evidence that institutional arrangements have been made for management of each activity, including where appropriate, decrees, charter, by-laws, etc.;

4. Designation of person(s) responsible for administration of the joint fund, for management of the activities of the program, and for collaboration on furtherance of sector objectives.

5. The GOM shall be required to provide to AID, as a condition precedent to disbursement, an opinion from a source acceptable to AID that all land use rights, related water rights and rights of way necessary for project implementation have been obtained.

#### E. Covenants

1. Price Policy. AID concurs with and supports the GOM's plan to remove domestic price controls on beef. AID recognizes that this is a difficult domestic problem with many ramifications. Nevertheless, the GOM's officially stated intention to move toward decontrol and the importance of such action for the country's livestock industry, weighed heavily in AID's decision to enter into the present program with GOM. Therefore, if there is not appreciable progress toward decontrol, or if controls are later reimposed without an effective alternative, such a situation would be likely to call into question a basic condition for the success of the program. In that event, AID would need to review with the GOM the efficacy of continuing the program as described in this agreement. It is understood that this matter will be an important item for consideration in the annual joint evaluations which are to be conducted and will be of special concern in the joint-in-depth evaluation which is to take place at the end of the second year.

2. Taxes and User Charges. The GOM and AID recognize the importance of generating additional financial resources within Mali to support the continued development of the livestock sector generally. In particular, the GOM will assume full responsibility for providing the cash resources necessary (including contributions to the joint fund) for the operation and maintenance of the Sahel grazing and new lands activities by the end of the proposed five-year program. To these ends, the GOM will seek to improve the collection of its cattle tax and will use its best efforts to install a system of user charges in the areas to be developed under this grant (Sahel grazing and new lands areas). AID for its part will be prepared to provide, as requested by the GOM, technical assistance (including an evaluation of the experience of other West African countries) on the technical and economic issues involved and their possible solutions.

3. The GOM shall establish procedures, with the representatives of the A.I.D. Country Development Office in Bamako for the management of the program and shall collaborate on the objectives, planning and execution of the program and of the activities within the program as well as with regard to means to increase the flow of resources to the sector, to further the sector strategy, and to identify policy and economic constraints upon accomplishment of the sector strategy and to seek to redress them.

4. The GOM and AID agree that the first Annual Work Plan will be prepared and approved by both parties no later than six months after execution of this Agreement. Subsequent Annual Work Plans shall be prepared and approved by no later than prior to termination of the preceding Annual Work Plan.

5. The GOM and AID will make contributions to the joint fund in accordance with the financial plan negotiated under the Annual Work Plan.

6. The Grant Agreement will also include these covenants contained in the Mali Livestock Production and Marketing Project Agreement of August 30, 1974, which are in AID's judgement, applicable to this project.

EXECUTION OF THE PROGRAMPREPARATION OF THE ANNUAL WORK PLAN

Upon the signing of the Grant Agreement and the satisfaction by the GOM of Conditions Precedent to initial disbursement of funds, the grant program will enter its initial phase which will include the various final design tasks, planning activities and studies that are required in order to refine implementation schedules, cost estimates and personnel requirements. Illustrative of these activities are: (a) consultant assistance to the CDO to install a Project Performance Tracking System (PPT), (b) consultant or TDY assistance to carry out the educational requirements study for the training and communications program, (c) consultant assistance on tax and financial matters (if requested by the GOM), (d) reconnaissance land capability surveys of the alternate sites for the New Lands Activities and for the Dilly and Kayes Nord sites, (e) other studies or consultant tasks as may be required prior to full-scale implementation. In addition, it may be desirable to finance advance training or consultative visits by key Malian personnel during this phase.

Upon completion of the foregoing studies, and the satisfaction by the GOM of the remaining Conditions Precedent for financing, the program would move into full-scale implementation. The implementation process will be assisted and guided by Annual Work Plans, jointly developed by the CDO and the GOM and based in large measure on the tracking system and Critical Performance Indicators of the PPT. Undoubtedly it will be necessary to construct a PPT for each of the three major components of the program, as well as a condensed consolidated PPT which will permit AID and GOM managers to assess their inter-relationships for effective implementation.

