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MINISTERE DE LA PRODUCTION  
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OFFICE MALIEN DU RETAIL ET  
DE LA VIANDE

REPUBLIQUE DU MALI  
Un Peuple - Un But - Une Foi  
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34 p.

ETUDE PRELIMINAIRE DE LA RESERVE DE TIENFALA

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# S O M M A I R E

	<u>Pages</u>
1 Renseignement généraux	2
10. Situation administrative	1
11. Contenance	3
12. Limite de la forêt	4
13. Troits divers	5
2 Facteurs de Production	5
20 Situation géographique et topographique.	5
21 Climat	6
210 Température	6
211 Evaporation et Humidité relative	7
212 Pluviométrie	8
22 Conditions édaphiques	10
220 Les cuirasses	10
221 Les colluvions	11
223 Sols alluvionnaires	11
224 Sols Hydromorphes	11
23 Facteurs biotiques et anthropiques	12
3 Etude des groupements végétaux	12
30 Methodologie	13
31 Les différents groupements	13
310 La galerie forestière	14
311 Formation sur sol gravillonnaire	14
312 Formation sur sol alluvial	14
313 " de cuirasse	15
314 " sur sol hydromorphe	16
3140 Graminées	16
3141 Cypéracées	17
3142 Amaranthacées	17
3143 Onagracées	17
3144 Acanthacées	17
3145 Papilionacées	17
4 Analyse Promatologique	19
5 Implantation de l'aménagement	20
50 choix du périmètre	20
51 Aménagement de la station	23
510 Découpage des pâturages	23
511 Clôture	24
512 Pare-feux	25
5120 Pare-feux principale	25
5121 Pare-feux périphérique	25
5122 Pare-feux du secteur I	25
513 Pistes de collecte	25
514 Perroquets	25
515 Abreuvoirs	26
5150 Cas du feed-lot	26
51500 Forage du puits	26
51501 Usage du fleuve	26
5151 Cas de la zone de quarantaine.	26

## INTRODUCTION

Au cours des mois d'Avril, Mai, Juin et Juillet, les éleveurs sont loins des grands marchés d'approvisionnement. Ils sont concentrés autour des points d'eau et des rives des fleuves où ils peuvent faire pâturer et abreuver leurs animaux. D'autre part, ces animaux maigrissent et sont au plus bas de leur forme, ce qui n'incite pas les éleveurs à les vendre.

En outre durant la période, les pistes de bétail reliant Nioro, Nara Kolokani, les principaux marchés qui approvisionnent celui de Kati sont difficilement utilisables, faute d'eau.

Ces raisons font que le bétail offert sur les marchés de Bamako et Kati est insuffisant et de mauvaise qualité. En plus les bouchers qui achètent le plus souvent à crédit sont durement concurrencés par les exportateurs qui enlèvent les quelques animaux de qualité au comptant.

L'offre insuffisante aboutit à une pénurie saisonnière de la viande à Bamako et à la hausse des prix de cette denrée.

Pour pallier cette situation, l'OLBEVI et l'AID ont préconisé la création d'une structure de stockage des animaux à abattre pendant la mauvaise saison. Ils seront achetés d'Octobre à Janvier, au sortir de la saison. Ils des pluies où ils sont en forme et où l'offre est abondante et par conséquent les prix intéressants.

Plusieurs études étant faites par différents spécialistes, la présente ne concernera que l'application des recommandations.

### I Renseignements généraux

1 Renseignements administratif

10 Situation administrative

Quoique portant le nom de Tienfala, cette forêt est située dans la partie Nord-Est de l'arrondissement central de Bamako.

Depuis le 21 Janvier 1939, elle a été érigée en réserve forestière, dépendant ainsi de l'administration des Eaux et Forêts.

#### 11 - Contenance

Avant son classement, les villageois de Tienfala, Sala, Monomonouba et Djikoni exploitaient environ 30ha dispersés dans l'actuelle réserve de 3.000 ha.

D'après le procès-verbal de classement, il n'y a eu aucune opposition à l'acte. Ce qui suppose qu'ils disposaient d'autres terres de culture. Dans le même document nous notons que les superficies avoisinantes portaient des boisements. Boisement sur lesquels les propriétaires des 30 ha ont été déplacés.

Depuis, la pression démographique a été telle que ces boisements ont laissé la place à une maigre végétation.

Initialement cette réserve devait, pour une grande part, servir de champ d'essais aux forestiers. A cet effet une pépinière a été créée pour alimenter les différentes parcelles matérialisées en vert sur le plan, à savoir :

##### a) Parcelle P<sub>1</sub>

Plantée en 1949, 1950 et 1951 en caflcédrat (*Khaya se negalensis*) puis en ronier (*Borassus aethiopium*) en 1954. Sa protection a été faite par une ceinture de pare-feux et par le fauchage de toute la parcelle. Cette dernière méthode a dû être abandonnée pour les raisons suivantes :

- coût élevé
- régénération de *Penisetum pedicellatum* facilitée par la décomposition de la paille.

.../...

## b) Parcelle des saus (Isoberlinia doka)

C'est une expérience de régénération naturelle protégée de la même manière que les autres en 1951 et 1952.

La méthode a été abandonnée en 1953 - 1954

## d) Parcelle des caflcédrats

Plantée en Juillet et Août 1954 à 5 x 5m sur sol riche et profond envahi par l'Andropogon gayanus et l'Andropogon amplexans.

Elle a reçu, en 1955, 500 noix de rônier.

En guise de protection, seulement le tour des plants a été desherbé en octobre de la même année.

e) Parcelle P<sub>3</sub>

En 1949 elle a été distribuée aux habitants de Djikoni qui furent obligés d'abandonner les lieux après une seule année de culture à cause du mauvais état du sol.

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L'échec de toutes ces expériences lié à la dégradation progressive du sol et la pénurie générale de bois autour de Bamako amenèrent le service forestier à en faire une réserve de bois de chauffe.

Les coupes s'y effectuent par rotation depuis 1967 ; d'abord par la régie forestière de Bamako puis par l'OAPF (Opération aménagement et Production forestière).

Depuis 1941 et 1942, une première coupe a été faite dans cette forêt.

12 - Limites12 Limite de la forêt :

A une vingtaine de km de Bamako sur la route de Kaulikoro, se trouve la réserve forestière de Tienfala dont les limites sont les suivantes :

A l'Est : la piste AJ, la droite AB, la route du magasin à riz de Tienfala, de B à C.

.../...

A l'ouest : la droite DE, le marigot de Sala, le marigot de E à G, la ligne brisée GH

Au Nord : le marigot de Monomonouba de H à I, la ligne brisée IJ.

Au Sud : le fleuve Niger

Les différents points sont matérialisés comme suit :

- A, le point de la route Bamako-Koulikoro situé à 5.206m à l'Est du pont du marigot de Sala.

- B, le point situé à l'intersection de la voie ferrée Bamako-Koulikoro avec la route conduisant au magasin à riz de Tienfala

- C, le point de la rive gauche du Niger situé à 2.431 m en amont du point D

- D, le point d'intersection de la rive gauche du marigot de Sala avec une droite formant un angle de  $37^{\circ} 30$  avec la direction du Nord géographique. DE = 2.360 m environ

- E, le point situé au pont du marigot de Sala

- F, le point de la rive gauche du marigot de Sala situé à 666 m de F vers le Nord

- G, le point de la rive gauche de Monomonouba situé à l'extrémité d'une ligne brisée de 940 m de longueur tracée sur le terrain.

- H, le point où le marigot de Monomonouba quitte la falaise de Tienfala

- I, le point situé à 2.360m de A vers le Nord sur une piste tracée à la base des montagnes de Tienfala.

### 13 - Droits divers

Les droits d'usage maintenus sur la réserve sont les suivants :

- ramassage du bois mort
- récolte des plantes médicinales
- récolte du kapock, des fruits de karité ou autres plantes alimentaires.

6.-

- les troupeaux de bovidés appartenant aux villages de Sala, Djikoni et Monoumonouba sont autorisés à y pâturer sauf dans les parcelles mises en défens.

## 2. Facteurs conditionnant la Production

Il s'agit là d'une description des facteurs climatiques, édaphiques et anthropiques du milieu.

### 20. Situation géographique et topographique.

Elle est située entre le 7° et le 8° de longitude W et entre le 12° et le 13° de latitude Nord.

Le relief y est accidenté surtout dans sa partie Nord reposant sur un massif de piémont. Sa partie Sud vue dans les détails présente une série de vallons et de colluvions.

Tous ces détails seront représentés sur l'esquisse que nous comptons faire dès que nous entrerons en possession des photographies récentes.

### 2.1. Climat

#### 210 Température

Tableau 1 : moyenne des températures enregistrées à Sotuba de 1950 à 1973, soit près d'un quart de siècle. Faute de relevés de la station, nous estimons que les températures de Sotuba seraient plus significatives que celles de Bamako à cause de sa proximité.

.../...

Période	M	m	$\frac{M+m}{2}$	M-m	AT
Janvier	36,7	10,1	26,1	26,6	104,4
Février	39,4	13,1	29,0	26,3	116
Mars	38,2	15,8	31,9	22,4	127,6
Avril	41,5	18,2	33,2	23,3	132,8
Mai	41	20,5	33,1	20,5	124,4
Juin	38,9	19,8	29,8	19,1	119,2
Juillet	34,9	19,2	27,2	15,7	108,8
Août	32,7	19,8	26,4	12,9	105,6
Septembre	33,7	19,5	28,9	14,2	115,6
Octobre	35,8	17,8	28,1	18,6	112,4
Novembre	36,4	13	27,7	13,4	110,8
Décembre	37,1	10,3	25,6	16,8	102,4
Moyenne annuelle	38,0	16,4	28,9	18,9	

M : moyenne mensuelle et annuelle des maximums journaliers

m : moyenne mensuelle/et annuelle des minimums journaliers

$\frac{M+m}{2}$  : moyenne mensuelle et annuelle des températures moyennes

M - m : Amplitude thermique des moyennes mensuelles

AT : 4 fois la moyenne mensuelle des températures moyennes.

Ces renseignements ont été tirés des annales du service de la Météorologie Nationale.

Les mois les plus chauds sont par ordre de grandeur décroissante Avril, Mai Mars Juin et Février. Le mois d'Avril a une température moyenne de 38°2

Le mois le plus frais est Décembre avec 25°6  
La moyenne des températures maximales mensuelles est de 41°6 en Avril

La moyenne des températures minimales mensuelles est enregistrées en Janvier avec 10°1

La moyenne des amplitudes thermiques journalières la plus faible est enregistrée pour Août soit 12°9 ; et la plus forte en Janvier avec 26°6.

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Depuis l'installation du poste pluviométrique, le minimum absolu et le maximum absolu extrêmes enregistrés sont 7°2 en 1957 et 43° en 1952' (Etude agrostologique et Aménagement des pâturages Naturels du CNRZ de Sotuba).

## 2 11. Evaporation et Humidité relative

Tableau 2 : Evaporation et Humidité relative

Période	Evapora- tion mm/j	Humidité relative en %		
		M	UX	UX
Janvier	7.6	32	52	15
Fevrier	8.0	29,1	46	13
Mars	9.9	29.5	46	13
Avril	8.7	39.5	53	20
Mai	6.4	55	78	32
Juin	4.2	66.5	89	44
Juillet	2.3	77.0	96	58
Août	1.6	81.0	38	64
Septembre	1.8	77.5	98	57
Octobre	3.2	68.5	94	43
Novembre	5.6	51	78	24
Décembre	6.5	41.5	63	20
Année	5.2	54		

M = moyenne des 3 valeurs journalières d'humidité relative : à 6h, à 12h à 18h maximale et minimale

UX = humidité relative maximale absolue

UX = " " minimale "

Ces renseignements ont été tirés de "l'étude agrostologique et Aménagement des pâturages naturels du CNRZ de Sotuba complétés au service météorologique national.

L'évaporation est inférieure à la moyenne annuelle pendant la saison des pluies de Juin à Octobre et tend vers cette moyenne en Novembre.

L'évaporation la plus forte est enregistrée pendant la saison sèche de Février à Avril avec un maximum en Mars (9,9 mm/j)

L'humidité relative la plus forte est enregistrée de Juin à Octobre avec un maximum en Août.

.../...

L'humidité relative la plus faible est enregistrée en saison sèche de Décembre à Avril avec un minimum en Février 29,1 %

L'humidité relative tend vers la moyenne annuelle en période de transition : Novembre et Mai (51 et 55 %) la moyenne annuelle faisant 54 %

Les maxima absolus sont enregistrés en Août et Septembre et les minima en Janvier et Décembre.

## 2 12. Pluviométrie

Tableau 3 : Pluviosité de Sotuba de 1950 - 73

Période	J	F	M	A	N	J	J	A	S	O	N
Hauteur en mm	-	0,2	5,1	15,9	54,6	130,6	244,9	312,3	200,7	57,3	4,6
Nombre de j de pluies	-	0,2	0,8	2,5	5,6	10,3	15,9	17,1	15,4	5,6	0,6

Normale : 1030,8

I.S.P. : 4 - 2 - 6

Tableau 4 : Pluviométrie

Année	Pluviométrie	Nb de j de pluies	Année	Pluviométrie	Nb de j de pluies
1950	1105,7	63	1962	1025,5	68
1951	1033,7	84	1963	721,0	66
1952	1343,7	78	1964	1129,1	69
1953	1077,8	82	1965	900,3	61
1954	1425,9	86	1966	1172,6	85
1955	902,5	78	1967	1243,0	82
1956	1046,8	90	1968	885,2	63
1957	1196,4	86	1969	1053,5	73
1958	1299,9	69	1970	820,7	60
1959	856,6	59	1971	867,9	68
1960	1042,3	65	1972	714,2	71
1961	895,8	66	1973	980,6	59
Moyenne Pluviométrie=1013,8		Moy nb de j de P= 72,1			

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Figure 1 : VARIATION DE LA PLUVIOSITE ANNUELLE (SOTUBA)