In constructing the PPT system, CDO will be guided by the networking instructions included in Annex B of AIDTO CIRCULAR A-234 of 4/14/75, adapting these instructions, of course, to the particular circumstances of this program. Although the PPT is a device for helping AID to manage its implementation work more effectively,

Annex B also points out the importance of host country's involvement in its development and application. This is particularly true in respect to the present sector grant program and the construction of the network must necessarily be a collaborative product with documentation (PPT forms, etc.) in both French and English.

The first annual tranche of the PPT will be a major element in the annual work plan and will, in fact, contribute greatly to its formulation. The annual work plan will include, in addition to the PPT: (a) designation of persons responsible for all work tasks, including for training, appraisal of manpower needs, (b) analysis of the work to be accomplished, including method of approach and problems foreseen, (c) costs estimates and the anticipated timing for disbursements, (d) cost allocation in accordance with the formula for cost sharing, (e) determination of annual AID and GOM contributions to the program and a breakdown of those contributions into those provided in kind or paid unilaterally and those passing through the joint fund.

The annual work plan will be a working, negotiated document that will reflect the interests and capabilities of the two parties. It will be the instrument through which AID and the GOM will collaborate in the mutual implementation of the program. On the one hand it will be a useful device through which each party will seek the compliance of the other in executing the various tasks it has agreed to perform during the year, and on a timely basis. Thus it will hold a yardstick for performance over both parties. On the other hand, it will also have to contain an element of flexibility and susceptibility to modification, given the complexity of the program and the logistic and administrative constraints that face both U.S. and Malian officials in that country. Clearly, the annual work plan will need to be a living document and should be the subject of frequent dialogues and consultations at both the managerial and technical levels.

It is suggested that the annual work plan be a "rolling plan" in the sense that at the end of each quarter the plan would be reviewed, adjusted if necessary, and a

new quarter added. This would assure a quarterly review at the managerial level of the critical tasks already planned and the new tasks which must be accomplished in the fourth quarter.

The first annual work plan will be completed and put into effect no later than six months following the date of the signing of the grant agreement, and it is expected that such can be accomplished well before then. The first annual work plan will also include deadlines for the completion of sub-obligating documents required for implementing the program and new deadlines will be entered as and when additional sub-obligating documents are required.

POSSIBLE ROLE FOR PEACE CORPS IN THE PROGRAM

One may envisage a variety of tasks which Peace Corps could perform in the Program; these would vary from language and other training services, extension outreach of activity management from its center to village levels, participation in organization of communications activities, covering for participants and then assisting in their reintegration into activities.

The subject has only been treated informally with Malian Government; before fruitful discussions may be held between GOM and Peace Corps, it will be necessary for Malian Government officials to have a more detailed appreciation of shorter term tasks that will need to be performed and the personnel requirements therefor.

Peace Corps/Bamako has been kept informed in detail of the preparation of the program. Whether and to what extent their participation may be envisaged will be worked out informally and collaboratively during the early phase of the program.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

ANNEX 9

Life of Proj. 75 to FY 80  
From FY 75 to FY 80  
Total U.S. Funding \$1,300 million  
Date Prepared Jan 75

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PROJECT REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Project Title & Number: Mali Livestock Sector Grant

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes: (A-1)</p> <p>1. To help reestablish the livestock sector, particularly as a food source, and to take measures necessary to avoid greater losses to herds or damage to pasture land;</p> <p>2. To improve human resource capacity of Government personnel and herders, and to increase communication of information to and exchange of ideas with persons dependent upon livestock for their mode of survival; and</p> <p>3. To aid the GOM to carry forward their livestock program for the five year plan, while providing the means by which they may improve their strategy, evaluate on-going efforts and encourage further external support.</p>	<p>Measures of Goal Achievement: (A-2)</p> <p>1. GOM will be able to furnish competent personnel to staff not only A.I.D., but other donor major interventions in the sector.</p> <p>2. GOM will be able to collect information; evaluate situation, plan and execute tse-tse fly eradication and new land use program.</p> <p>3. GOM will be able to assure equivalency of training in animal husbandry and range management as in other livestock disciplines for 200 persons during 3 year period.</p> <p>4. In sahel grazing area, mortality will decrease by 4%, fertility will increase</p>	<p>A-3)</p> <p>1. Special evaluation of A.I.D. livestock programs in Mali to be built into implementation plan.</p>	<p>Assumptions for achieving goal targets: (A-4)</p> <p>1. There will be a close and continuous collaborative relationship between the GOM and all aspects of the program and on sector strategy and financial and policy constraints on the sector.</p> <p>2. The GOM will further refine their strategy, will continue to improve their interest in integrating their activities in the sector, and will increasingly attract external support.</p> <p>3. Meat price constraint will be lifted, tax reform will be made and user charges instituted emphasis will be placed on marketing initiative to bring better commercial opportunities to herders.</p>

ANNEX 9

AFD 1020 20 01 198  
SUPPLEMENT 1

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

(INSTRUCTION: THIS IS AN OPTIONAL FORM WHICH CAN BE USED AS AN AID TO ORGANIZING DATA FOR THE PAR REPORT. IT NEED NOT BE RETAINED OR SUBMITTED.)

Life of Project: \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding: \_\_\_\_\_  
Date Prepared: \_\_\_\_\_

Project Title & Number \_\_\_\_\_

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS
<p>Program or Sector Code: The number of active to which this project contributes (A-1)</p>	<p>Measures of Goal Achievement (A-2)</p> <p>A-3)</p> <p>by 6%; and carrying capacity of the rangeland will increase by up to 40% on 1/4 to 1/2 of the total land area.</p>		<p>Assumptions for achieving goal targets (A-4)</p> <p>4. Livestock Demand in Maliland and external markets will continue to rise.</p>

**PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK**

Life of Project: \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared: \_\_\_\_\_

Project Number: \_\_\_\_\_

**PAGE 2**

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Purpose: (B-1)</p> <p>To make a measurable impact toward restoration and improvement of one of Mali's most productive sectors, livestock, within a period of three to five years, and of quality of life of those dependent upon the sector for their livelihood.</p>	<p>Conditions that will indicate purpose has been achieved: End-of-Project status. (B-2)</p> <ol style="list-style-type: none"> <li>1. Measurable increase in sales of cattle from the Dilly area to cattle feeding activities in the modern sector;</li> <li>2. Government of Mali personnel with reasonable familiarity in animal husbandry and range management disciplines are available for all essential livestock sector tasks;</li> <li>3. Comparative economic basis for alternative means of introducing cattle to trypanosomiasis zones, means to define perimeters to be approached by each alternative, become known (assuming new lands test action is undertaken);</li> </ol>	<p>(B-3)</p> <ol style="list-style-type: none"> <li>1. Government of Mali statistical documents.</li> <li>2. Special evaluation of the program built into the implementation plan.</li> <li>3. Reevaluation by other donors of the quality of personnel participating in the various livestock projects who have received training under the proposed program.</li> </ol>	<p>Assumptions for achieving purpose: (B-4)</p> <ol style="list-style-type: none"> <li>1. It will be possible at manageable cost to develop a variety of water facilities in the Dilly area.</li> <li>2. Through improved animal health services and distribution of mineral supplements, there will be a decline in mortality, a sharp drop in calf mortality, and an increase in fertility.</li> <li>3. The Government of Mali will continue to give high priority to testing the opening of new lands and will complete all preparatory work for the new lands test operation in earliest reasonable time.</li> </ol>

- 9-3 -

**PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK**

Life of Project: \_\_\_\_\_  
 From FY \_\_\_\_\_ to FY \_\_\_\_\_  
 Total U. S. Funding \_\_\_\_\_  
 Date Prepared: \_\_\_\_\_

(1-72)  
 T 1

Title & Number: \_\_\_\_\_

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Purpose: (B-1)	Conditions that will indicate purpose has been achieved. End-of-Project status. (B-2)  4. Basis is found to measure increase in forage potential for extensive land use, for different rainfall levels and modes of land use.  5. Government revenues from the livestock sector increase.	(B-3)	Assumptions for achieving purpose: (B-4)

- 9-4 -

**ANNEX 9**

AID 1020-28 (1 73)  
SUPPLEMENT 1

**PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK**

Life of Project: \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding: \_\_\_\_\_  
Date Prepared: \_\_\_\_\_