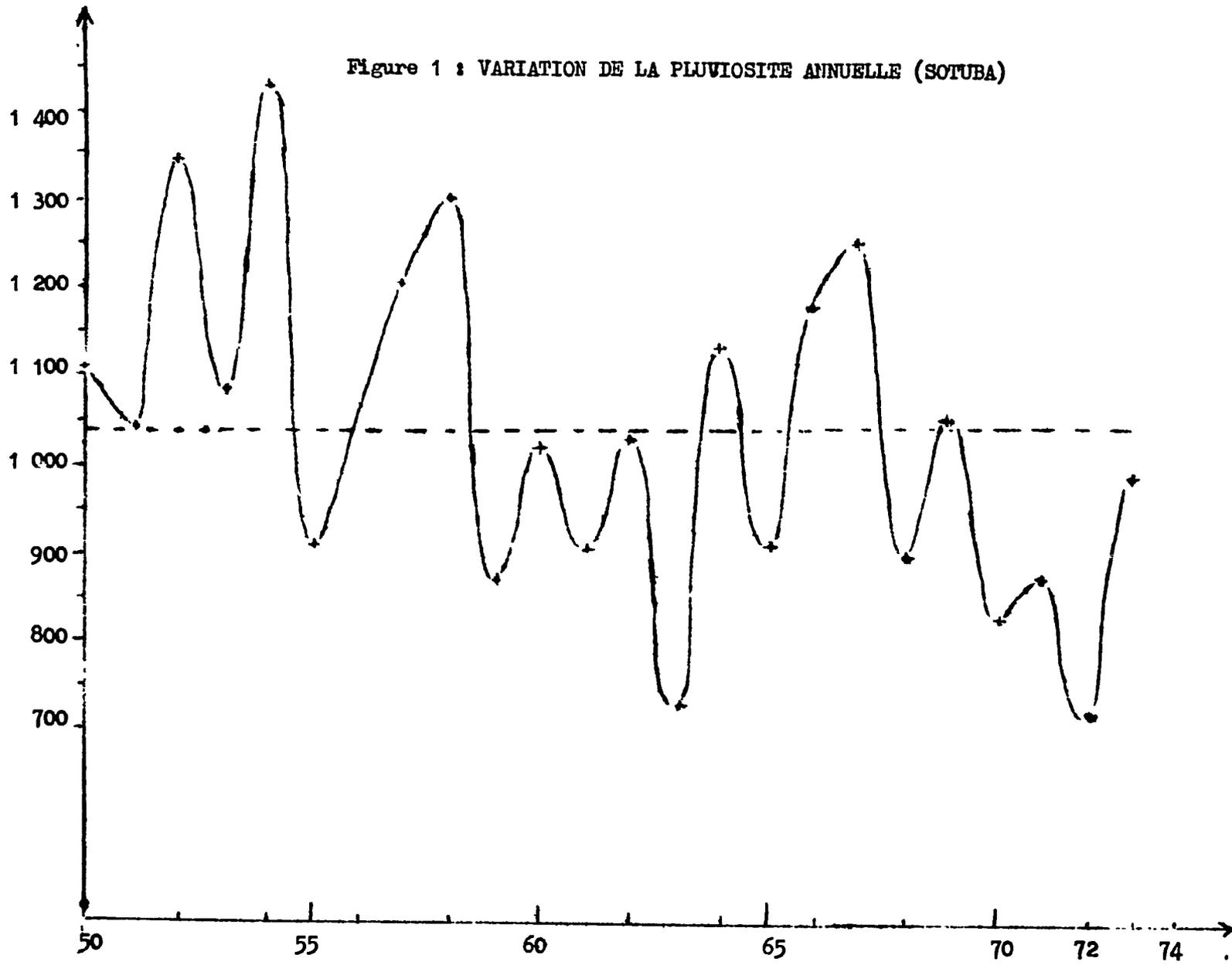
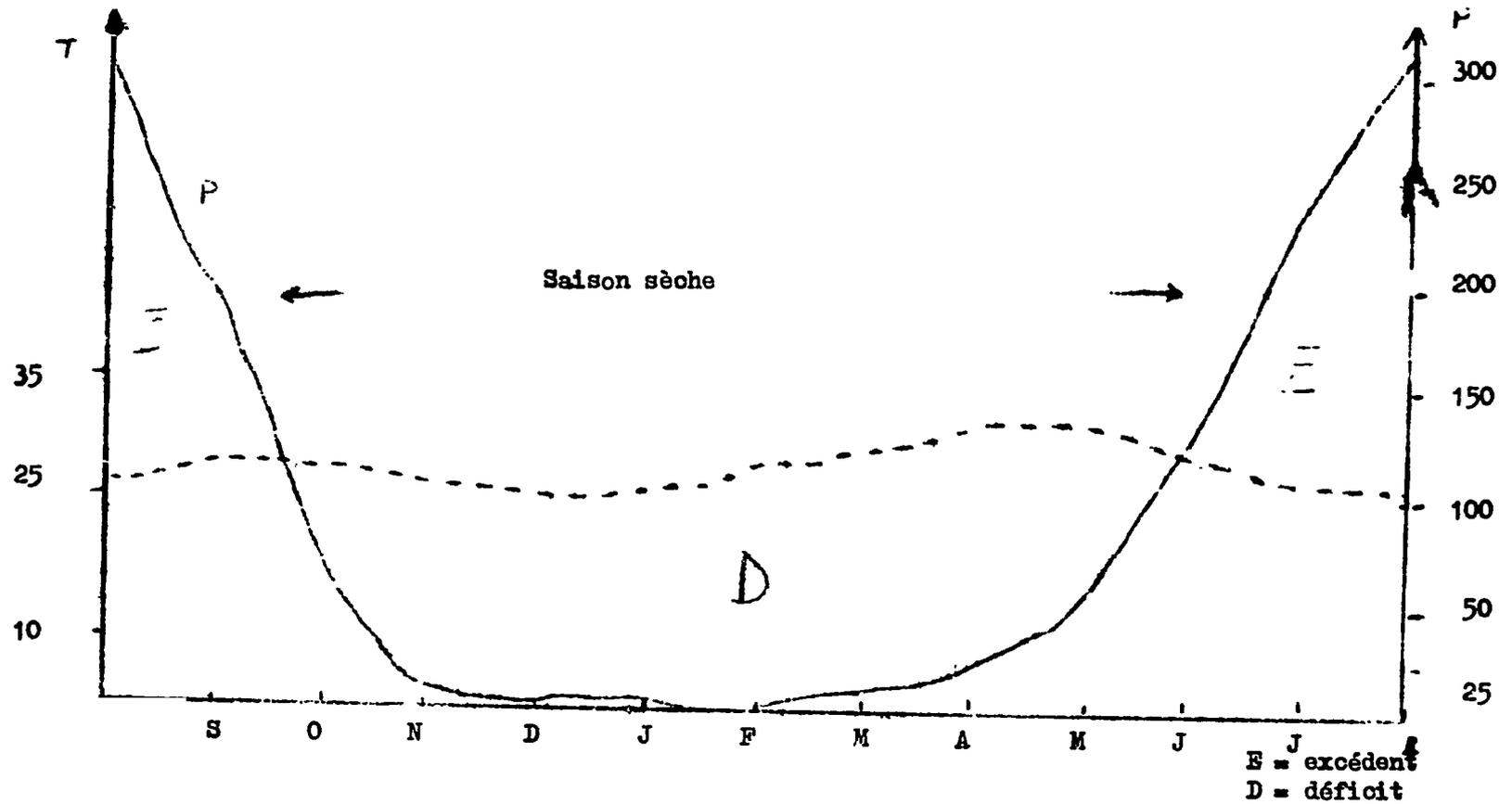


Figure 2 : Diagramme pluviothermique (SOTUBA)



Généralement les premières pluies tombent en Avril et les dernières en Novembre. Les pluies de Novembre n'excèdent 10 mm qu'exceptionnellement.

Nous constatons que l'année 1954 a été la plus pluvieuse (1425,9mm tombés en 86 j réparties entre Février et Novembre).

Nous convenons avec Boudet que c'est seulement à partir de cette date que l'aridité à commencer à s'annoncer.

L'année 1955 a été très déficitaire. Quand en 1956, 1957 et 1958, les pluies tombées sont supérieures à la moyenne des 24 ans, la répartition a été très mauvaise.

L'année 1959 a été très catastrophique 856mm entièrement tombée sur 4 mois avec un indice d'aubreville de 4-0-8. Depuis cette date, la pluviométrie n'a été qu'exceptionnellement supérieure à la moyenne soit 1030mm.

En appliquant la formule de Birot 4 T pour 1mm le déficit théorique serait de l'ordre de 44 %. C'est dire que pour les mêmes températures, il faudrait un apport de 450 mm en plus.

Ignorant le nombre de jours de rosée pour Sotuba, il serait très hasardeux de calculer le nombre de mois secs puisque toute extrapolation en matière de climat n'a aucun sens.

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La réserve de Tienfala pouvant servir de champs d'expérimentation, il serait souhaitable d'y installer une station météorologique.

## 22. Conditions édaphiques.

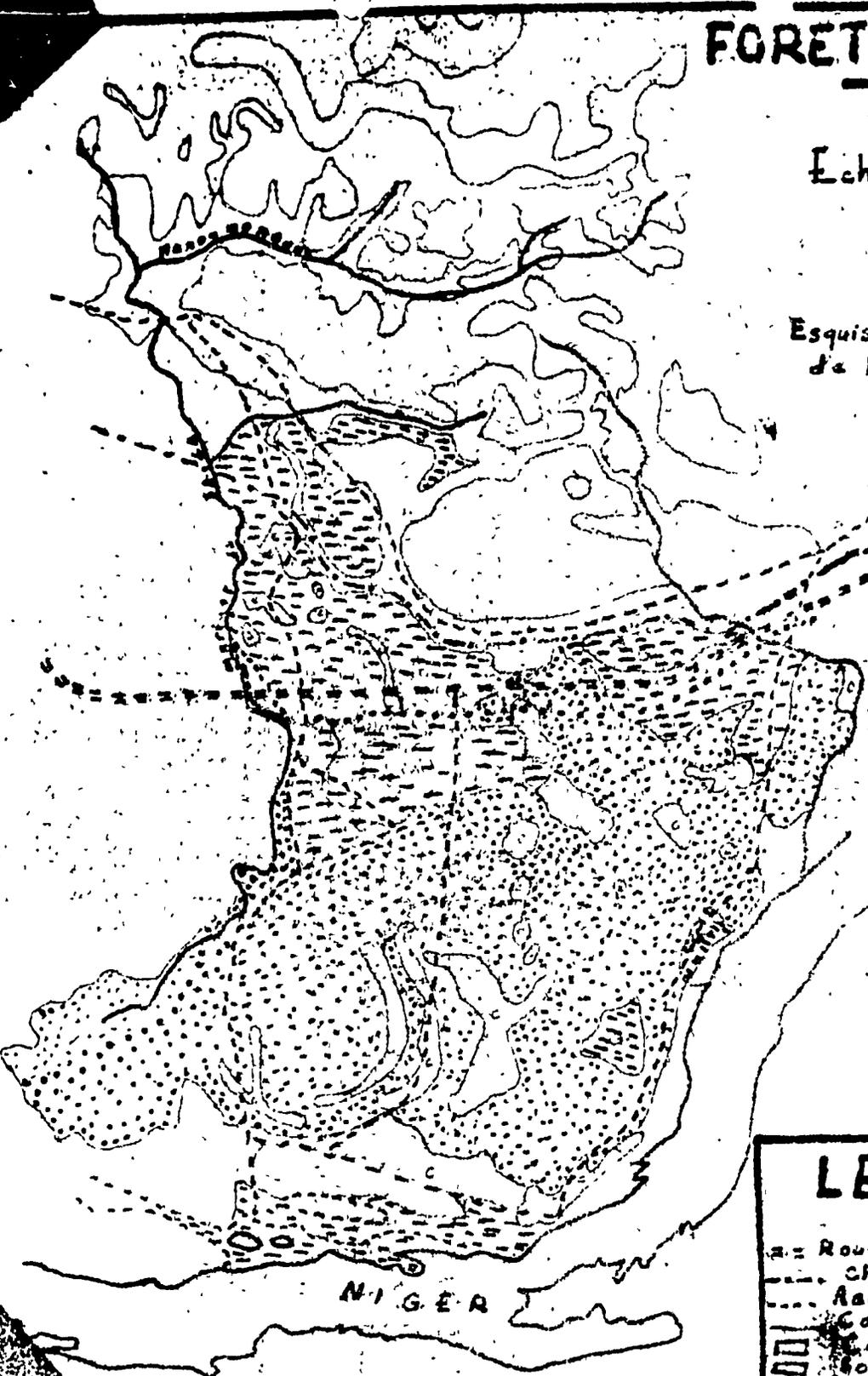
Nous avons affaire à des sols ferripinent tropicaux en voie de bowalisation. Le relief qui est plus ou moins accidenté conditionne les micro-types. Quand certains mimicro-types sont évolutifs d'autres sont regressifs.

.../...

# FORET de TIEN

Echelle: 1/50.000

Esquisse réalisée à partir  
de photographies aériennes



Barnabé, le 10/10/52  
Par M. SIMBE  
Ing. des E.P.

## LEGENDE

- Route goudronnée
- - - - - Chemin de fer
- - - - - Routes, Terrasses, Chemins
- - - - - Cours d'eau
- ▨ Laitucas, Boyé, Coton
- ▩ Sol granitique
- Sols ferrugineux, po  
ou sol aride

Nous sommes parvenus à localiser les différents types à partir de photographies aériennes prises en 1974 au 50.000<sup>e</sup>. L'échelle ne nous a pas permis de trouver la précision demandée.

Les différents types enregistrés sont les suivants:

- Les Cuirasses
- Les colluvions
- Les sols gravillonnaires
- Les sols alluvionnaires à hydromorphies plus ou moins temporaires.

#### 220. Les Cuirasses.

Ce sont les sols bowalisés dont la partie superficielle a été entraînée par les eaux de ruissellement. Ce type, généralisé dans le secteur I, forme des mosaïques dans le secteur II.

La végétation ligneuse, presque inexistante, est essentiellement formée par le *Pteléopsis suberosa* et les *combrécae*.

C'est le domaine du *Loudetia togoensis* et de l'*Andropogon pseudapricus*.

Le penisetum y apparaît dans certaines poches.

#### 221. Les colluvions.

Ces types sont apparentés soit aux cuirasses soit au sol gravillonnaires. Leur particularité fondamentale est qu'ils se rencontrent sur élévation.

La végétation caractéristique est celle des sols gravillonnaires.

La photo permet de les définir.

#### 222 Sols gravillonnaires

Ce sous-type est généralisé dans tout le secteur. Il s'agit de sols peu évolués où la roche mère solide se trouve à une faible profondeur. Ils se rencontrent sur sols relativement plats.

En dehors des sols alluvionnaires, ils sont les plus riches.

### 223. Sols alluvionnaires.

Ils se rencontrent au bas des pentes et à la proximité immédiate des cours d'eau où le ruissellement a déposé les particules fines transportées des sols situés en hauteur sont des sous-types que l'on pourra considérer comme évolutifs.

### 224. Sols hydromorphes.

Ce sous-type se rencontre dans l'enclave sud-ouest du secteur I et dans la partie ouest de la zone d'inondation du fleuve. Dans les 2 cas l'hydromorphie est temporaire. La végétation n'est pas la même selon qu'on se trouve au Nord de la route goudronnée ou aux abords du fleuve.

\* \* \*

\*

Sur le plan géologique, les roches sont apparentées à la série de Koulouba dans le secteur I, suite des collines du mont mandingue.

Dans le secteur II elles sont apparentées à la série de Sotuba (formant des apparemment à près ronsis)

### 2.3 Facteurs biotiques et anthropiques

Nous avons abordé l'influence de l'homme en parlant de l'historique de la forêt.

Toutes les essences rencontrées ne sont que des rejets de souches.

C'est cette intervention de l'homme qui explique l'envahissement des essences drageonnantes comme le *Daniellia aliveri* le *Détarium microcarpum* et le *Ptelopsis suberosa* aux abords des cuirasses.

.../...

La pression démographique explique le fait que les populations riveraines ont souvent sollicité l'installation de leurs champs dans la réserve. La convoitise actuelle de la forêt n'est-elle pas une autre preuve.

Il n'y a pratiquement plus de jachère exploitables aux environs immédiats de la réserve.

L'aménagement de la forêt par l'OMBEVI va poser de sérieux problèmes pour les éleveurs des villages voisins et pour les éleveurs récemment installés par la Mairie de Bamako.

Sur le plan cynégetique, il y a été dénombré un couple et un petit troupeau de coba (*Hypotragus equinus*) de quelques individus, de nombreux singes, des Water bucks et quelques petites antilopes dont la cohabitation avec les animaux domestiques n'est pas facile.

Les animaux en feed-lot ne pourront en aucun cas les gêner. Le feed-lot va au contraire leur permettre de s'épanouir, toute concurrence avec les animaux domestiques étant écartée.

La présence de similis dans la zone mérite une attention particulière.

### 3. Etude des groupements végétaux

Il s'agit là de la définition des types de pâturages. Nous nous contenterons de faire la liste des espèces inventorisées et celle des espèces caractérisant les différents groupements végétaux.

Les types de pâturages seront fonction des types de sols.

### 30. Méthodologie.

Nous nous proposons de faire un inventaire assez complet, pour chaque type de sol. Ainsi à l'aide de l'esquisse faite au 50.000e, nous pourrions avec précision, évaluer la productivité de la réserve.

La cotation pour l'abondance-dominance et la sociabilité sera faite à partir de la méthode zuricho-Mompelliéraine de Braun-- Blanquet et Pavillard.

1°) abondance-dominance

- x espèces rares à degré de recouvrement très faible
- 1. espèces peu nombreuses ou nombreuses dont le degré de recouvrement très faible
- 2. espèces nombreuses recouvrant moins de 1/5 de la superficies totale
- 3. espèces nombreuses recouvrant entre 1/5 et 1/2 de la superficies totale
- 4. espèces très nombreuses recouvrant au moins 1/2 de la superficie totale.
- 5. espèces englobant les espèces numériquement prédominantes, regroupant 80 % et + de la superficie totale soit 4/5

2°) La précédente cote sera accompagné de celle de la sociabilité

- 1. Espèces dispersées isolément
- 2. espèces formant des groupes
- 3. espèces formant des troupes
- 4-5 espèces formant des peuplements purs ou presque purs.

### 31. Les différents groupements

La présence de certaines espèces comme le *Berlinia heudelotiana*, le *Bauhiuria tomingii* laisse croire que la savane soudanienne à laquelle nous avons affaire a succédé dans un passé récent à une savane soudano-guinéenne.

Les sous types sont les suivantes :

- la galerie forestière
- la savane soudanienne à *Vitellaria* et à *Bombax*
- la végétation de bas-fond sur sol alluviale
- la formation rupicole dont la végétation herbeuse est prédominante.

.../.....

### 310 La galerie forestière.

Elle est localisée le long du marigot de Sala. C'est un Berlinietum Heudelotianaeae. Entre autres, on y rencontre le *Sarcocephalus exculentus*, le *Mitragyna inermis*, le *Dombeya multiflora*, et l'*Isoberlinia doka*.

C'est le site des glossines. Cette étroite bande n'a pas un grand intérêt.

### 311. La formation sur sol gravillonnaire

Cette formation est caractérisée par les espèces suivantes :

- <i>Bombax costatum</i>	4 - 4
- <i>Andropogon amplexans</i>	4 - 4
- " <i>pseudapricus</i>	4 - 3

On y rencontre parfois de l'*andropogon gayanus* du *pennisetum pedicellatum* pour les plus importantes.

Cette formation est apparentée à celle se trouvant sur certains colluvions

En octobre sa productivité est la suivante :

PV = 11.550 kg/ha      PS = 7.128 kg      H % = 38,5 %

### 312 Formation sur sol alluvial

Cette formation est caractérisée par les espèces suivantes :

<i>Detarium microcarpum</i>	4 - 4
<i>Bombax costatum</i>	3 - 3
<i>Pterocarpus erinaceus</i>	3 - 3
<i>Vitellaria paradoxa</i>	2 - 2
<i>Kaya senegalensis</i>	2 - 2
<i>Ptelopsis suberosa</i>	2 - 2
<i>Stereospermum Kunthianum</i>	+ 1
<i>Terminalia macroptera</i>	+ 1
<i>Sarcocephalus exculentus</i>	+ 1
<i>Strychnos spinosa</i>	+ 1

.../.....

<i>Ximena americana</i>	+ 1
<i>Sécuridaga longipedon culata</i>	+ 1
<i>Trichilia emetica</i>	+ 1
<i>Afromosia laxiflora</i>	+ 1
<i>Acacia macrostachya</i>	+ 1
<i>Dicrostachys glomerata</i>	+ 1
<i>Crossopterus febrifiga</i>	+ 1
<i>Guiera senegalensis</i>	+ 1
<i>Grevia mollis</i>	+ 1
<i>Bauhinia thonningii</i>	+ 1
<i>Prosopris africana</i>	+ 1
<i>Gardenia erubescens</i>	+ 1
<i>Anona Senegalensis</i>	+ 1

Comme végétation herbacée, on y rencontre :

<i>Andropogon amplexans</i>	4-3
<i>Digitaria lecardii</i>	4-4
<i>Coclospermum tinctorium</i>	3-3
<i>Pennisetum pedicellatum</i>	2-2

Cette formation est la plus riche, il nous a été impossible d'y prendre des échantillons parce qu'elle était surpâturée par les animaux existants (SOMBEPEC, MAIRIE et divers)

### 31.3. Formation de cuirasse.

Elle est la plus généralisée dans le Secteur I.  
Sa végétation herbacée est la suivante :

<i>Andropogon pseudapricus</i>	4-3
<i>Loudetia togoensis</i>	4-3
<i>Ctenium élégans</i>	2-1
" vilosum	2-1
<i>Elionorus élégans</i>	2-1
<i>Pennisetum pedicellatum</i>	2-2
<i>Coclospermum tinctorium</i>	2-2
<i>Andropogon amplexans</i>	2-2

La végétation arbustive est suivante :

Combretum ghasalensae	3-2
" nigricans	2-2
Ptelopsis subérosa	2-3
Bombax costatum	2-2
Guiera senegalensis	2-2
Heeria insisguis	2-2
Vitellaria paradoxa	+ 1
Stryenes spinosa	+ 1
Vitex pobeguini	+ 1
Gardenia ternifolia	+ 1
Grevia molis	+ 1
Burkea africana	+ 1
Prosopis africana	+ 1
Pterocarpus lucens	+ 1
Acacia macrostachya	+ 1
Combretum micranthum	+ 1
Sarcocephalus exculentus	+ 1
Lannea velutina	+ 1
Detarium microcarpum	+ 1

Cette formation quoique herbeuse est à productivité faible PV = 11.280 kg/ha PS = 4.850 kg H % = 57

#### 3.1.4. Formation sur sol hydromorphe.

Cette formation qui est le domaine du Vitiveria nigritana et du Sorghastrum trichopus comprend entre autres.

#### 3140. Graminées

- Schizachyrium palustre
- Hyparrhenia ruffa
- Pobeguinea arreôta
- Setaria pallidifusea
- " sphacalata
- Pennisetum atrichum
- Pennisetum hordeodes
- Paspalum serobiculatum
- Panicum repens
- Eragrostis gangetica

.../.....

3141. Cyperacées

- *Cyperus Schweinfurthianus*
- *Pycurus tremulus*
- *Ascolepsis brasiliensis*
- *Lipocarpa triceps*

3142. Amaranthacées

- *Alternanthera sessilis*

3143. Onagracées

- *Jussiaera repens* var. *diffusa*
- " *linearis*

3144. Acanthacées

- *Hygrophila senegalensis*

3145. Papilionacées

- *Vigna filiacaulis*
- " *reticulata*
- *Ericsema glomeratum*
- *Alysicarpus zeyheri*
- *Abrus precatorius*
- *Asschynomene* sp.

Les essences ligneuses sont les suivantes :

- *Mitragina inermis*
- *Terminalia macroptera*
- *Sarcocephalus exculentus*
- *Zizuphus micronata*
- *Coclospermum planctonii*
- *Crossopterus febriga*

et certains représentants de zones exondées.

Le rendement à l'ha en matière verte au mois d'octobre a été l'ordre 10.000 kg/ha contre 17.500 kg en Août.

.../.....

La matière sèche récoltée a été évaluée à 6.250 kg/ha soit 37,5 % d'humidité.

La présence des animaux dans la réserve ne nous permet pas de faire foi à 100 % à ces chiffres. Il serait donc souhaitable que les dispositions suivantes pour la saison des pluies prochaine soient prises :

- Faire un échantillonnage tous les 15 jours du 1er Juillet au 1er octobre dans chaque type de pâturages. Au besoin choisir deux types dans chaque cas pour la simple raison que les pâturages sur cuirasse par exemple n'ont pas le même rendement dans le secteur I ou dans le secteur II.

- Faire au moins 10 relevés par échantillonnage.
- Calculer le rendement pour chaque espèce importante
- Calculer la production secondaire après fauchage ou passage éventuel de feu.

Ces dispositions nous permettront de connaître avec précision : la charge exacte de nos pâturages pour toutes les périodes de l'année d'où le moment propice au fauchage. Nous pourrions également connaître l'éventualité de régénérer l'essence la plus hautement productive.

- Le rendement des superficies défrichées et celle des superficies dessouchées sera également calculé pour nous fixer sur la politique à suivre pour l'avenir.

Ainsi cette réserve pourra être pour l'OLBEVI un champs d'essais.

#### 4. Analyse Bromatologique.

Quatre échantillons ont été soumis à l'analyse dans les laboratoires de Sotuba dont les résultats ne pourront nous parvenir avant fin Novembre. Dans l'avenir tout échantillon dont la productivité sera évaluée pourra être soumis à l'analyse.

## 5.- IMPLANTATION DE L'AMENAGEMENT

### 50 - Planification des achats

Pour l'installation du feed-lot le choix a été porté sur le secteur II (partie de la reserve située au Sud de la route goudronnée reliant Bamako à Koulikoro).

Toutefois le Secteur I (partie Nord) sera aménagé sommairement selon la gestion moderne des pâturages (rotation) puisqu'elle doit supporter les animaux en quarantaine dont le nombre peut dépasser 2.000 têtes au cours de la période allant de Janvier à Mars si tous les animaux doivent être achetés aux environs de Bamako et pendant la période au cours de laquelle ils coûteraient le moins cher.

Au cas où la première solution serait adoptée, le Secteur I ne pourra pas à lui seul supporter les 2.000 têtes de Mali-Livestock et les animaux déjà existants.

Pour éviter le surpâturage, il serait préférable d'acheter les animaux entrant en feed-lot les premiers dans la région de Bamako et les autres soit à Niono soit ou dans la région de Hopti de façon qu'ils ne puissent atteindre Tienfala que 2 à 5 jours avant leur mise en quarantaine.

Pour les achat il sera tenu compte du temps qu'ils doivent mettre entre leur lieu d'achat et Tienfala-

Si cette solution est admise, il va donc falloir changer les structures.

- Faucher le Secteur I pour :
- garantir la nourriture des animaux devant faire les 21 jours de quarantaine, les onglons de ces animaux n'étant pas adaptés à notre milieu. D'où la nécessité de leur épargner une marche trop longue.
- Prévoir un pourcentage de mortalité au cours du voyage.
- Prévoir l'installation d'un magasin à foin ou des perroquets devant être protégés.

.../...

La planification des achats pourrait se faire selon une étude faite par le Projet Mali 523, le déficit par rapport à la courbe idéale serait le suivant :

Janvier : 200	Février : 280	Mars : 300
Avril : 450	Mai : 620	Juin : 330
Juillet : 330	Août : 480	

Nous soumettrons les deux tableaux de séjour des animaux tant en quarantaine que dans le feed-lot indépendants des solutions adoptées.

500 Tableau n°5 : Solution dégagées par les études de Mali-Livestock. Cas où les animaux doivent nécessairement faire 60 jours en feed-lot avec entrées sorties régulières.

Dans ce cas, compte tenu de la capacité du feed-lot (1.000 têtes, il n'est pas possible de prévoir un abattage de 25 têtes tous les jours, car cela nous amènerait à faire entrer 175 têtes par semaine. Nous prévoyons donc un abattage de 25 têtes 5 fois par semaine. Ce qui nous permettra de respecter la capacité du feed-lot et les 60 jours d'embouche. Il en ressort le tableau ci-dessous :

ENTRÉES				SORTIES			
Dates	Nbres	En Fee-lot	Restants en pât.	Dates	Nbres	du Feed	Restant Disponible
1 - 1	125	125	2.875	2 - 3	125	125	2.875
8 - 1	125	250	2.750	9 - 3	125	250	2.750
15 - 1	125	375	2.625	16 - 3	125	375	2.625
22 - 1	125	500	2.500	23 - 3	125	500	2.500
29 - 1	125	625	2.375	30 - 3	125	625	2.375
5 - 2	125	750	2 250	6 - 4	125	750	2 250
19 - 2	125	875	2.125	13 - 4	125	875	2.125
19 - 2	125	1 000	2 000	20 - 4	125	1 000	2 000
26 - 2	125	1 125	1 875	27 - 4	125	1 125	1 875
6 - 3	125	1 250	1 750	4 - 5	125	1 250	1 750
13 - 3	125	1 375	1 625	11 - 5	125	1 375	1 625
20 - 3	125	1 500	1 500	18 - 5	125	1 500	1 500
27 - 3	125	1 625	1 375	25 - 5	125	1 625	1 375
3 - 4	125	1 750	1 250	1 - 6	125	1 750	1 250
10 - 4	125	1 875	1 125	8 - 6	125	1 875	1 125
17 - 4	125	2 000	1 000	15 - 6	125	2 000	1 000
24 - 4	125	2 125	875	22 - 6	125	2 125	875
1 - 5	125	2 250	750	29 - 6	125	2 250	750
8 - 5	125	2 375	625	6 - 7	125	2 375	625
15 - 5	125	2 500	500	13 - 7	125	2 500	500
22 - 5	125	2 625	375	20 - 7	125	2 625	375
29 - 5	125	2 750	250	27 - 7	125	2 750	250
5 - 6	125	2 875	125	3 - 8	125	2 875	125
12 - 6	125	3 000	-	10 - 8	125	3 000	-

Suivant les nécessités, il sera possible d'avancer d'autant de semaines que l'on désire l'entrée ou la sortie des animaux. Par exemple si l'on ne veut pas faire d'embouche en Août, il suffira de faire entrer les premières bêtes le 18 décembre. Ce qui suppose que la quarantaine, de ces animaux débutera le 27 Novembre.

Nous avons également la possibilité de faire une embouche courte d'un mois avec les animaux dont l'abatage est prévu pour Août et pour la dernière semaine de juillet pour combler les déficits.

On pourra ainsi faire tous les aménagements désirés.

Nous voyons donc qu'il va falloir acheter seulement les premiers comme prévu sur les marchés de Kati et Bamako et au même moment les seconds seraient achetés dans la région de Mopti de Ségou ou de Kayes (Nioro).

.../....

Ces derniers devant faire un parcours d'environ 40 jours et entrant en zone de quarantaine le 5 Février seront achetés en début de la 2e quinzaine de Décembre presque au même moment que les premiers.

Le dernier lot sera nécessairement acheté en début de la deuxième quinzaine de Février dans la région de Mopti où les animaux sont encore en forme pendant cette période.

Ainsi, on aura résolu le problème du surpâturage du Secteur I, 501 : Cas où les prévisions du projet Mali 523 seraient respectées.

L'intérêt de cette 2e solution est de faire respecter le déficit théorique mensuel. Dans le tableau n°5, les chiffres des abattages sont les suivants :

Janvier	0	contre un déficit théorique de					200
Février	0	"	"	"	"	280	
Mars	625	"	"	"	"	300	
Avril	500	"	"	"	"	450	
Mai	500	"	"	"	"	620	
Juin	625	"	"	"	"	330	
Juillet	500	"	"	"	"	330	
Août	250	"	"	"	"	480	

Il va de soi que la charge des pâturages ne pourra être calculée avant qu'une solution ne soit trouvée au problème. Il en est de même pour :

- Le nombre de rations
- Les superficies à réserver
- La rotation.

#### 5-1 AMENAGEMENTS DE LA STATION

Pour une bonne gestion du feed-lot, un certain nombre de dispositions doivent être prises :

- Délimitation et clôture de la station
- Mise en place des pars-feux
- " " " " pistes de collecte
- Installation des perroquets
- Fauchage
- Installation des barrages collinaires ou des puits.

##### 5.1.0 Découpages des pâturages

Ce découpe a été essentiellement fait dans l'intention de soustraire la réserve des feux de brousse qui dessinent la forêt tous les ans.

##### 510 Découpages des pâturages

Le plan de charge envisage l'achat de 3.000 têtes de Novembre à Janvier.

La capacité du feed-lot fait 1.000 têtes.

Les animaux doivent passer 21 jours minimum de quarantaine et 60 jours dans le feed-lot.

.../.....

Le secteur I ne devant pas être clôturé servira non seulement à nos animaux de quarantaine mais également aux animaux de la SOI-BEPEC, de la Mairie de Bamako et à ceux des villages environnants. La plus grande difficulté se rencontrera à ce niveau.

Le Secteur II sera divisé en 5 parcelles. Chaque parcelle sera sillonnée de sentier de collecte.

- La parcelle 1 a une superficie de 257 ha 61 dont 5 km 450 de pistes pouvant nourrir d'animaux.

- La parcelle 2 a une superficie de 688 ha 23 dont 7 km 520 de pistes pouvant entretenir d'animaux.

- La parcelle 3 a une superficie de 279 ha 58 dont 7 km 020 de pistes pouvant entretenir d'animaux.

- La parcelle 4 a une superficie de 246 ha 72 dont 5 km 980 de pistes pouvant entretenir d'animaux.

- La parcelle 5 couvrant une superficie de 213 ha 44 en zone hydromorphe pouvant entretenir d'animaux.

Les animaux devant s'abreuver au fleuve, il n'est pas à écarter que cette parcelle 5 soit pâturée

#### 511.- Clôture

La zone à clôturer a une superficie de l'ordre de 1 700 ha pour un périmètre de 13 km.

Cette clôture est indispensable pour l'exploitation rationnelle des pâturages.

En effet la clôture empêchera les bergers de faire paître les animaux étrangers.

Pour une raison d'économie nous utiliserons les poteaux de teck qui compléteront les troncs d'arbres et d'arbustes situés sur leur tracé au lieu et place des poteaux en béton dont le coût serait très élevé.

Compte tenu de la non résistance du bois aux intempéries la clôture en barbelé sera renforcée par une haie vive de sisal.

Cette clôture vive devra occuper une bande d'au moins 3 mètres circonscrivant la clôture de barbelé.

.../.....

Cela afin d'empêcher les bergers d'atteindre les barbelés qu'ils seront enclin à détruire.

Avant le développement des jeune sisals, la précaution à prendre serait d'utiliser 7 rangées de barbelés ce qui n'excluera pas le gardi'nnage.

L'agent forestier de Tienfala nous sera utile à cet effet.

Quand il sera question de remplacer le fauchage par l'exploitation directe des pâturages, la nécessité de faire une autre série de clôture s'imposera en vue de séparer la station en blocs soumis à une rotation.

Ces clôtures seront sommaires puisqu'il ne s'agira que d'organiser l'exploitation.

Pour la mise en place des clôtures tous comme pour les autres travaux nécessitant un piquetage (ouverture des pare-feux, tracé des pistes) le concours des étudiants de l'IPR pourra être demandé. Ce qui leur servira de travaux pratiques.

#### 512.- Pare-feux :

Les feux de brousse représentant le principal ennemi des pâturages dans nos régions, il sera impérieux d'installer un certain nombre de pare-feux.

#### 5120.- Pare-feux principal :

Dans le Secteur II, nous tracerons deux doubles pare-feux divisant la zone en 4 parcelles.

Chaque double pare-feux représente deux bandes de 6 mètres entièrement desso séparées par une bande de 50 mètres brûlés en feux précoces ou fauchée.

Ces pare-feux représentant une longueur de 6 km 400.

#### 5121.- Pare-feux périphériques :

Pour plus de sécurité, un double pare-feux de 6 mètres séparé par une bande 30 mètres sera exécuté sur tout le périmètre du Secteur soit une longueur de 13 km.

.../....

La clôture et la haie vive seront installées sur la bande extérieure

La bande intérieure servira également de piste de gardiennage.

#### 512.- Pare-feux du Secteur I :

Il a été constaté que les feux viennent tous les ans des collines du Nord. Pour sauver le secteur, l'installation d'un pare-feux s'impose. Il consistera soit à l'entretien du pare-feux longeant l'ancienne route Bamako - Koulikoro - ce qui impliquera la perte du riche pâturage à Andropogon emplencteus de la zone Nord-Est - soit à la création d'un pare-feux tout au long de l'ancienne piste Bamako-Koulikoro.

Si la deuxième solution est plus onéreuse, elle a l'avantage de garantir l'exploitation d'une superficie plus importante.

#### 513.- Pistes de collecte :

Ces pistes ont été tracées en fonction de celles déjà existantes. Ce qui a pour but principal d'anéantir le coût à l'exécution. Ils permettent de diviser le secteur en blocs ; facilitant ainsi la collecte du foin entroposé sur des perroquets.

Ces blocs serviront de base pour la rotation quand il sera admis le principe du pâturage direct - Ce qui d'emblée n'est pas à écarter étant donné qu'il est autorisé par l'arrêté de classement de la réserve.

Ces pistes intérieures représentent une longueur de 26 km environ.

#### 514.- Perroquets :

L'exploitation du feed-lot se faisant en pleine saison sèche, l'installation d'une série de perroquets par bloc évitera la construction des magasins à foin dont le coût serait très élevé (plus de 2 millions de francs maliens).

Le bois destiné à leur construction proviendra des abattis. Ainsi pour tout frais, nous n'aurons qu'à payer la main d'oeuvre.

.../....

## 515.- Abreuvoirs

### 5150.- Cas du feed-lot

Le feed-lot sera installé le plus près que possible du fleuve pour permettre aux animaux de s'y abreuver directement. Sa position est telle qu'il serait onéreux d'envisager le transport de l'eau par pompage.

Deux solutions peuvent être proposées :

- forage d'un puits munis de pompe
- faire abreuver directement les animaux au fleuve.