Project Title & Number: \_\_\_\_\_

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Outputs: (C-1)</p> <p>1. Establishment of an extensive livestock operation in the Dilly area based upon voluntary herder cooperation on mode of land use and provision of improved health services, mineral supplements and select new water resource installations.</p> <p>2. Organization of Government of Mali capacity for all aspects of tsetse fly eradication and land use planning and improvement. Testing the economics and parameters for alternative means to valorize zones now removed from livestock use by presence of trypanosomiasis.</p> <p>3. Creation of a training and communications capability to assure continued upgrading and recycling of Government of Mali personnel and sensitization and improved communication with herder groups.</p>	<p>Magnitude of Outputs: (C-2)</p> <p>1. Increase in range-land carrying capacity for a significant portion of the Dilly site from 1 A.U./10 ha to 1 A.U. for 6 Ha.</p> <p>2. Increase in marketing of cattle from Dilly to the modern sector.</p> <p>3. Approximately 80,000 animal units will extend their stay in the Dilly area by from a few days to perhaps 1-2 months.</p> <p>4. Malians will complete all preparatory work for new lands test action, will conduct operation and then confirm fly free zone, will monitor subsequent land use patterns.</p>	<p>(C-3)</p> <p>1. Records maintained by the Sahel grazing operation on land use practices and cattle marketing.</p> <p>2. Records maintained by the Entomology Section of CVL and the New Lands Unit on the tse tse test area.</p> <p>3. Specific studies and observation.</p> <p>4. Special project evaluation and audit.</p>	<p>Assumptions for achieving outputs: (C-4)</p> <p>1. Communications with herders will develop to the point which will permit planning of physical improvement and herder consensus on a mode of land use which will conserve the land resource consistent with climatic fluctuations.</p> <p>2. GOM will be able to provide persons of level of education and quality such that, with modest additional training or directly they will be able to effectively perform the various tasks of program execution</p>

ANNEX 9

AFD 1020-20 (1-73)  
SUPPLEMENT 1

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project: \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared: \_\_\_\_\_

Project Title & Number: \_\_\_\_\_

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS UNDERLYING OUTPUTS (C-3)
<p>Project Outputs (C-1)</p>	<p>Magnitude of Outputs (C-2)</p> <p>5. Malians will establish two man rural livestock service groups with one trained in animal husbandry and range management, at least for Dilly area and probably for other operations.</p>	<p>(C-3)</p>	<p>3. GOM will make available from its officials individuals who will contribute time to the training and communications effort, such that most of the human resources for the activity will be theirs.</p> <p>4. The GOM will encourage marketing initiatives to the extent necessary to assure improved revenue opportunities to herders in the Dilly area.</p>
<p>effort to improve revenue allocation to the livestock sector.</p> <p>6. Management of the joint fund will be expeditious and GOM will follow through on negotiated annual increase in contribution to the program.</p>			<p>5. The GOM will establish user charges, at least at Dilly, will collaborate with A.I.D. consultants on means to improve tax revenue collection, and will make serious</p>

9-6-73

ANNEX 9

AID 1020-70 (1) 731  
SUPPLEMENT 1

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

Life of Project \_\_\_\_\_  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared \_\_\_\_\_

Project Title & Number \_\_\_\_\_

PAGE 4

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Inputs: (D-1)</p> <p>Technical assistance:</p> <ol style="list-style-type: none"> <li>1. Sociologist</li> <li>2. Entomologist, fly eradication operations specialist, land use planner-ecologist, economist for new lands activity;</li> <li>3. two range management animal husbandry personnel for Sahel grazing activity;</li> <li>4. Animal husbandry-range management trainer for training and communications activity.</li> </ol> <p>Extensive short term consultants for engineering, water resources, sociology and economics, studies and evaluations and to complement US advisors in each of principal activities.</p> <p>Commodities and construction for Sahel grazing activity, training facilities at Sotuba and</p>	<p>Implementation Target (Type and Quantity) (D-2)</p> <p>A work plan will be prepared initially and each year providing implementation targets in detail. See Annex 10.</p>	<p>(D-3)</p> <ol style="list-style-type: none"> <li>1. Program Agreement and other funding documents.</li> <li>2. Contracts for commodities, services and construction.</li> <li>3. Continual operational revision of the work plan.</li> <li>4. Progress reports from contractors and from A.T.D. field management, controller reports on disbursement.</li> <li>5. Satisfaction of conditions precedent.</li> </ol>	<p>Assumptions for providing inputs: (D-4)</p> <ol style="list-style-type: none"> <li>1. GOM will be able to select qualified contractor(s) for services and construction.</li> <li>2. Continued US funding will be available for the program.</li> <li>3. Qualified personnel and candidates for training will be identified on a timely basis and will be placed in key position on completion of training.</li> <li>4. Through close collaboration additional or modified inputs will be introduced and the mode of use altered so as to further the objectives of the program and facilitate its execution.</li> </ol>