#### 51500 - Forage du puits

Dans ce cas, la proximité du fleuve pour l'installation du feed-lot n'aura d'autre raison que la probabilité d'atteindre le plus rapidement possible la nappe phreatique.

Il n'écartera pas l'installation du chateau d'eau et des tuyauteries de distribution.

Il a l'avantage de fournir l'eau courante au personnel et de reduire les frais de tuyauterie.

#### 51501 - Usage du fleuve

C'est la solution la moins onéreuse. Toutefois il nécessite plus de main-d'oeuvre (berger) et le problème du ravitaillement en eau du personnel se posera.

### 5151.- Cas de la zone de quarantaine :

Les animaux du Secteur I étant plus nombreux le problème de l'eau s'y posera avec plus d'acuité.

L'installation de barrages collinaires sur les marigots de Sala et de Nonoumonouba sera obligatoire. Il est douteux que ces barrages arrivent à satisfaire tous les besoins à savoir : entretenir les animaux de quarantaine, les animaux de la SOMBEPEC, les animaux de la Mairie de Bamako, les animaux des particuliers et couvrir les besoins du personnel.

Une partie du problème sera résolu quand les animaux étrangers au projet doivent utiliser les pare-feux peripheriques pour aller s'abreuver au fleuve.

.../...

Même dans ce cas il va falloir installer le parc de déparasitage le plus près possible de l'un des barrages collinaires (ancien emplacement de pépinière) et d'aménager l'amont des barrages.

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Contract No.: REDSO/WA-75-52

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C O N T R A C T

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Between

EXPERIENCE, INCORPORATED

and the

MINISTRY OF PRODUCTION  
GOVERNMENT OF MALI

For the

MALI LIVESTOCK PROJECT

TABLE OF CONTENTS

<u>Article Number</u>	<u>Page Number</u>
Article I - Statement of Work	1
Article II - Advisor Assignments	7
Article III - Level of Effort	8
Article IV - Period of Contract	9
Article V - Estimated Cost plus Fee	9
Article VI - Budget Exclusive of Fee	10
Article VII - Costs Reimbursable, Logistic Support to Contractor, Project Equipment & Construction Cost	11
Article VIII - Duties, Taxes & Assessments	14
Article IX - Procedure for Payment	15
Article X - Establishment of Overhead Rate	21
Article XI - Personnel Compensation	21
Article XII - General Provisions	
A. Audit and Records	24
B. Termination for Convenience	24
C. Default	26
D. Force Majeure	26
E. Arbitration	27
F. Status of Contractor	28
G. Ownership of Documents and Copyright	28
H. Amendment and Modification	28
I. Insurance	28
J. Subcontracts	29
K. Non-Discrimination	29
L. <b>Personnel</b>	29
M. Insurance of Motor Vehicles	31
N. Conflict of Interest	32
O. Scope of Contract	32
P. Notices	32
Q. Approval of AID	33
R. Assignment	34
S. Leave and Holidays	34
T. Allowances	36
U. Travel and Transportation	38
V. Limitation of Cost	46
W. Language of Contract	47
X. Changes	47
Y. Title to and Care of Property	48
Z. Orientation	48
Signatures and Witnesses	49

CONTRACT

This Contract is hereby made and entered into this 25<sup>th</sup> day of February 1975 between the Government of the Republic of Mali (Hereinafter called "GRM") and Experience Incorporated, a corporation duly organized and existing under the laws of the State of Minnesota, United States of America, with main offices at 1930 Dain Tower, Minneapolis, Minnesota (Hereinafter called the "Contractor").

WHEREAS, GRM is desirous that advisory and consulting services be rendered by the Contractor, and WHEREAS GRM hereby appoints the Contractor and the Contractor hereby accepts the appointment of the terms and conditions set forth, it is hereby agreed by and between the parties hereto as follows:

ARTICLE I - STATEMENT OF WORK

A. Objectives of the Contract

The objective of this contract is to provide a five-man residential advisory team, short-term specialists and home office support to give advisory, administrative, management and procurement services to GRM in the following areas, under the project known as the Mali Livestock Project.

1. Technical advice for expansion of livestock production by sedentary farmers in the Koulikoro and Douna regions;
2. Construction of, and technical advice for the operation of a feedlot in Segou with an annual capacity of 5,000 animals per year.
3. Clearing, seeding, construction of, and technical advice for the operation of the Doukolomba Park managed grazing area;
4. Construction of, and technical advice for the operations of a Tienfalla feedlot and managed grazing areas in Tienfalla with an annual capacity of 3,000 animals per year.

5. Procurement and placing-in-operation of vehicles and veterinary equipment and supplies;
6. Technical advice for the administration of a credit activity;
7. Overall project management, coordination and administration advice.

## B. Specific Tasks

More specifically, the Contractor shall furnish a field staff, home office support staff and short-term specialists to carry out the following tasks:

### 1. Phase I

a. Conduct of range surveys. The contractor will survey the Doukolomba Park and Tienfalla Forest managed grazing areas to determine location of the necessary fences, firebreaks, water ponds, quarantine areas, feed pens, storage sheds, quantity and quality of forage, associated equipment required, etc. Detailed written recommendations based on the surveys, including cost estimates, will be submitted to the GRM for review and approval.

b. Completion of feedlot designs. The contractor will review the results of an earlier design effort and will prepare detailed engineering plans for the construction of the two feedlots at Segou and Tienfalla Forest. Plans will include the size and location of all water, feed storage, cattle handling, quarantine, management and other facilities. They will also include detailed recommendations covering associated equipment required to operate the feedlots. Standards will be similar to or equivalent to good U.S. standards for similar facilities, having due regard for economical use of funds. All plans and written recommendations, including cost estimates, will be submitted to the GRM for review and approval. The Contractor will also prepare and submit plans for the construction of temporary feedlots on the sites.

c. Procurement of veterinary equipment and supplies. The Contractor will procure veterinary supplies and equipment based on a list prepared by the GRM in the amount of \$266,000. The Contractor will order the equipment and supplies, receive it in Bamako, unpackage and inspect it, place it in operation (e.g., in the case of vehicles), and arrange for its delivery to the Malian Veterinary Service for use in support of project livestock operations.

d. Procurement of materials, supplies, equipment and services for the feedlots and managed grazing areas. Upon approval by the GRM and AID of relevant plans, specifications and equipment lists, the Contractor will order the required materials, equipment and supplies. He will also subcontract for any local labor required to complete construction. ~~He will~~

He will receive the equipment, materials and supplies in Bamako, unpack and inspect it, place it in operation and deliver it to and install it in its proper project site.

e. Construction. Upon GRM approval of relevant plans and the arrival of necessary materials and equipment, the Contractor will construct the two feedlots (Sagou and Tienfalla), including two temporary feedlots on the sites, and the two managed grazing areas (Doukolomba Park and Tienfalla Forest) in accordance with the approved plans. In the case of Doukolomba Park, "construction" will include clearing the range of unnecessary brush and trees and reseeding it with high-quality forage grass

f. Credit activity. Working in the context of ECIBEV, with the GRM Ministry of Production and Finance, and with the Malian Development Bank, the Contractor will organize the system for administration of small loans to support purchases of seed, fertilizer and cattle in each of the direct livestock activities. This will include criteria for borrowing eligibility, interest rate schedules, evaluation of credit-worthiness, approval procedures

g. Organization of the sedentary farmers. Working in the context of ECIBEV and in close cooperation with the GRM Veterinary Service and the Peanut Corporation (Operation Arachides), the Contractor will review the existing lists of small farmers who have expressed willingness to participate in the program to fatten beef cattle for the meat market. The Contractor will organize the administration of fertilizer and seed purchase, cattle purchase, credit administration, livestock extension advice, and veterinary services required to initiate this activity in the Koulikoro area and in the Douna area

h. Project management advice. Working in close coordination with the GRM, the Contractor will provide overall project coordinating, scheduling and administrative advice for the successful and timely completion of the above preliminary activities and for the coordinated transition of the project to livestock production operations.

## 2. Phase II

a. Livestock Production Operations. The second major increment of work in the project is the provision of long-term administrative, and management advice to the GRM for the operation of each of the subproject activities described above in Phase I. It is recognized that certain portions of Phase II will begin before some Phase I subproject activities are completed.

3. Contractor personnel administration. The Contractor will be fully responsible for the administration, including housing, transportation, pay, etc., of his own personnel.

C. Composition of Field Team

The five-man field team provided under this contract shall consist of the following:

1. Team Leader
2. Animal Husbandry Specialist
3. Animal Husbandry Specialist
4. Livestock and Range Management Specialist
5. Small Farmer Credit Advisor

D. Contract Relationships

The Contractor's Team Leader will report directly to the Minister of Production or his designee. The primary supervision of the other field team members will be provided by the Team Leader. However, the other members will also work closely with and report to the head of GRM units with which they will be working. Team Leader will prepare, with the GRM, detailed arrangements for implementing this provision.

Since AID is financing the services of the Contractor under this contract, the GRM and the Contractor recognize that AID/Washington, REDSO/Abidjan and CDO/Bamako have a legitimate interest in the work of the Contractor. CDO/Bamako may make arrangements for special briefings, from time to time on progress and problems, by the Team Leader and make any other arrangements acceptable to GRM and the Contractor to implement this provision. Specific legal rights of AID are covered in Article XII Q of the contract.

## E. Reports

### 1. Monthly Reports

The Team Leader shall prepare and submit to GRM and CDO/Bamako two copies each of a brief monthly report in English and French on progress and problems encountered in carrying out the work of the field team under this contract. The report will be submitted within ten (10) days after the end of the month.

### 2. Annual Reports

Annual progress reports will be submitted shortly after the end of each 12-month period. These reports will be prepared by the field team and reviewed by the Contractor's senior home office staff. These reports will include achievements, problems, and objectives for the next 12 month-period. Ten copies in French and one (1) in English will be submitted to the GRM and three copies each in English to AID/Washington, REDSO/Abidjan and CDO/Bamako. Annual reports shall be submitted within sixty (60) days following the end of each 12-month period.

### 3. Final Reports

The Contractor will prepare and submit to the GRM and to AID a final report on activities under this contract. The report shall provide a discussion of the activities of the team and a discussion of the progress of the Project, along with recommendations of the Contractor for future GRM activities and further foreign assistance if considered desirable. The report will be due not less than ninety (90) days following the completion of field services or termination of this contract, unless termination is under conditions of force majeure as described in Article XII D of this contract in which case

this report will be due within six (6) months following such termination. Ten copies of the final report in French and one (1) in English will be submitted to the GRM and three copies each in English to AID/Washington, ~~REDSO~~/Abidjan and CDO/Bamako.

4. Reports of Delay

The Contractor agrees to immediately alert the GRM and CDO/Bamako of any event that may cause a delay in meeting the objectives of this contract.

F. Project Review Meeting

1. In order to complete the work of this contract as scheduled, the parties to this contract have agreed to estimated completion dates of a series of related sub-projects under the contract. The sub-projects and estimated completion dates are shown on Exhibit A dated February 21, 1975 attached hereto and incorporated into this contract.

2. At the end of a calendar quarter, the parties to this contract and CDO/Bamako shall meet to discuss the Contractor's progress in meeting the estimated completion dates on the sub-projects as described in Paragraph A above. In the event that the Contractor has failed to meet any of the estimated completion dates, he shall be prepared to explain fully the reasons for such failure.

3. During the meeting the participants shall agree on any changes to the estimated completion dates for sub-projects. If changes are required, Exhibit A will be deleted and a revised Exhibit A will be incorporated into the contract by amendment.

ARTICLE II - ADVISOR ASSIGNMENTS

A. The Contractor shall undertake to supply the services of the following persons for the field team positions indicated:

- |  |                   |
|--|-------------------|
| 1. Team Leader                             | Raleigh Yugas     |
| 2. Animal Husbandry Specialist             | Henry Van Blake   |
| 3. Animal Husbandry Specialist             | Warren C. Putman  |
| 4. Livestock & Range Management Specialist | James F. D'Amelio |
| 5. Small Farmer Credit Advisor             | Larry W. Harms    |

B. The personnel specified above are considered to be essential to the work being performed hereunder. Prior to diverting any of the specified individuals to other programs, the Contractor shall notify the GRM reasonably in advance and shall submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on the program. No diversion shall be made by the Contractor without the written consent of the GRM and AID; provided, that the GRM may ratify in writing such diversion and such ratification shall constitute the consent of the GRM required by this clause. The listing of personnel may, with the consent of the contracting parties, be amended from time to time during the course of the contract to either add or delete personnel, as appropriate.

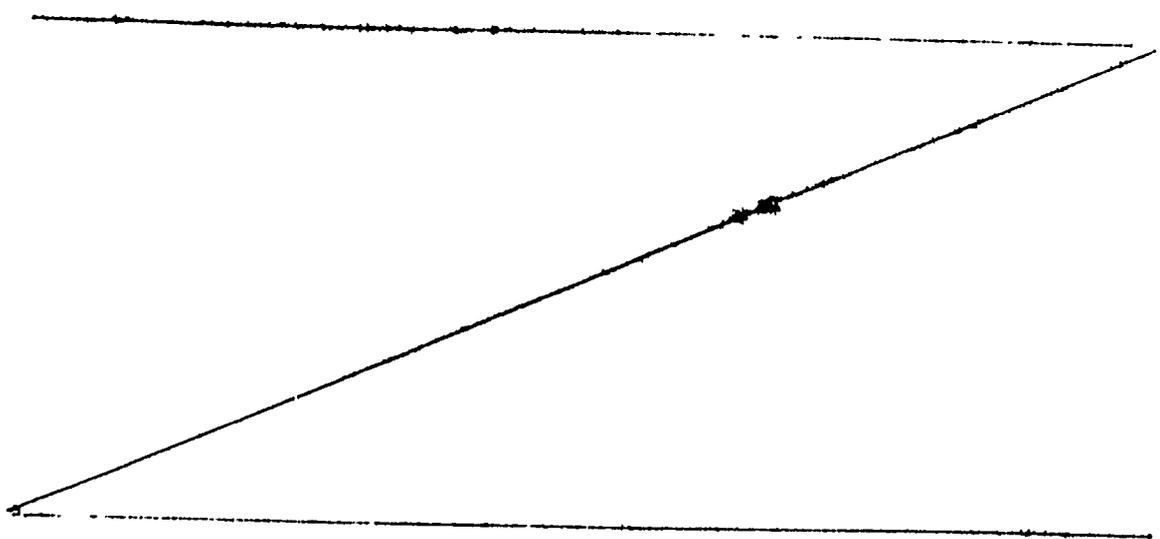
C. In the event the Contractor is required to replace any advisor under this contract, the Contractor agrees to provide biographical data and salary history to the GRM. No replacement advisor will be sent to Mali without the written approval of the GRM.

ARTICLE III - LEVEL OF EFFORT

A. The level of effort for the performance of this contract shall be approximately 220 total man-months of direct labor.

B. The estimated composition of the total man-months of direct labor is as follows:

<u>Permanent Field Team</u>	<u>Man-months</u>
Team Leader	48
First Animal Husbandry Specialist	48
Second Animal Husbandry Specialist	19
Range Management Specialist	48
Credit Specialist	<u>42</u>
	205
 <u>Short-Term Personnel</u>	
Land Clearing Specialist	2
Feedlot Design Specialist	2
Administrative Specialist	3
Home Office Procurement Specialist	4
Home Office Supervision	2
Field visits, home office personnel	<u>2</u>
	<u>15</u>
 Total	220



Article IV - PERIOD OF CONTRACT

- A. The effective date of this contract shall be the date of the final signature hereunder. Work by the Contractor shall start upon Contractor's receipt of the Letter of Credit called for in Article IX hereof.
- B. The estimated completion date of this contract is June 30, 1979.

Article V - ESTIMATED COST PLUS FIXED FEE

- A. The total estimated cost of this contract to GRM, exclusive of the fixed fee, is \$ 2,476,340
- B. The fixed fee is \$ 78,200

The fee stipulated herein is based upon the estimate that the services to be performed hereunder will require 220 man-months of time. In the event that the total man-months of service performed are less than 205 then the fee due and payable to the Contractor upon completion of the work hereunder shall be adjusted downward by \$ 355..... for each man-month less than 220 man-months of service provided. In the event that man-months in excess of 225 are required, the parties hereto agree to negotiate an equitable adjustment in the fee, provided however, that such negotiation shall only relate to those man-months in excess of 225 performed and provided further that the Contractor shall not exceed the 220 man-month limitation without the prior written approval of the GRM. Failure to agree on such equitable adjustment shall be treated as a dispute under the provisions of Article XII Section E of the contract.

C. The amount obligated for payment to the Contractor is \$ 2,554,540

Article VI - BUDGET EXCLUSIVE OF FIXED FEE

A. Dollar Budget

The following budget sets limitations for reimbursement of dollar costs for individual line items exclusive of fixed fee. Without prior written approval of the GRM, the Contractor may not exceed the grand total set forth in the budget hereunder.

<u>Category</u>	<u>Budget Amount</u>
1. Personnel costs, including allowances	645,705
2. Travel, transportation and storage	159,505
3. Other direct costs	58,760
4. Project operating costs	312,000
5. Overhead	345,570
6. Contractor equipment and supplies	96,800
	SUB TOTAL
	1,627,340
7. Project equipment and construction	849,000
	TOTAL
	2,476,340

B. Deviations to budget amounts

The Contractor may vary the amounts expended in any line item by not more than 15%. In the event the Contractor has reason to believe that costs for any line item will exceed 15% of the amount provided for that line item, the Contractor shall so notify the GRM and CDO/Bamako in writing. The Contractor shall not exceed any line item by more than 15% until the GRM shall have provided written approval to the Contractor to do so.

Article VII - COSTS REIMBURSABLE, LOGISTIC SUPPORT TO CONTRACTOR, PROJECT  
EQUIPMENT AND CONSTRUCTION COSTS

A. Contract Costs, Dollar and Local Currency

The GRM shall reimburse the Contractor in U.S. dollars within the budgetary limitations of Article VI and the allowable provisions of this contract for the actual costs of :

1. Salaries, Differentials, Allowances, Overhead and Fees.
2. U.S. and international transportation and travel costs.
3. Medical expenses, including inoculations, local treatment and travel expenses associated with medical evacuations.
4. Education allowances for school age dependents.
5. Transportation of household effects and baggage.
6. Storage of household effects.
7. Field equipment and miscellaneous manufactured articles necessary to performance of the work if not furnished by GRM, provided that title to such equipment will be in the name of GRM.
8. Other direct costs such as Workmen's Compensation Insurance, F.I.C.A., passports, visas, pre-departure and terminating medical examinations, preparation of reports, lump sum leave payments, and miscellaneous expenses.
9. Housing and utilities, household furniture and equipment (stoves, refrigerators, air-conditioners, water heaters, etc.) and any required maintenance on housing.

10. Official transportation vehicles, drivers, maintenance, fuel, etc. in Mali.
11. Standard local support services such as passports, visas, drivers licenses, ID cards, and road passes.
12. Per diem allowance at standard AID rates covering temporary lodging for personnel and dependents while awaiting housing or on departure in Mali.
13. Local official travel and per diem at standard AID rates for official travel of personnel and dependents within Mali.
14. Per diem at standard AID rates during their stay in Mali of home office supervisors and short-term specialists.
15. Authorized third country travel and transportation costs.
16. Local medical services for the Contractor's personnel and dependents.
17. Office space, necessary office machines and equipment including typewriters, calculators, desks, file cabinets, etc.
18. Secretarial services, translation and other office help.
19. Interpreters and other normal administrative support.
20. Project equipment and construction materials (feedlots and managed grazing areas).
21. Other direct costs which are neither specified herein nor specifically excluded by other provisions of the contract, provided that such costs are reasonable and necessary in the performance of this contract.

NOTE: Determination that the costs described in this Article VII are reasonable, allocable and allowable shall be made pursuant to the AID Manual Order specified in Article XII-B-5 hereof.

It is further intended and agreed by both parties that the level of accommodations, office space and other local support utilized by the Contractor's personnel shall be equivalent to that provided to USG technical assistance personnel in Mali.

**B. Source and origin**

1. All goods and services procured by Contractor for purposes of this contract must be of U.S. or AID Geographic Code 941 country origin ("Selected Free World" countries, hereinafter referred to as "941 countries"), except where AID authorizes other countries of origin.
2. Procurements in Mali which are less than \$2500, and are for materials (regularly available and normally sold on the local market) which are to be consumed or expended in the performance of this contract are exempt from the limitation of paragraph B.1 above; provided, however, in no event shall the Contractor purchase, pursuant to this paragraph B.2, any materials from other than free world countries as described in AID Geographic Code 935.

**C. Medical Facilities**

In implementation of subsection A.16 above, as soon as possible following the arrival of the Team Leader in Mali, the Team Leader and Project Manager will jointly select a doctor of medicine resident in Mali to be appointed to serve as the contract Team doctor. The doctor so appointed shall provide the following

services to the Contractor's expatriate personnel in Mali.

Immunization and certification, on behalf of the GRM, of the necessity for medical evacuation as provided in Article XII-U-8, ii (I) and (II) of this contract.

The necessary costs of providing the services called for above will be a reimbursable cost under this contract.

Article VIII - DUTIES, TAXES AND ASSESSMENTS

- A. If AID and any public or private organization furnishing commodities through AID financing for operations hereunder is under the laws, regulations or administrative procedures, liable for customs duties and import taxes on commodities imported into Mali for purposes of carrying out this Grant Agreement, the Republic of Mali will pay such duties and taxes unless exemption is otherwise provided by an applicable international agreement.
- B. If any personnel (other than citizens and permanent residents of the Republic of Mali) whether United States Government employees, or employees of public or private organizations under contract with AID, or any agency authorized by the GRM, who are present in Mali to provide services which AID has agreed to furnish or finance under this Grant Agreement, are under the laws, regulations, or administrative procedures of the Republic of Mali (i) liable for income and social security taxes with respect to income upon which they are obligated to pay income or social security taxes to the Government of the United States, (ii) liable for property taxes on personal property or any tariff or

duty upon personal or household goods (including one personal vehicle per family), brought into Mali for their personal use, the Government of Mali will pay such taxes, tariff, or duty unless exemption is otherwise provided by any applicable international agreement.

Article IX - PROCEDURE FOR PAYMENT

- A. The GRM will establish or cause to be established a confirmed irrevocable letter of credit in the amount of \$ 2,554,540 in the name of Experience Incorporated at the Chase Manhattan Bank, New York, N.Y., U.S.A., hereinafter called "the Bank". In establishing this letter of credit, the GRM shall designate the person or persons authorized to execute the Certificate of Performance and Exceptions specified in Section E of this article, and shall specify the procedures to be followed for the designation of substitutes for such authorized persons.
- B. Failure of GRM to carry out the actions specified in Section A of this article shall be conclusive evidence of default of this contract. In the event of such default, the Contractor shall have the option to terminate this contract at any time before such default is remedied. In the event of termination, the liability of GRM shall not be limited to the amount of any letter of credit outstanding at the time of termination.
- C. The letter of credit specified in Section A of this article shall contain the following provisions :

1. Payment of 85 percent of the total amount billed each month shall be promptly paid to the Contractor against presentation to the Bank of documentation specified in Section D of this article.
2. Payment of the remaining 15 percent will be made against the documentation specified in subsection 6 of the section and Section E of this article.
3. Billings for termination costs in the event of termination shall be treated as set forth in Subsection 1 and 2 of this Section.
4. In the event that GRM takes exception to any invoiced items, the amount or amounts involved will be stated in the Certificate of Performance and Exceptions as specified in Subsection 6 of this Section and Section E of the article so that amounts not affected by such exceptions can be paid out of the 15 percent withheld.
5. If the amount objected to by GRM is in excess of 15 percent, that excess amount should be deducted from subsequent monthly bills of the Contractor.
6. Failure by GRM to furnish a proper Certificate of Performance/ Statement of Exceptions to the Bank within 15 days of the date set forth in Section D shall be interpreted as acceptance of the invoice as correct, and the retained 15 percent shall be paid to the Contractor at the end of the period.
7. Any amounts not paid due to exceptions by GRM shall be paid by the Bank upon subsequent certification by GRM or upon submission of an arbitration award made pursuant to Article XII E.

- b. All expenses of establishing and servicing the letter of credit will be borne by GRM.
- D. Once each month or more frequently as may be reasonable for specific costs the Contractor shall submit by registered mail to the Bank and GRM its billings including supporting documentation specified below. Each document shall identify the contract under which payment is sought. Documentation required for payment under this contract shall consist of the following :
1. Voucher  
An original and three copies of a completed voucher (Standard Form 1034).
  2. Contractor's Invoice  
One copy or photostat describing the services performed, the period of performance, and identifying this contract. Such invoice shall cover costs incurred during the present and any prior billing period and shall include personnel costs, allowances, travel and transportation, other direct costs, overhead, equipment and materials, and a pro-rata share of the fixed fee based on the proportion of man-months expended during the billing period to the total man-months in the contract.
  3. Contractor's Certificate and Agreement  
An original and two copies of the AID Contractor's Certificate and Agreement (Form AID 1110-3) executed by the Contractor. The Contractor shall, in addition, submit to the Bank a copy of the registration

receipt for the letter containing the documentation sent to GRM. The date shown on such registration receipt shall be determinative for the purposes of Section C.6. of this article.

- E. The GRM shall designate the person or persons authorized to sign a Certificate of Performance and Exceptions, and shall cause such person promptly to prepare and execute such certificate for each of the Contractor's claims for payment as follows:

"The undersigned certifies that (a) the services for which reimbursement is requested have been satisfactorily rendered: (b) the amounts thereof are proper and due in accordance with the terms of the contract: (c) any reports or recommendations required under the terms of the contract have been received and are in accordance with the terms of the contract; subject to the following specific exceptions (if any).

SIGNED \_\_\_\_\_  
\_\_\_\_\_

- F. The GRM shall send copies of the Certificate of Performance and Exceptions, together with copies of the documentation specified in Section D of this article, to the Bank and to the Contractor.

- G. A final voucher for direct and indirect costs and fee during the final period of the contract shall be submitted by the Contractor promptly following completion of the work under this contract but in no event later than 120 days (or such longer period as the GRM may in its discretion approve in writing) from the date of such completion. This final voucher does not include any adjustment in indirect costs that may be due pursuant to Article X of the contract.
- H. The person designated by the GRM, pursuant to paragraph E above, to sign certificates of performance shall sign the following certificate for the final invoice :

"The undersigned certifies that the services for which final payment is invoiced meets in all respects the specifications prescribed in the covering contract, and the amount invoiced is properly due and payable under the terms of the contract.

SIGNED \_\_\_\_\_

\_\_\_\_\_ "

Distribution of this certificate shall be made in accordance with paragraph F. above.

- I. Contractor agrees that any refunds, rebates, credits, or other amounts (including any interest thereon) accruing to or received by Contractor under this contract shall be paid by Contractor to the GRM to the extent that they are properly allocable to costs for which Contractor

has been reimbursed by GRM under this Contract. Reasonable expenses incurred by Contractor for the purpose of securing such refunds, rebates, or other amount shall be allowable costs hereunder when approved by the GRM. Prior to final payment under this Contract, Contractor shall execute and deliver:

- (a) an assignment to the GRM, in form and substance satisfactory to the GRM, of refunds, rebates, credits or other amounts (including any interest thereon) properly allocable to costs for which Contractor has been reimbursed by the GRM under this contract; and
- (b) a release discharging the GRM, its Officers, agents, and employees from all liabilities, obligations, and claims arising out of or under this contract, subject only to the following exceptions :
  - (i) Specified claims in stated amounts or in estimated amounts where the amounts are not susceptible of exact statement by contractor;
  - (ii) Claims, together with reasonable expenses incidental thereto based upon liabilities of Contractor to third parties arising out of the performance of this contract; provided that such claims are not known to Contractor on the date of the execution of the release; and provided further that Contractor gives notice of such claims in writing to the GRM not more than six (6) years after the date of release or the date of any notice to Contractor that the GRM is prepared to make final payment whichever is earlier.

Article X - ESTABLISHMENT OF OVERHEAD RATE

Pursuant to the provisions of the clause of this contract entitled "NEGOTIATED OVERHEAD RATES", rates shall be established for the initial period beginning on the effective date of this contract and ending December 31, 1975. Pending establishment of final overhead rates for the initial period, provisional payments on account of allowable indirect costs shall be made on the basis of the following negotiated provisional rates applied to the base(s) which are set forth below:

<u>Billing Rate</u>	<u>Maximum Rate</u>	<u>Base</u>	<u>Period</u>
60%	65%	Direct Field Salaries	Through Dec. 1975
100%	10%	Direct Home Office Salaries	Through Dec. 1975

During the period described above, the Contractor will use the billing rate for all invoices for payment. After agreement by the parties to the actual rate to be applied during this period, the Contractor may invoice for any additional overhead that may be payable or will provide a credit if excessive overhead has been paid. However, in no event shall the CM be liable for overhead costs in excess of the maximum percentage of salaries specified above.

Article XI - PERSONNEL COMPENSATION

A. Limitations

Compensation of personnel which is charged as a direct cost under this Contract is subject to the following understanding which set limits on items which otherwise would be reasonable, allocable and allowable:

1. Approvals

Salaries and wages may not exceed the Contractor's established policy and practice, including the Contractor's established pay scale for

equivalent classification of employees, which will be certified to by the Contractor nor may any individual salary or wage, without approval of the GRM, exceed the employee's current salary or wage or the highest rate of annual salary or wage received during any full year of the immediately preceding three years. However, the Contractor is authorized to provide a ten (10) percent increase as an overseas incentive. The ceiling on reimbursable salaries and wages paid to a person employed directly under this contract is \$36,000 per year. The GRM hereby approves the salaries for the technicians specified in Article II hereof in the amount specified in the Contractor's proposal dated December 9, 1974, in response to the GRM's Request for Proposal dated September 9, 1974.

2. Salaries During Travel

Salaries and wages paid while in travel status will not be reimbursed for a travel period greater than the time required for travel by the most direct and expeditious air route, as defined in Article XII, U. 1 of this contract.

3. Return of Overseas Employees

Salaries and wages paid to personnel serving overseas who are discharged by the Contractor for misconduct or malperformance will in no event be reimbursed for a period which extends beyond the time required to return him promptly to his point of origin by the most expeditious air route plus accrued vacation leave, if any.

4. Merit or Promotion Increases

Merit or promotion increases of not to exceed five (5%) percent may be granted to Contractor personnel serving in Mali after completion of each 12 months of satisfactory service under the contract.

5. Third Country and Cooperating Country Nationals

No compensation for third country or Malian nationals will be reimbursed unless their use under the contract is authorized by GRM nor will their rates of compensation exceed that normally paid for such services in Mali. GRM hereby authorizes the use of the following numbers and types of personnel under this contract: one administrator, one assistant administrator; one secretary; five drivers; and 1 general office helper. Furthermore, the GRM recognizes the need to use Malian or third country contractors (land clearing feedlot construction, etc.) and hereby agrees to authorize their use expeditiously.

6. Work Week

The work week for the Contractor's overseas personnel shall be scheduled to coincide with the work week for those employees of GRM associated with the work of this contract. Reimbursement for overtime and/or travel time, i.e., either or both in excess of the regular work week, is not authorized under this contract for expatriate personnel. Contractor shall maintain in Mali an accurate record of days worked and maintain leave records.

B. Definitions

As used herein, the terms "Salaries", "Wages", and "Compensation" mean the periodic remuneration received for professional or technical services rendered exclusive of overseas differential and other allowances associated with overseas services, except as otherwise stated. The term compensation includes payments for personal services (including fees and honoraria). It excludes earnings from sources other than the individual's professional or technical work, overhead and other charges.

Article XII - GENERAL PROVISIONS

A. Audit and Records

1. The Contractor shall maintain books, records, documents, and other evidence involving transactions related to this contract in the same manner as consistently maintained for Contractor's other business.

2. The Contractor's records shall be subject at all reasonable times to inspection and audit by AID and/or by an auditor acceptable to GPM for a period of three (3) years after final payment under this contract.

3. The Contractor shall preserve and make available his records until the expiration of three years from the date of final payment under this contract.

4. If this contract is terminated for any reason, the records relating to the work terminated shall be preserved and made available to GPM or AID upon request for a period of three years from date of any resulting final settlement between GPM and the Contractor.

5. The Contractor agrees to provide for these same rights to review the books and records of any subcontract issued under this contract.

B. Termination for Convenience of GPM

1. The performance of work under this contract may be terminated, in whole or from time to time in part, by GPM whenever for any reason the GPM shall determine that such termination is in the best interest of GPM. Termination of work hereunder shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which performance of work under this contract is terminated and the date upon which said termination becomes effective.

2. If at any time during the operation of this contract GPM shall fail to provide payment as provided in Article IX of this contract, then

The Contractor may serve notice in writing to GPM requiring it to take remedial action by a specified date. If GPM shall fail to comply by such specified date, the Contractor may terminate its work under this contract and such termination shall be deemed a termination for convenience of GPM and settlement shall be governed accordingly.

3. The Contractor shall submit his termination claim to the GPM promptly after receipt of a Notice of Termination, but in no event later than ninety (90) days, or one (1) year in the case of force majeure, from the effective date thereof, unless one or more extensions in writing are granted by the GPM upon written request of the Contractor within such period or authorized extension thereof. Upon failure of the Contractor to submit his termination claim within the time allowed, the GPM may determine, on the basis of information available to it, the amount due to the Contractor by reason of the termination and shall thereupon pay to the Contractor the amount so determined.

4. The Contractor's termination claim shall include all costs which are reasonable and equitable under the circumstances of this termination.

5. Any determination of costs under the above Paragraph 4 shall be governed by the policies set forth in Article XII. E. below and the cost principles set forth in USID Manual Order 1442.4, "Cost Principles Guidelines for Borrower/Grantee Contracts" as in effect on the date of this Agreement.

6. The Contractor agrees that all documents, statistics, reports or records prepared by Contractor personnel, shall at the conclusion of this contract or earlier termination thereof, remain in the custody of GPM.

7. Any disputes as to questions of fact which may arise hereunder shall be subject to the arbitration clause of this contract.

C. Default

1. If at any time during the operation of this contract the Contractor shall, in the judgment of the GRM have failed to carry out the requirements of this contract, then the GRM may serve notice upon the Contractor with respect to any such default requiring him to take remedial action by a specified date.

2. If the Contractor:

- a. shall fail to comply with any requirement of such notice as specified in Section 1 above to the satisfaction of GRM;
- or
- b. shall comply with the requirements of such to the satisfaction of GRM but shall again be served with a notice for violation of Section 1 of the Section; or
- c. shall become bankrupt or insolvent or shall compound with or make any assignment for the benefit of his creditors; or
- d. shall be dissolved or go into liquidation,

the GRM at once, without prejudice to any other rights or remedies, by notice in writing terminate the employment of the Contractor under this contract.