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AID 1020-20 (11-73)  
SUPPLEMENT 1

**PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK**

Life of Project:  
From FY \_\_\_\_\_ to FY \_\_\_\_\_  
Total U.S. Funding \_\_\_\_\_  
Date Prepared: \_\_\_\_\_

Project Title & Number: \_\_\_\_\_

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Inputs: (D-1) Dilly, CVL research facilities, and for new lands test action in the future.</p> <p>Financial support for research and studies.</p> <p>Funds for unanticipated needs and for testing new opportunities (including marketing).</p>	<p>Implementation Target (Type and Quantity) (D-2)</p>	<p>(D-3)</p>	<p>Assumptions for providing inputs: (D-4)</p>

IV ACTIVITIES FOR EARLY' FUTURE CONSIDERATION BY A.I.D.  
AND/OR OTHER DONORS

A. Improvement of Existing Educational Facilities  
for Livestock Sector Personnel

No attempt is made in the livestock sector grant to modify the two classical training facilities for livestock sector personnel: the Rural Polytechnic Institute at Katibougou and the Veterinary Nurse School in Bamako. Some classroom space to be added to Sotuba may be made available to the Veterinary Nurse School.

It has clearly been stated to the GOM that A.I.D. would not undertake alone support for traditional educational institutions because of their recurrent support needs and long term nature. The Minister of Production responded by soliciting A.I.D. assistance in organizing a donor group to accomplish this task.

(1) The Rural Development School at Katibougou

The Rural Polytechnic Institute at Katibougou trains Engineer and Technician level personnel, through a 4 year curriculum, in livestock, agriculture, water and forestry, and genie rural disciplines. Training is directed to furnishing cadre for the "services" of the Ministry of Production.

In view of the GOM emphasis on gradually shifting from centralized service institutions to decentralized, integrated rural development units, the "service" orientation of disciplinary training at Katibougou warrants reconsideration. Consensus was that training in specific disciplines should be continued at the same level of intensity, but that emphasis should be placed on training cadre with a view to their integration in multi-discipline rural development schemes. Three additional recommendations were put forth for Katibougou:

(a) increase level of financial support for operation of the school (and implicitly quality of teaching personnel - this may involve both increase in technical assistance and University training for Malian professors);

(b) Addition of a range management discipline to the school and improvement of teaching in animal production; and

(c) creation of a farm for applied training work, run by the Ministry of Production, in the vicinity of the school. The farm would be both for practical training of students and for outreach to herders and cultivators.

Physical facilities at Katibougou are good, although equipment is scarce. We understand that the European Development Fund may further expand the school's infrastructure so that physical improvements will probably not be further required.

## (2) The Veterinary Nurse School

The Malians would like to add physical plant for the school at Sotuba. They have also suggested the desirability of building a second veterinary clinic\*(there is one in Bamako) on the south bank of the Niger River, so that veterinary health services could be provided to cattle moving southeastward to export markets along that side of the Niger River.

The needs are for physical plant (laboratories, library, possibly dormitories, and perhaps 1 or 2 classrooms beyond what is already provided), equipment, operating support and improvement/in teaching staff. There is considerable benefit which may accrue from relocation at Sotuba, being both access to CVL and integration with the training and communications activities. The Malians express the need to increase the number of graduates per year from a current 25 - 35 to about 60. Even if one is more conservative about numbers, better facilities and integration at Sotuba appear warranted in terms of qualitative improvement. Perhaps most important is the absence at present of training in animal husbandry, feeding and nutrition disciplines.

### B. Marketing

The objective will be to improve market outlets for the Sahel grazing activity to the modern sector and export. It is hoped that the test marketing action in the livestock sector grant will permit definition of the operating format for a sizeable intervention seeking to link output from the area of the Sahel grazing activity to the modern sector. Similarly, may be investigated means to organize off-take of adult cattle for the export market.