D. Force Majeure

Force Majeure means unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, or the public enemy, acts of the U.S. Government, acts or failures to act on the part of the Government of Mali in its sovereign or contractual capacity, exercised either directly or through organizations it owns or controls, acts of another Contractor in the performance of a contract with the said Government, floods, epidemics,

quarantine restrictions, strikes, freight embargoes, and unusually severe weather.

In the event of force majeure the Contractor shall continue as far as is reasonably practicable under the specific circumstances to undertake and perform the duties set forth in this contract and in accordance therewith. It is understood that the Contractor is entitled to payment for the services of its personnel during period of force majeure as if such service had otherwise been rendered under the provisions of this contract.

E. Arbitration

Any dispute arising under this contract shall be decided by the Minister of Production who shall reduce his decision to writing and deliver the same to the Contractor within 30 days of receipt from the Contractor of a written notice and statement giving details of the dispute and requesting the decision of the GRM thereon. The decision of the GRM shall be final and conclusive unless within 30 days from the date of receipt thereof the Contractor shall deliver to GRM notice of its intention to submit the dispute to arbitration.

Where disputes are submitted to arbitration the parties agree to accept the decision of the arbitrators as final and binding on both parties. Each party shall have the right to appoint one arbitrator. The two arbitrators so appointed shall select a third arbitrator acceptable to the two appointed arbitrators. No arbitrator shall be of the same nationality of any of the parties of this agreement.

Arbitration shall be conducted at a site determined by the arbitrators, in accordance with the Rule of Conciliation and Arbitration of the International Chamber of Commerce, and judgment upon the award rendered may be entered in any court having jurisdiction thereof. The above mentioned site will be neither Mali nor the United States.

F. Status of Contractor

In all work and at all times covered by this contract the Contractor shall maintain his status as an independent contractor and shall exercise complete control over personnel assigned to this project. The Contractor and his personnel shall conform to all applicable laws and regulations of the Government of Mali as applied to a foreign citizen and shall promptly correct any violations thereof called to its attention.

G. Ownership of Documents and Copyright

All documents prepared by the Contractor in connection with this contract and the project are the property and copyright of GRM and the Contractor shall not be entitled, either directly or indirectly, to make use of such documents for the carrying out of any work beyond the work to which this contract relates without prior approval of GRM.

H. Amendment and Modification

No modifications or amendments shall be made to this contract except as may be mutually agreed upon in writing, by the Contractor, the GRM and approved by AID.

I. Insurance

1. The Contractor shall provide and thereafter maintain Workmen's Compensation Insurance, or other security, with respect to and prior to the departure for overseas under this contract of all personnel who are hired in the United States or who are American citizens or bona fide residents of the United States.

2. The Contractor shall further provide for all personnel who are nationals or permanent residents of the country in which services are being rendered, if the contract authorized their employment, security for compensation benefits pursuant to the applicable law of such country for injury

or death in the course of such employment or in the absence of such law, employer's liability insurance. For all other authorized personnel not hired in the United States or who are not American citizens or bona fide residents of the United States, Contractor shall provide the necessary liability insurance.

3. The Contractor is required to maintain public liability insurance in amounts of not less than US \$50,000. Such insurance shall be with a recognized Italian or American Insurance Company and the cost of such insurance is a reimbursable expense under this contract.

4. Inasmuch as the Contractor shall be operating project vehicles under the terms of this contract, Contractor shall maintain insurance on such vehicles in the same manner as prescribed in Article XII. M. The cost of such insurance is a reimbursable expense under this contract.

J. Subcontracts

The Contractor is authorized to enter into subcontracts for any portion of the work covered by this contract, within the limits of Article VI of this contract. Such subcontracts shall, however, be subject to approval by GRM and AID. The subcontract between Experience Incorporated and Checchi and Company is attached hereto and hereby approved by GRM.

K. Non-Discrimination

The Contractor shall refrain from discrimination in employment of U.S. nationals due to race, color, creed, religion, sex or national origin, and will provide U.S. nationals with equal opportunity employment.

L. Personnel

1. Biographical Data

Contractor agrees to furnish to the GRM biographical information on all personnel to be employed in the performance of the contract.

2. Physical Fitness of Employees and Dependents

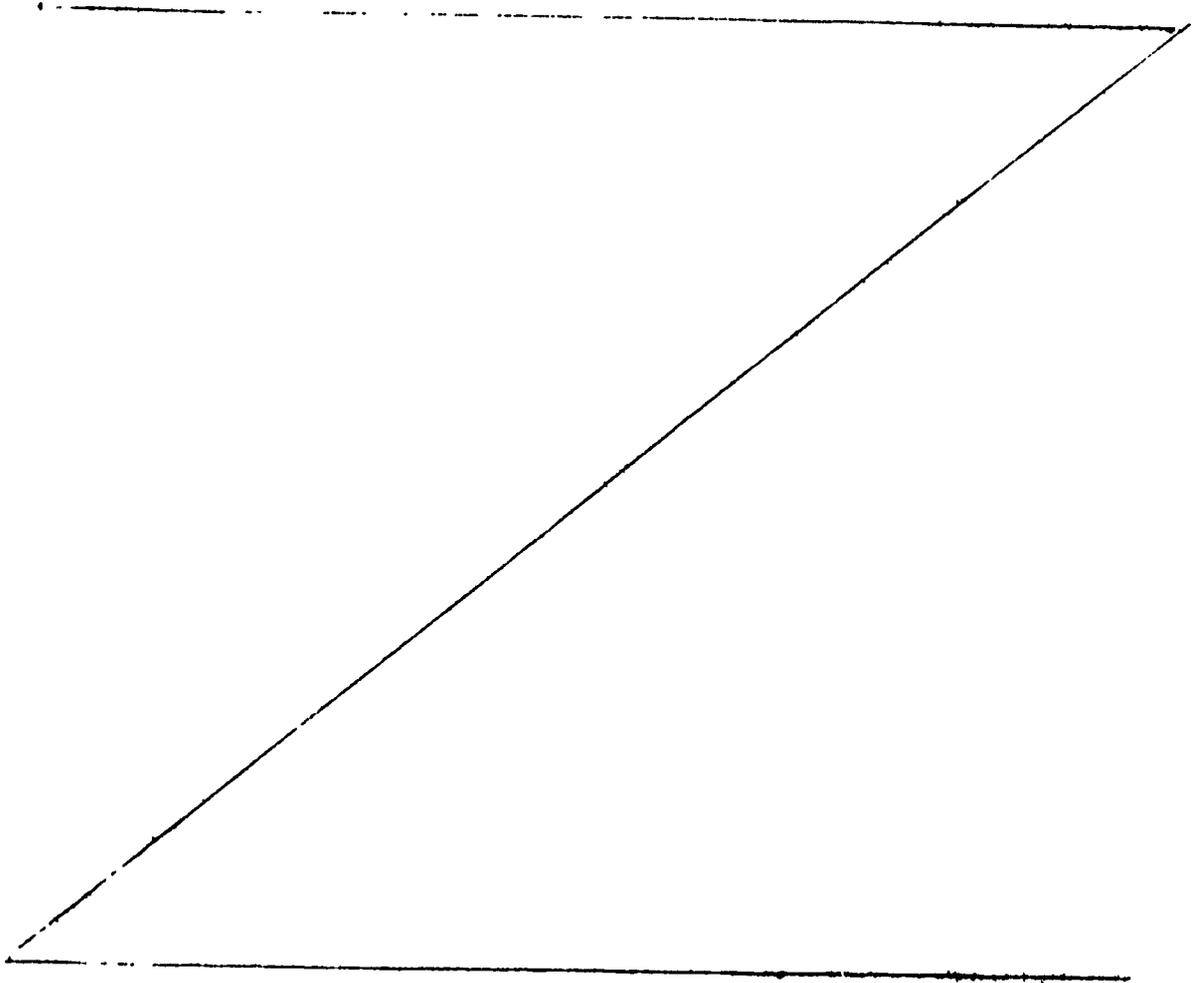
Contractor shall exercise reasonable precautions in assigning personnel for work under this contract in Mali to assure that such personnel are physically fit for work and residence in Mali. In carrying out this responsibility, Contractor shall require all such personnel (other than those hired in Mali, and their dependents authorized to accompany such personnel to be examined by a licensed doctor of medicine. Prior to their departure for Mali, the Contractor shall require the doctor to certify that, in the doctor's opinion, the staff member is physically qualified to engage in the specific duties and the staff member and authorized dependents are physically qualified to reside in the country to which the staff member is recommended for duty. If Contractor has no such medical certificate on file prior to the departure for Mali of any staff member and such staff member is unable to perform his specific duties and complete his tour of duty because of any physical disability (other than physical disability arising from an accident while working under this contract), the Contractor shall be deemed to have failed to exercise due care and will be required to pay all costs associated with replacement of the personnel concerned.

3. Right to Recall

After consultation by the GEM with the Contractor and on the written request of the GEM, the Contractor will terminate the employment under this contract of any individual serving hereunder. Under the provisions of this Subsection the Contractor will have 90 days to provide a suitable replacement, who must be approved by the GEM. Travel, transportation and related costs incident to such replacement will be reimbursed to the Contractor under this contract. Any dispute concerning the existence of cause shall be subject to arbitration under the provisions of Section E of this Article.

M. Insurance of Motor Vehicles

If Contractor or any of its personnel or their dependents transport or cause to be transported privately owned motor vehicles to Mali, or if they or any of them purchase a motor vehicle within Mali, such vehicle will be covered by an insurance policy issued by a reliable company providing the minimum coverages or such other coverages as may be set by local law. The cost of such insurance shall be borne by the individual.



**N. Conflict of Interest**

Other than work to be performed under this contract for which an individual is assigned by the Contractor, no such personnel of the Contractor shall engage during the period of his employment under this contract, directly or indirectly, either in his own name or in the name or through the agency of another person, in any business, profession or occupation in Mali or other foreign countries to which he is assigned and he will refrain from participation in any political, social or religious disputes.

**O. Scope of Contract**

This contract shall constitute the entire agreement between the parties hereto and shall supersede all prior agreements and negotiations between the parties whether written or oral prior to the effective date of this contract.

**P. Notices**

Any notice given by any of the parties hereunder shall be sufficient and binding only if in writing and delivered in person or sent by telegraph, cable or registered mail, postage prepaid, addressed as follows:

TO GRM:                   Ministry of Production  
                              B.P. 61  
                              Bamako, Mali

Note: Any change in the address shall be announced by registered letter to all parties concerned.

TO CONTRACTOR:       Experience Incorporated  
                          1930 Dain Tower  
                          Minneapolis, Minnesota 55402  
                          ATTN: Kenneth E. Holt

or to such other address as either addressee shall designate by notice given as herein required. Notices given hereunder shall be effective when received.

Q. Approval of AID

The parties hereto understand that AID has reserved certain approval rights including, but not limited to, the right to approve the terms of this contract, the Contractor, and any or all plans, reports, specifications, subcontracts, bid documents, drawings, or other documents related to this contract and the project of which it is part. The parties hereto further understand and agree that AID, in reserving any or all of the foregoing approval rights, has acted solely as a grantor to assure the proper use of United States Government funds, and that any decision by AID to exercise or refrain from exercising these approval rights shall be made as a grantor in the course of financing this project and shall not be construed as making AID a party to the contract. The parties hereto understand and agree that AID may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the project of which this contract is part, with the parties jointly or separately, without thereby incurring any responsibility or liability to the parties jointly or to any of them.

Any approval (or failure to disapprove) by AID of any plan, report, specification, contract, bid document, drawing or other documents shall not bar GRM or AID from asserting any right, or relieve the Contractor of any liability which the Contractor might otherwise have to GRM or AID, because of such plan, specification, contract, bid document, drawing or other document, or any performance thereunder, or any AID contractor's or supplier's certificate.

R. Assignment

This contract shall not be assigned without prior written approval of the GRM and AID.

S. Leave and Holidays

1. Vacation Leave

Contractor may grant to personnel assigned under this contract vacations of reasonable duration in accordance with Contractor's usual practice, but in no event shall vacation leave be earned at a rate exceeding 26 working days per annum. It is understood that vacation leave is provided under this contract primarily for the purpose of affording necessary rest and recreation to regular personnel during their tours of duty in Mali. The Contractor will use its best efforts to arrange that earned vacation leave will be used for the above stated purpose during the tour of duty unless the interest of the project dictates otherwise. Lump sum payments for vacation leave earned but not taken may be made at the end of an individual's service under the contract, but

shall not exceed an amount equivalent to 26 days earned vacation leave.

Notwithstanding the foregoing, if the Team Leader and the GRM decide that it is in the best interests of the project to do so, he may schedule some or all of an individual's remaining days of earned vacation for a period ending on the final day of this scheduled assignment in Mali. Under such circumstances, the individual may leave Mali at the start of such vacation period and the vacation may be charged as if the individual were present in Mali on the last day of his assignment. The assignment of each of the members of the expatriate staff shall be deemed to end on the date shown on Exhibit A unless the parties to this Contract shall mutually agree in writing on other termination dates for specific individuals.

2. Sick Leave

Sick Leave may be granted in accordance with the Contractor's usual practice but not to exceed 13 working days per annum. Additional sick leave after use of accrued vacation leave may be advanced in accordance with Contractor's usual practice, if in the judgment of the Contractor, and with the prior approval of the GRM, it is determined that such additional leave is in the best interest of the project. In no event shall additional leave exceed 30 calendar days. Contractor agrees to reimburse GRM for leave used in excess of the amount earned

during the regular individual's assignment under this contract.

Unused sick leave is not reimbursable under this contract.

3. Holidays

The Contractor shall be entitled to all official Malian holidays and in addition, the Contractor shall be entitled to American Independence Day as a holiday.

4. Home Leave

Contractor employees shall be authorized home leave under the same conditions as is provided for AID personnel as from time to time amended.

T. Allowances

1. Post Differential

Post differential in the same percentage, as from time to time amended, of salary as is applicable to AID employees in Mali shall be payable beginning on the date of arrival at the post of assignment and such payments shall continue, including periods away from post on official business, except while in the United States, until the close of business on the day of departure from the post of assignment en route to a Contractor's or Subcontractor's personnel points of origin. Sick leave taken and leave taken for vacation at or away from the post of assignment will not interrupt the continuity of the assignment or require a discontinuance of such post differential payments, provided such leave is not taken within the United States or other country of permanent residence

of the Contractor's or Subcontractor's personnel. Post differential shall not be payable on the first 42 days of any assignment in Mali for home office based employees.

2. Cost of Living Allowance

Contractor will be reimbursed for cost of living allowances which are equivalent to that paid to AID employees in Mali with similar salaries. Such payments to Contractor personnel shall vary up or down in the same manner as do such payments to AID employees in Mali.

3. Temporary Lodging Allowance

The Contractor will be reimbursed by GRM for payments made to personnel and authorized dependents for a temporary lodging allowance while awaiting permanent living quarters, or for a period of not more than one month prior to final departure from Mali. Such payments shall not exceed payments that would be made to AID employees under similar situation.

4. Educational Allowance

a. The Contractor will be reimbursed in Malian Francs for payments made by personnel for education of their dependent children in grades 1 through 6 in Mali, up to the amount charged by the Ecole Liberte for tuition of such dependent children.

b. The Contractor will be reimbursed in U.S. dollars for the education of personnel dependent children in grades 7-12 away from Mali under the same conditions and in the same amounts as

would be applicable to an AID employee in Mali under a similar situation.

5. Educational Travel

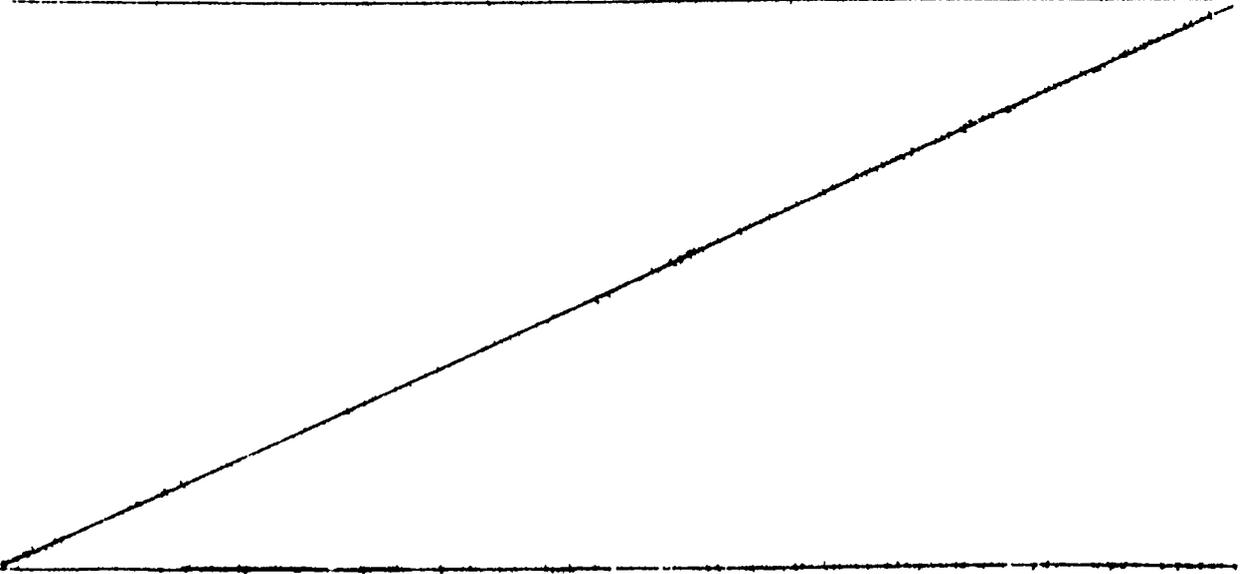
The Contractor will be reimbursed for payments made to regular personnel for educational travel for dependent children. Dependents who have both parents in Mali and are attending secondary school (grades 7-12 or equivalent) or college or university in any country outside of Mali will be eligible for one round trip between Mali and the site of the school during each one-year period of this contract.