The GOM also wishes to explore a variety of approaches for organizing supply of requirements for important export purchasers such as the larger meat retailers in Abidjan. With appropriately organized market information (provided for in the communications activity) and careful planning of market studies, \*

\* Not to be confused with CVL. This is a small animal health treatment facility (dispensary).

series of market arrangements may be proposed.

C. Planning and Projecting Sector Needs/Options

A.I.D. and other donors are embarking on programs in the livestock sector with longer term risk consequences which they are not presently in position to assure. The very rapid increase in planned and anticipated investments in the sector and the sizeable number of activities proposed for accomplishment in the plan call attention to the need for priorities and for planning for future recurrent support. It seems appropriate, therefore, to suggest a collaborative study by the Malians with assistance from A.I.D. and others to spell out investment and operating cost estimates running to several years beyond the 5 year plan, so that longer term budgetary and aggregate investment implications may be understood. From this information, discussions can begin on setting priorities for different assumptions regarding future financing levels and for estimating order of magnitude budget shortfalls which may be anticipated.

The subject of donor coordination on planning investment priorities is a delicate one in Mali. It will need to be left to the collaborative discussions during the execution of the livestock sector grant to determine to what extent and in what manner the above objectives can be accomplished. Therefore, no specific proposal is made here, and expenses, if any, could be met from the fund for unanticipated actions.

D. Addressing the Problem of Longer Term Support for the Sector

The financial formula proposed in the livestock sector grant, and its underlying objectives of increasing revenue generation in the sector and channeling a major portion of the increase to the sector, are important steps. However, even under the most optimistic conditions they cannot solve two fundamental problems constraining performance in the sector:

- (1) the unfavorable macro-economic posture of Mali

and the overall budget constraint which is the consequence; and

(2) the major demands for budget contributions to the sector which large donor investments will bring forth - particularly over a longer time frame wherein continuity of donor support cannot be assured.

Although going beyond the scope of this presentation, and while of necessity a subject for multi-donor treatment, this paper closes with the request that serious attention be given now to organizing the means to support the shortfall in Malian financial capacity which will be the inevitable consequence of inaction.

A.I.D. staff have already begun to explore the possible use of PL 480 cereals imports to Mali as a means for generating needed local currency. Other financial tools will also be explored. An A.I.D. contract with Michigan University (C.R.E.D.) provides for analysis of post drought effects on future macroeconomic and budgetary posture of the Sahelian states. This study, in conjunction with the analysis being done in Mali on Malian capacity to increase contribution to the livestock sector should provide the analytical basis to justify support of Mali financial shortfalls.

A.I.D. MEMOIR

The Governments of Mali and the United States have entered into negotiation which is intended to culminate in a Project Agreement for a Livestock Program consisting of range management, livestock grazing, educational component, etc. The initial phase of negotiation dealt with seeking agreement on the policy issues, concept of the program, funding of the program, and other major points essential to permit the detailed negotiations to commence.

The Governments have agreed that a livestock program is essential to the economic development of Mali and that selections of the site, developing a related educational institution, identifying pertinent manpower resources to design, develop and implement the project, as well as, identifying persons for training to assure the indefinite life of the project are critical factors of this project.

The Government of Mali has designed a five-year program and strategy for the livestock sector. The U.S. Government will commit itself to the concept of a five-year program of cooperation and is prepared to undertake the formal authorization of approximately \$7-10 mil. for the first-three years of the project. Additional funding for the remaining two years will be sought prior to the completion of the third year, depending on the progress of the project. Prior to the beginning of each year there will be a negotiated annual work plan which will provide the estimated cost associated with that negotiated plan.

The Governments have also agreed that the project should involve the establishment of a special joint fund located in Bamako to assure and facilitate

the orderly and timely progress of the project. The fund would receive contributions from both Governments in accordance with provisions to be specified in the formal agreement.

The USG contribution will be approximately 95% of the first negotiated annual work plan and the GOM contribution cannot be less than 5% of the total cost of the first annual work plan. The percentage of cost to the GOM will increase on a graduated scale to reach 25% of negotiated annual work plan for the fifth year which will include 100% of operating costs.

By agreement reached during the initial phase, the following sequence of events is planned:

1. Develop the basic formulation for the annual contribution by both Governments:
2. The following categories and percentage responsibility by each Government were approved and the annual work plan will be developed to reflect the following summary categories:
  - a. Personnel Costs - These costs will not be included in the joint fund and will be paid directly by the two Governments. These costs will include:
    - (1) U.S. to meet all costs of its technical people including housing, transport, per diem, etc.
    - (2) Malians to pay for all local costs of own people - rents, utilities, per diem, travel, etc. Salaries to be a part of GOM regular budget.

b. Operating Expenses - U.S. would pay for all operating expenses directly related to the U.S. personnel. The GON will cover office rent, maintenance, utilities, repairs, etc., related to its personnel and the project.

c. Capital Costs and Equipment -

(1) No tax to be paid by USG on items specifically imported for program - e.g. vehicles, etc.

(2) U.S. would pay for major costs with GOM paying 10% of total costs.

d. Training Costs -

(1) U.S. - International transportation

Per Diem

Costs of Study

(2) Mali - Salary

Family Support, etc.

(Bonding) - This is assurance of the return by the trainee to Mali for performance of work.

e. Research and Studies - Same formulation as personnel costs - operating costs within fund.

f. Miscellaneous Operating Costs - (Petroleum, local transportation, etc.)

(1) U.S. would pay for all expenses under this category for the first year.

(2) Second year - GOM would assume a percentage

(3) Third year - GOM would assume more

(4) By fifth year - all operating expenses would be met by Malians.

### Funding of Project

There will be established the Mali Livestock Development Fund constituted by the monies which the Governments of Mali and the United States of America shall contribute annually to the Fund in accordance with the provisions of the Agreement. The funds will be used only for the purposes, and in accordance with the provisions of the Agreement.

The Fund will be physically located in a banking institution jointly selected by both parties to this Agreement. The Fund and its assets and accounts shall be kept separate and apart from all other accounts and assets of the banking institution and shall be separately designated the "Mali Livestock Development Fund."

### Contributions to Fund

The estimated cost for the negotiated annual work plan for the current operating year will be allocated between the GOM and the USG in accordance with the provisions of the Agreement. The USG will utilize a Letter of Credit (L of C) payment process to the Fund on a quarterly basis. (See Attachment No. 1 for sample.) The instructions for handling are contained in AID M. O. Nos 789.1 and 1454.10. The total amount of the L of C will be equal to the USG share of the annual work plan. The estimated amount to be contributed by the USG for the first-three years is approximately \$10 million U.S. dollars.

The GOM contribution to the Fund will be in Malian Francs and will be the net amount determined by provisions of the Agreement.

Both Governments (Parties) upon agreeing to the amount required to be paid by it as part of its contribution to the Fund to cover estimated dis-

bursements of the Fund during the operating year will undertake to make the payment specified at the time or times and in the amounts specified or provided for in accordance with the Agreement.

Payments of contributions shall be made in dollars, or in the equivalent thereof in such other currencies, freely useable or convertible, as may be agreed upon between the contributing Parties.

Disbursements from Fund

Amounts in the Fund shall be used or disbursed exclusively to finance the cost of goods and services as specified in the annual work plan and in accordance with provisions of the Agreement.

Disbursement records will be maintained separately and jointly by both parties and the amount disbursed shall be recorded in U.S. dollars and Mali CFA equivalent. See Attachments A-I for samples of the records to be maintained. The disbursements will be reconciled monthly by both Parties to reflect the status of disbursements and undisbursed balances monthly or other specified time periods.

Disbursements from the Fund shall be in such currencies as the Parties elect.

Disbursement from the Fund shall be supported by invoice and/or other document as deemed evidence to support the eligibility of such disbursements. The authority to make disbursements will be jointly signed

by specified officials of both Parties and be supported by the above-mentioned evidence of liability which should satisfy purpose, suitability for the project and the cost is not unreasonable.

Formal Agreement

Technical teams from both Governments will continue to work on the design details of the project to enable the preparation of essential documents, i.e., PROP for USG, etc., which will, after approval, result in a Project Agreement for joint execution to enable the commencing of this project. It is expressly understood that this AID Memoir does not constitute an obligation of United States Government funds, and no commitment to undertake the project as herein described shall exist until the AID project approval process has been completed, the project authorized, and a Project Agreement executed between the Parties.