U. Travel and Transportation

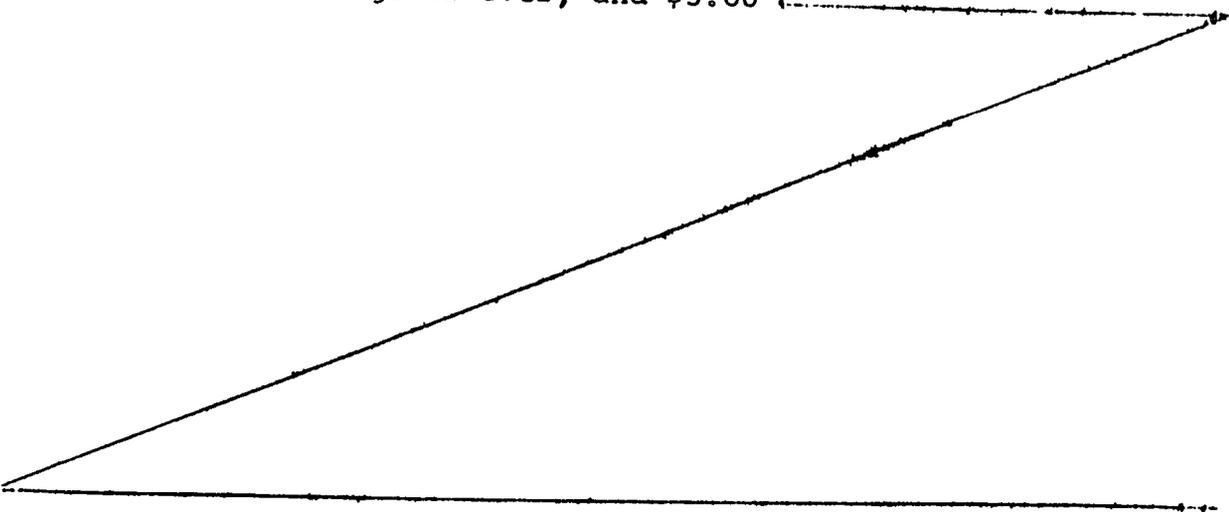
1. Overseas Travel and Transportation

(a) International Travel. The Contractor shall be reimbursed for actual transportation costs and travel allowances of Contractor's employees and dependents, pursuant to paragraph 10

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hereof, from normal place of residence in the United States (or other location as approved by the GRM) to post of duty in Mali via Washington, D. C. and return to normal place of residence in the United States upon completion of services by the individual. Such transportation costs shall not be reimbursed in an amount greater than economy class commercial scheduled air travel by the most expeditious route, except as otherwise provided in paragraph below and unless economy air travel or economy air travel space are not available and the Contractor certifies to the facts in the voucher or other documents retained as part of his contract records to support his claim or for the post audit. When travel is by economy-class accommodations, the Contractor will be reimbursed for transporting up to twenty-two (22) pounds of accompanied personal baggage per traveler in addition to that regularly allowed by the economy ticket. Travel allowances for such travelers shall be at the rate of \$6.00 per day per persons eleven years of age or over, and \$3.00



per day for persons under eleven years of age, for not more than the travel time required by scheduled economy class commercial air carrier using the most expeditious route and computed in accordance with the Standardized U.S. Government Travel Regulations as from time to time amended. One stopover enroute for a period of not to exceed twenty-four (24) hours is allowable when the traveler uses economy accommodations for a trip of fourteen (14) hours or more of scheduled duration. Such stopover shall not be authorized when travel is by indirect route. Per diem during such stopover shall be paid in accordance with the established practice of the Contractor, but not to exceed the amounts stated in the Standardized U.S. Government Travel Regulations, as from time to time amended.

Contractor's personnel shall provide to GRM, in writing, their "normal place of residence" for purposes of this subsection and contract as a whole. The stop in Washington D.C. enroute to Mali shall only apply to long-term employees.

## 2. Local Travel

The Contractor shall be reimbursed at the rates established by AID for transportation of travelers in Mali in connection with duties directly referable to the contract. In the absence of such established rates, the Contractor shall be reimbursed for actual costs of such transportation.

## 3. Travel for Consultation

The Contractor shall be reimbursed for travel to or from Mali from or to the Contractor's principal place of business in the United

States or to AID/Washington of the Contractor's home office personnel or any designated member of the Contractor's personnel serving in Mali for the purpose of consultation on occasions deemed necessary by the Contractor, up to a total of four round trips during the four year period of the contract. Additional trips must be approved in writing by the GRM,

4. Pre-contract Travel

Travel expenses incurred by Mr. Raleigh Yugas in visiting Mali for contract negotiations will be considered pre-contract expenses and will be reimbursed under this contract after it has been executed.

5. Special International Travel and Third Country Travel

Upon the prior written approval of the GRM, the Contractor shall be reimbursed for (i) the costs of international transportation of travellers other than between the United States and Mali and for local transportation within other countries and (ii) travel allowance for travelers while in travel status and while performing services hereunder in such other countries at rates prescribed by the Standardized U.S. Government Travel Regulations, as amended, when such travel advances the purposes of the contract.

6. Indirect Travel for Personal Convenience

When travel is performed by an indirect route for the personal convenience of the traveler the allowable costs of such travel will be computed on the basis of the cost of economy class air fare via the direct usually traveled route.

7. Delays En Route

The Contractor may grant to travelers under this contract reasonable delays en route, not circuitous in nature while in travel status,

caused by events beyond the control of such traveler or Contractor, other than those caused by physical incapacitation. It is understood that if delay is caused by physical incapacitation, personnel shall be eligible for such sick leave as is provided under Section S of this Article entitled "Leave and Holidays".

8. Emergency and Irregular Travel and Transportation

Actual transportation costs and travel allowances while en route, as provided in this section will also be reimbursed under the following conditions:

(i) Subject to the written approval of the GRM, the costs of going from post of duty in Mali to the United States or other approved location for regular personnel and dependents, when because of reasons or conditions beyond his control, the said individual has not completed his required service in Mali or the dependent must leave Mali. The GRM may also authorize the return to Mali of such individual and/or his dependents.

(ii) It is agreed that Paragraph (i), next above, includes but is not necessarily limited to the following:

(I) Need for medical care beyond that available within the area to which the individual is assigned;

(II) Serious effect on physical or mental health if residence is continued at assigned post of duty;

(III) Death or serious illness in the immediate family (parents and children) of the individual or spouse;

(IV) Emergency evacuation, including, subject to the GRM approval, the transportation of household effects and automobile

or storage thereof, and a per diem allowance for subsistence. The GRM hereby agrees to provide written approval for such travel in an expeditious manner and, in emergencies, authorizes the team leader to authorize travel and to seek approval after the fact. Such approval will not be unreasonably withheld.

9. Transportation and Storage of Personal Effects and Household Goods and Transportation of vehicles

(a) Contractor will be reimbursed for the costs of shipping the personal effects and household goods of the five-man field team, or their replacements, up to the following amounts. Reimbursable costs shall include the costs of crating, clearing, shipping, clearing storage, uncrating and related costs:

(1) Surface

7,500 lbs. net weight for an individual with dependents at post; 4,500 lbs. net weight for an individual with no dependents at post.

(2) Air

175 lbs. gross weight for the individual and each dependent.

(3) Storage

Contractor shall be reimbursed for the costs of storage of goods in the United States or other country of origin provided that the total net weight of household goods and personal effects shipped, under the surface allowance, to Mali and the goods stored shall not exceed 7,500 lbs. for each individual without dependents.

(4) Shipment of vehicle

Pursuant to Article VIII, C, the Contractor is authorized to ship one (1) personnel vehicle for each long term advisor.

(b) If the Contractor, with GRM approval, furnishes furniture or household equipment to Contractor employees, the surface shipping allowance will be reduce to 2500 lbs. net weight for individuals with dependents at post and 1500 lbs. net weight for individuals without dependents at post.

10. Limitation on Travel by Dependents

Travel costs will be allowed only for dependents of long-term employees and such costs shall be reimbursed for travel from place of abode in the United States to assigned station in Mali and return only if dependent remains in Mali for at least nine months or one-half of the required tour of duty of the long-term employee responsible for such dependent, whichever is greater. A Long-Term Tour of Duty will be a maximum of two (2) years.

11. Limitation on Transportation

A. All international air travel under this Contract shall be made on United States flag carriers. Exceptions to this rule will be allowed in the following situations, provided the Contractor certifies to the facts in the voucher or other documents retained as part of his contract records to support his claim for reimbursement and for post audit:

(a) Where a flight by a United States carrier is not scheduled to arrive in time for the conduct of official business;

(b) Where a flight by a United States carrier is scheduled but does not have accommodations available when reservations are sought;

(c) Where the departure time, routing, or other features of a United States carrier flight would interfere with or prevent the satisfactory performance of official business;

(d) Where there is no scheduled U.S. carrier.

(e) Where a scheduled flight by a United States carrier is delayed because of weather, mechanical or other conditions to such an extent that use of a non-United States carrier is in the GRM's interest;

(f) Where the appropriate class of accommodations is available only on a non-United States carrier and the cost of transportation and related per diem is less than the cost of available accommodations of another class on a United States carrier and related per diem; and

(g) Where payment for transportation can be made in excess foreign currencies, provided no United States air carriers adequately serving the points of travel will accept the currency. This preferential use of a foreign air carrier will also apply to near-excess foreign currencies;

B. International Ocean Transportation. All international ocean transportation of things which are to be reimbursed in United States dollars under this Contract shall be by United States flag vessels, to the extent they are available. With respect to persons, ocean transportation is not authorized;

C. Unauthorized Travel. The Contractor shall not be reimbursed for any costs for travel of its employees when such travel has not been authorized under the terms of this Contract.

12. Rest and Recuperation Travel

The Contractor shall be reimbursed for the cost of travel performed by long term Contractor employees and their dependents for purposes of rest and recuperation on the same basis as authorized for AID employees in Mali. The Contractor agrees to obtain the written approval for the timing of such travel and such approval will not be unreasonably withheld.

13. Assistance with Visas

The GRM will take such steps as may be necessary to facilitate entry and travel within Mali by securing multiple-entry visas for purposes of allowing persons to perform duties as contemplated under this Agreement.

V. Limitation of Costs

1. It is estimated that the total cost to GRM, exclusive of fixed fee, will not exceed the estimated dollar costs as set forth in Article VI. The Contractor agrees to use his best efforts to perform the work specified and all obligations under this contract within such estimated costs. If at any time the Contractor has reason to believe that the total costs set forth in Article V, exclusive of any fixed fee, or 115% of the limits of any cost category set forth in Article VI, are likely to be exceeded, the Contractor shall notify the GRM in writing to that effect, giving the revised estimate of costs for the performance of this contract.

2. GRM shall not be obligated to reimburse the Contractor for costs incurred in excess of the total estimated costs or 115% of the limits

placed on any cost categories set forth in Article VI, and the Contractor shall not be obligated to continue performance under the contract or to incur costs in excess of the cost limits set forth in Article VI, unless and until the GRM shall have notified the Contractor in writing that such estimated costs have been increased and shall have specified in such notice revised estimated costs which shall thereupon constitute the estimated costs of performance of this contract. When and to the extent that the estimated costs set forth in article VI have been increased, any costs incurred by the Contractor in excess of such estimated costs prior to the increase in estimated costs shall be allowable to the same extent as if such costs had been incurred after such increase in estimated costs.

4. Language of Contract

Notwithstanding that this contract may be translated into French, in the event of a dispute the English version shall be controlling.

5. Changes

The GRM may at any time, by a written order, make changes, within the scope and duration of work required under this Contract. If any such change causes an increase or decrease in the estimated cost of, or in the time required for, the performance of this Contract whether changed or not changed by any such order, an equitable adjustment shall be made (1) in the price or completion time or both, and (2) in such other provisions of the contract as may be affected, and the contract shall be so modified in writing. However, any change increasing the price of this agreement or changing the scope of work that is not approved in writing by AID shall not be financed by AID.

Y. Title to and Care of Property

1. Title to all material and equipment, the cost of which is reimbursed hereunder, shall at all times be in the name of the GRM. With the exception of the vehicles and equipment purchased by the Contractor for use by GRM officials, Contractor shall maintain custody of all material and equipment purchased hereunder.

2. Contractor shall establish a program for the receipt, use, maintenance and protection of all material and equipment in his custody. Such program shall be approved by the GRM.

3. At the conclusion of the contract, the Contractor shall prepare a list of all equipment that is in his custody and shall indicate disposition that has been made and what is planned for that remaining.

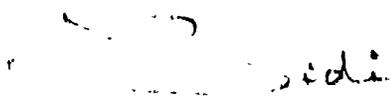
4. Orientation

The Contractor will be reimbursed salary and per diem expenses for five (5) days of orientation in Washington, D.C. en route to Mali. Such orientation shall only apply to long-term employees and their dependents. Per diem payments will be the same as paid to AID employees on travel to Washington, D.C.

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IN WITNESS, the parties have put their signatures and seals hereunder on the respective date mentioned against the signature:

For And On Behalf Of The  
Government Of The Republic  
Of Mali



The Minister  
Ministry of Production  
Date: 25 Feb 1975

Witness: 1.   
Date: 25 Feb 1975

For And On Behalf Of The  
Contractor, Experience Incorporated



Robert A. Delemarre  
Project Administrator  
Date: 25 Feb 1975

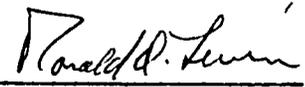
Witness: 1.   
Date: 25 Feb 1975

Exhibit A

Mali Livestock I Project Outputs

I. Tienfalla Feedlot

A. Temporary Feedlot Outputs

1. Feedlot proper including:
  - (a) Feeding pens with feed bunks for supplements and for forage for minimum of 500 cattle.
  - (b) Quarantine ("Warm up") pens and isolation pens.
  - (c) Cattle working pens and chutes.
  - (d) The unit should be well designed as a labor intensive type feedlot and provided with any other necessary components as decided by GOM and contractor to achieve this design.
2. Water supply with drinking containers for all pens and the means of supplying water to same.
3. Veterinary supplies and service.
4. Loading chute
5. Storage building with office
6. Forage storage facilities and feed supplement and minerals storage facilities.
7. Contractual agreements to supply forage and supplementary feeds and minerals.

B. Permanent Feedlot Outputs

1. Permanent feedlot proper with permanent facilities as indicated in items A1-7 above
2. Integrated forage supply organized (Since the site selected south of the highway is larger than required for feed lot pens and facilities the excess land should be subdivided probably by means of fire break roads and prepared for intensive forage production using fertilizer generated in the feed lot.)
3. A perimeter fence built around area referred to in B-2 above
4. A perimeter fence and fire breaks built in the range area north of the highway.
5. Water supply created for managed range area referred to in B-4 above

6. The following equipment and supplies as determined by GOM/contractor as project develops:

- (a) Brush and tree clearing and soil preparation machinery, materials and supplies.
- (b) Forage seeding and harvesting machinery materials and supplies.
- (c) Feed mixing and forage processing facilities, equipment and supplies.
- (d) Tractors and necessary vehicles such as hay wagons, carts and trailers
- (e) Pickup truck and/or personnel vehicles
- (f) Machinery storage sheds
- (g) Cattle scales
- (h) House for feed lot manager.
- (i) Housing for labor force

This list is not exclusive for other items deemed necessary by GOM/contractor.

II. Segou Feedlot Outputs

A. Temporary Feed lot

Same outputs as for Tienfalla feed lot as indicated in A1-7 above for minimum of 1,000 cattle.

B. Permanent Feed Lot Outputs

1. Permanent feed lot with permanent facilities which replace, supplement and expend the temporary feed lot facilities referred to in II.A. above. These include (but do not exclude other items deemed necessary):
  - (a) Soil preparation and forage seeding and harvesting equipment and supplies.
  - (b) Forage processing equipment, facilities and supplies.
  - (c) Feed mixing equipment and supplies.
  - (d) Tractors and necessary farm vehicles such as wagons, carts and trailers
  - (e) Pick up truck and/or personnel vehicles.
  - (f) Machinery storage sheds
  - (g) Cattle scales.
  - (h) House for feed lot manager
  - (i) Housing for labor force
2. Integrated forage production organized. (Since the site selected is larger than required for the feed lot proper and since additional land could possibly be acquired the excess land should be used for intensive forage production using fertilizer generated in the feed lot and planting heavy producing crops which can be processed as ensilage).

- 3 Contractual agreements with local farmers to supply forage to feed lot in addition to forage produced in II.B-2 above
- 4 Contractual agreements to supply supplementary feeds and minerals.

### III. General Evaluation Criteria for Segou and Tienfalla Feedlots

1. Average weight of cattle supplied to Bamako and export markets during the dry season measurably greater than before project.
2. Feed lots capacity has been expanded or additional feed lots built elsewhere in country.
3. Average price paid for cattle entering feed lot progressively increases after discounting other complicating economic factors. (Price to producer should increase due to increased demand for cattle by feed lot operators and after increased efficiency and profitability occurs in feed lot to marketing process).