**SUMMARY OF CASH TRANSACTIONS**

	U. S. Dollars		Malian Francs	
	Current Quarter	Cumulative FY 19	Current Quarter	Cumulative FY 19
Receipts Derived from:				
1. Deposit on Account of				
a. U.S. Dollars				
b. Malian Francs				
2. Other Sources				
<b>Total Receipts</b>				

Date \_\_\_\_\_

Country \_\_\_\_\_

Project Title \_\_\_\_\_

Project No. \_\_\_\_\_

Funds Begin FY \_\_\_\_\_

Funds End FY \_\_\_\_\_

C O S T

	1st*	2nd*	3rd*	4th*	5th*	Total
	\$ CFA					
Est. Total U.S.						
Est. Total Mali						
Est. Others						
Total Est. Cost						

\*Year

Footnotes:

Special Account \_\_\_\_\_

Trial Balance as of \_\_\_\_\_

Country \_\_\_\_\_

	U.S. Dollars		Malien Francs	
	Debit	Credit	Debit	Credit
Cash on Deposit				
Accounts Receivable				
Authorized for Withdrawal or other Current Liabilities				
Equity				
Totals				

Net Cash Change

	U.S. Dollars		Malien Francs	
	Current Quarter	Cumulative FY 19	Current Quarter	Cumulative FY 19
Opening Cash Bal., Current Fiscal Yr.				
Bal. at end of Pre- vious Quarter				
Bal. at end of Quarter				
Net Change				

### Capital & Equipment Costs

Description/Dimension	Date		Vendor	Date Put into Operation	Est. Life	Charges		Credit		Balance	
	Ordered	Rec'd				U.S.	GOM	U.S.	GOM	U.S.	GOM

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PARTICIPANT/TRAINING

Departure Date	Institution	Area of Study	Date of Completion	Travel Cost	Per Diem	Tuition	Other

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MALI LIVESTOCK II  
BUDGET FORMULATION/WORK PLAN - FIVE YEARS

<u>Description/Categories</u>	1st Year		2nd Year		3rd Year	
	USG	GOM	USG	GOM	USG	GOM
<u>Personnel:</u>						
U.S.	100%		100%		100%	
GOM		100%		100%		100%
<u>Operating Expenses:</u>						
Office Rent		100%		100%		100%
Office Maintenance		"		"		"
Utilities		"		"		"
Repairs		"		"		"
<u>Capital and Equip. Costs:</u>						
Construction of Facilities	90-95%	5-10%	90-95%	5-10%	90-95%	5-10%
Equipment	90-95%	5-10%	90-95%	5-10%	90-95%	5-10%
(No tax by GOM on project equipment)						
<u>Training:</u>						
International Travel	100%		100%		100%	
Per Diem	"		"		"	
Costs of Study	"		"		"	
Participants:						
- Salary		100%		100%		100%
- Family Support		"		"		"
- Others		"		"		"
<u>Research and Studies:</u>						
U.S. Technical	100%		100%		100%	
GOM Technical		100%		100%		100%
Miscellaneous Operating Costs	100%	-0%	75%	25%	50%	50%

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<u>Description/Categories</u>	<u>4th Year</u>		<u>5th Year</u>	
	<u>USG</u>	<u>GOM</u>	<u>USG</u>	<u>GOM</u>
<u>Personnel:</u>				
U.S.	100%		100%	
GOM		100%		100%
<u>Operating Expenses:</u>				
Office Rent		100%		100%
Office Maintenance		"		"
Utilities		"		"
Repairs		"		"
<u>Capital and Equip. Costs:</u>				
Construction of Facilities	90-95%	5-10%	90-95%	5-10%
Equipment	90-95%	5-10%	90-95%	5-10%
(No tax by GOM on project equipment)				
<u>Training:</u>				
International Travel	100%		100%	
Per Diem	"		"	
Costs of Study	"		"	
Participants:				
- Salary		100%		100%
- Family Support		"		"
- Others		"		"
<u>Research and Studies:</u>				
U.S. Technical	100%		100%	
GOM Technical		100%		100%
Miscellaneous Operating Costs	25%	75%	0%	100%