### IV. Doukoulomba Forest Outputs

1. Detailed range survey
2. Detailed range management operational plan including designated forage production areas and disposition of land presently used for crop production and fishing by sedentary farmers
3. Perimeter fence and such internal fencing as deemed necessary by the GOM/contractor.
4. Water supply system for each of the proposed range pastures.
5. Construction of necessary roads and firebreaks.
6. Veterinary services established.
7. Working pens and chutes and cattle scales.
8. Quarantine holding area with water supply.
9. Equipment and supplies storage building and office.
10. Machinery storage building.
11. Range Manager house.
12. Housing for labor force and guards.
13. The following machinery, facilities, materials and supplies as determined by GOM/Contractor as project develops: (This list not exclusive of other items deemed necessary.)

- (a) Brush and tree clearing machinery equipment and supplies
- (b) Soil preparation and seeding equipment and supplies
- (c) Forage harvesting and storage equipment and facilities if these are deemed necessary to maintain forage reserve for dry season to prevent damage to range
- (d) Storage and mixing facilities for supplementary feeds and minerals
- (e) Tractors and necessary farm vehicles such as wagons and carts
- (f) Pick up truck and personnel vehicles

14. General Outputs

- (a) Carrying capacity increased by 30% after the second year and 60% by end of project
- (b) Cattle population increased by 60% by end of the project
- (c) Cattle offtake percentage measurably increased

V. General Evaluation Criteria for Doucoulomba Forest

- 1. General outputs as listed in IV.14 above achieved
- 2. Technical details outlined in item IV1-13 achieved on schedule
- 3. Managed forest area extended or duplicated elsewhere in country.

VI. Sedentary Farmer Program

A. First Year Program Outputs

- 1. Credit system organized to provide credit for participating sedentary farmers and also for cattle owners participating in Segou and Tienfalla feedlot operations.

2. Sign up and organize minimum of 100 sedentary farmers who already have sufficient fodder supplies. Credit will be issued to these farmers to purchase cattle for on the farm fattening.
3. Screen and give credit to responsible cattle buyers supplying cattle to Segou and Tienfalla feed lots.

B. Second year through end of the project

1. Credit system refined

- (a) Minimum of 200 farmers organized (2nd year), supplied with credit for seed and fertilizer for forage crops and credit for purchase of at least one bovine for fattening. Provided with necessary veterinary services. This number increased to minimum of 1000 by end of the project.
- (b) Refine credit system to cattle buyers supplying cattle to Segou and Tienfalla feed lots.

C. General Outputs

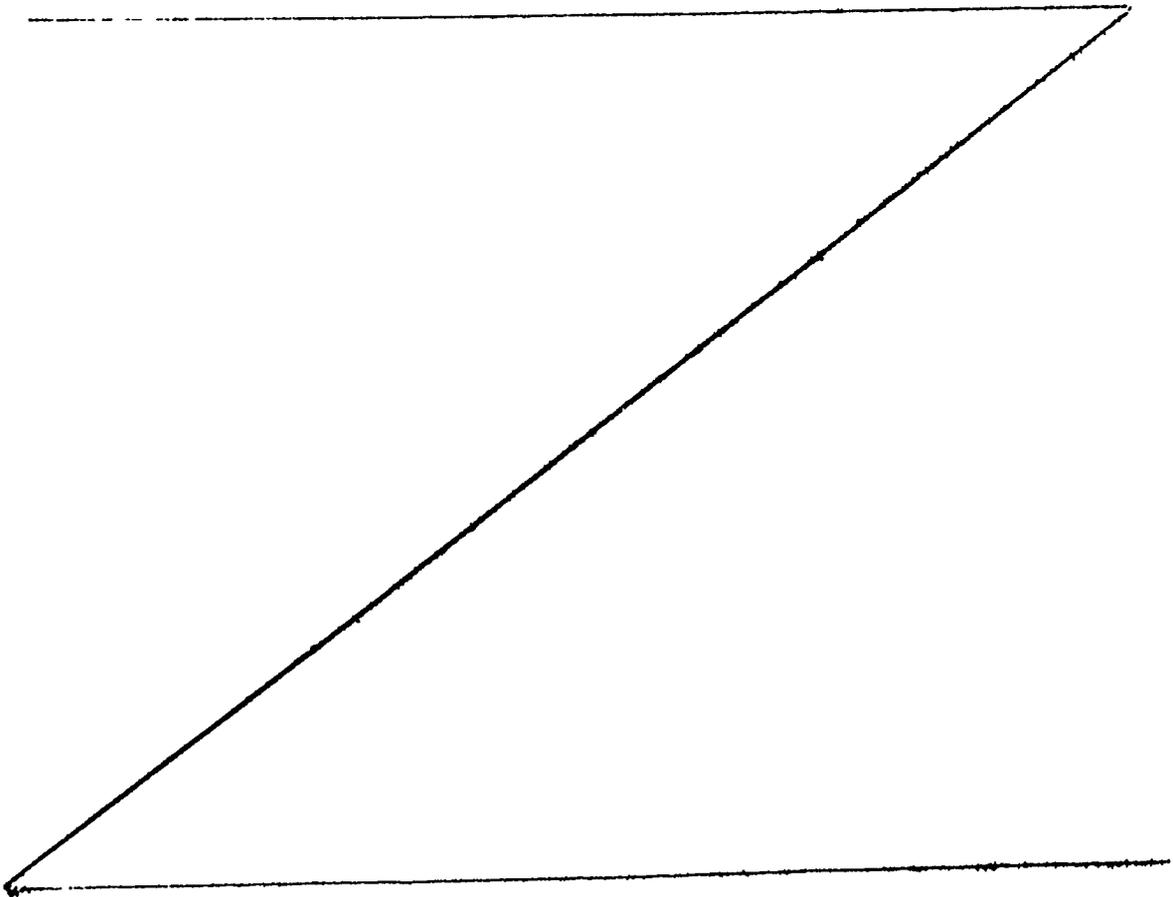
1. Offtake of cattle for Bamako and export markets measureably increased from sedentary farmer project areas.
2. Inflow of cattle into Segou and Tienfalla feedlots increased measureably each year.
3. Financial growth of credit fund to provide for expansion
4. Demonstrable demand from Sedentary farmers for expansion of program

VII. Training outputs

1. Four assistants malian managers of all four activities given on the job training.
2. Four U.S. Participant trainees given on the job training after return from U.S. (One manager trainee for each of 4 project activities).

VIII. Contractor Performance

Attached hereto is a PERT CHART dated February 21, 1975 indicating the estimated time for completion, by the Contractor, of each of the outputs specified in Paragraphs I through VII of this Exhibit A. This performance schedule has been reached through negotiations between the parties to this contract and revisions, as required will be made in accordance with Article I.F. of the Basic Contract.



AGREEMENT

This agreement provides for professional services, relating to the Mali Livestock Project, to be furnished to Experience Incorporated (Contractor) by Checchi and Company (the Subcontractor).

Experience Incorporated intends to enter into a Cost Plus Fixed Fee Contract (hereinafter known as "Prime Contract") for Technical Advisory Services with the Government of the Republic of Mali. The contract will be designated Contract REFDSO/WA-75-52. A copy of that Contract and the General Provisions contained therein (Exhibit A) will be attached hereto and made a part hereof by this reference. Should the above contract not be entered into, this subcontract shall be null and void.

In summary, the purpose of said Contract is to assist the Government of the Republic of Mali with the design, implementation and management of the project known as the Mali Livestock Project.

For the consideration hereinafter set forth, the Subcontractor agrees to assist the Contractor with the performance of the work required of the Contractor by the attached Contract and possible amendment thereto and to specifically provide the personnel and perform the work as set forth below.

The Subcontractor shall furnish personnel for the following positions and undertakes to make available the individuals for those positions as follows:

1. Resident Field Team

- a. Livestock and Range Management Specialist      James F. D'Amelio
- b. Small Farmer Credit Advisor                              Larry W. Harms

2. Home Office Personnel

- a. Project Management    Thurston E. Teele
- b. Home Office Procurement Specialist                      Colbens Scherr

The Subcontractor shall make every reasonable effort to provide the services of the indicated individuals for the positions listed. If for any reason one or more of the above individuals should become unavailable, or should the Contractor, Subcontractor of GRM decide that it is in the best interest of the project that one or more of these individuals be replaced, the Subcontractor undertakes to replace such individuals with individuals of equal qualifications. Should the replacement be at the initiative of the Subcontractor, it may not be carried out without the written consent of the Contractor except that the Contractor may ratify in writing the replacement and such ratification shall constitute consent by the Contractor required by this clause. The listing of personnel may, with the consent of the contracting parties, be amended from time to time during the course of the contract to either add or delete personnel, as appropriate.

The Subcontractor agrees to mobilize its team and perform field investigations, home office procurement services and subcontract management as necessary to successfully complete appropriate portions

of the tasks required by Article I.B.1. a., b., c., d., and f. of the Prime Contract. It is further understood and agreed that Contractor personnel will work closely with and assist Subcontractor personnel in these efforts. The Subcontractor also agrees to assist the Contractor with: briefings of GRM and AID officials; preparation of appropriate sections of reports; and with preparation of work plans and scheduling of tasks.

The Contractor agrees to reimburse the Subcontractor the amount exclusive fee of \$494,535 for its costs of providing the aforescribed services in accordance with the cost estimates set forth in Exhibit B; provided, however, that the Subcontractor does not exceed the grand total set forth in Exhibit B nor exceed the dollar costs for any individual line item by more than 15 percent of such line item. The fixed fee shall be \$33,850.

The Subcontractor shall submit invoicing data to the Contractor monthly in proportion to the work then accomplished and for expenditures made, and the Contractor agrees to process each as rapidly as possible and to make payment within five (5) days of receiving payment for the accepted monthly vouchered amounts as mentioned in Article IX, Procedure For Payment, of the Prime Contract (Exhibit A).

In the event of termination of the Prime Contract by GRM before completion, the Subcontractor shall be entitled to payment for work performed and return of its employees to their residencies, but only to the extent that payment may be negotiated by the Contractor in good

faith with, and received from GRM according to the provisions of the Prime Contract.

In the event that the GRM and the Contractor determine that the Subcontractor is unable to provide personnel to perform any part of the work previously assigned to the Subcontractor, the Contractor may, with reasonable notice and in consultation with the Subcontractor, assume such work himself. Contractor and Subcontractor will make every effort to maintain the original balance in work load between the parties.

The Subcontractor certifies that the cost and pricing data and all other representations contained in Exhibit B hereof are accurate, complete and current as of the date hereof.

The Subcontractor agrees that it shall be bound to the Contractor upon the same terms and conditions as the Contractor is bound to the Government of the Republic of Mali pursuant to the terms of Exhibit A, hereof insofar as such terms may be applicable to this agreement.

The foregoing Letter Agreement is hereby accepted and agreed on:

Robert A. Delemarre  
Robert A. Delemarre  
Manager-Washington Office  
Experience Incorporated

DATE: February 22, 1975

Thurston F. Teele  
Thurston F. Teele, Deputy Director,  
Consulting Division  
Cecchi and Company

DATE: February 22, 1975

EXHIBIT B

COST AND PRICING DATA

I. Fixed Fee

The fee stipulated in this subcontract is based upon the estimate that the services to be performed hereunder will require 96 man-months of time. In the event that the total man-months of service performed hereunder are less than 90 then the fee due and payable to the Contractor upon completion of the work hereunder shall be adjusted downward by \$255 for each man-month less than 96 man-months of service provided. In the event that man-months in excess of 98 are required, the parties hereto agree to negotiate an equitable adjustment in the fee, provided however, that such negotiation shall only relate to those man-months in excess of 98 performed and provided further that the Contractor shall not exceed the 96 man-month limitation without the prior written approval of Experience Inc. Failure to agree on such equitable adjustment shall be treated as a dispute under the provisions of Article XII of the Prime Contract.

II. Budget

A. Dollar Budget Exclusive of Fixed Fee

The following budget sets limitations for reimbursement of dollar costs for individual line items. Without prior written approval of Experience Inc., the Subcontractor may not exceed the grand total set forth in the budget hereunder or exceed the dollar costs for any individual line item by more than 15 percent of such line item.

<u>Category</u>	<u>Budget Amount</u>
1. Personnel costs, including allowances	\$ 243,780
2. Travel, transportation and storage	61,875
3. Other direct costs	20,220
4. Project operating costs	-
5. Overhead	168,660
6. Contractor equipment and supplies	-
SUB TOTAL	494,535
7. Project equipment and construction	-
TOTAL	494,535

III. Establishment of Overhead Rate

Pursuant to the provision of the clause of the Prime Contract entitled "NEGOTIATED OVERHEAD RATES", rates shall be established for the initial period beginning on the effective date of this Subcontract and ending December 31, 1975. Pending establishment of final overhead rates for the initial periods provisional payments on account of allowable indirect costs shall be made on the basis of the following negotiated provisional rates applied to the base(s) which are set forth below:

<u>Billing Rate</u>	<u>Maximum Rate</u>	<u>Base</u>	<u>Period</u>
90%	95%	Direct Field Salaries	Through Dec. 1975
100%	105%	Direct Home Office Salaries	Through Dec. 1975

## MALI LIVESTOCK PROJECT

18p.

**1. Expansion of Livestock Production by Sedentary Farmers**

This sub-project will provide technical advice, veterinary services, and credit to stimulate increased production of beef cattle by sedentary mixed farmers in one area northeast of Koulikoro and another north of Doura.

The first project area, near Koulikoro, is about (50 kilometers) 30 miles northeast of Bamako, the capital of Mali. It lies within a rough triangle formed by Koulikoro at the southwest corner, Banamba in the north, and Nyaning in the east. The Niger River forms the southeast boundary of this region. The region is about midway between Bamako and Ségou, another principal city of Mali.

The second project area, near Doura, is just north of the Dani River and about (50 kilometers) 30 miles east of Ségou near Doukolons Park.

These savannah areas are generally characterized by flat or gently rolling terrain and covered by Andropogon grass, scrub trees and bushes. The shea nut tree is common. Sedentary farmers who will participate in this project work small, scattered, communally owned plots of land.

The typical farmer cultivates about (7 hectares) 17.5 acres in millet and peanuts, and has about (6 hectares) 15 acres in fallow. Soil is generally laterite. He is likely to own a yoke of oxen that are used for plowing and heavy work. He may also have two brood cows. Most of the farmers also have sheep, goats, and chickens that are used for their own food consumption. Occasionally the better farmer will keep a cow that is being fed for market.

With the exception of plows pulled by oxen, general farming operations are carried on by manual labor with short-handled mattocks. Peanuts and cotton are the cash crops. Farm buildings are typical African construction of mud and wattle walls, thatched or mud roofs, and dirt floors.

The objective of this sub-project is to induce these mixed, sedentary farmers to raise at least one animal per year for sale to the market. This would give him increased income during the spring dry season when he has no cash income from other sources. The chemical fertilizer supplied by this project and nitrogen fixation action from legume crops such as peanuts and peas will increase soil fertility and provide a long-term potential for greater production of cash crops. The additional cattle will augment the Bamako and Ségou meat markets during the dry period.

and thus help to stabilize prices when seasonal upward pressure on prices is greatest.

Sedentary farmers in Mali are assisted by two semi-private organizations: the Compagnie Francaise de Developpement de Textiles (CFDT) (cotton) and Operation Arachides (peanuts). Both organizations make small loans to farmers, encourage use of modern farming methods, carry out agricultural extension services, and provide equipment and fertilizer. This A.I.D. sub-project to promote livestock growth by sedentary farmers will be carried out with the administrative assistance of both local organizations.

Farmers will be asked if they want to enroll in the program, to buy and feed one animal for a period of 60 to 90 days during the dry period, that is, from about March to June. To qualify, a farmer will have to have at least one hectare (2.5 acres) of land due for fallow that can be seeded before the arrival of the dry season.

At the beginning of the rainy season in June the farmers who have enrolled in the program will be issued fertilizer and pea seeds. Each farmer will then seed his hectare (2.5 acres) of fallow land. It will later provide hay for the additional animal. Groups of cattle will be purchased near the beginning of the dry season by the sponsoring association. Each participating farmer will purchase his animal from the association and begin feeding him during the following February or March. He will then be issued supplementary feeds and minerals.

The farmer will sell his animal in June in the highest local market. Farmers may pool their animals to reduce the cost of transportation to market. Profit to the farmer will accrue for two reasons: (1) the differential between the low purchase price of the animal just before the beginning of the dry season and the much higher market price the same animal commands at the end of the dry season; (2) the much improved condition and weight of the animal at the time he is sold due to the 60-90 day period of proper care and supplementary feeding provided by the sedentary farmer.

The credit activity that will be part of the Mali Livestock Project will finance the purchase of seeds, fertilizer, and cattle with individual or group loans repayable after the animals are sold.

An American senior agricultural advisor resident in Bamako will oversee the execution of the sedentary farmer livestock project in the Koulikoro region. The U.S. senior

range manager resident in Ségué will oversee the project in the vicinity of Doura. Both will work in close coordination with officials of the Malian Office of Cattle and Meat (OMPEVI), the Malian Veterinary Service (Service d'Elevage), and the cooperating companies, Operation Arachides and the CPDT. Each will be provided with a vehicle and an interpreter.

At Koulikoro and at Doura the Government of Mali will provide two range technicians, a veterinarian, and a nutrition specialist to carry out the project. At both locations the cooperating companies will provide agricultural extension workers during the critical five months of the growing-feeding cycle.

In both the Koulikoro and Doura areas the veterinary services provided by the Government of Mali will be an important element in the success of the project. An experienced animal health assistant will make periodic visits to the participating sedentary farmers to inspect the animals, provide required vaccinations and treatment, and counsel the farmers on care and nutrition.

At the beginning of the project two Malian officials will be sent to the U.S. for participant training. Upon return to Mali they will be assigned to assist the U.S. advisors at Bamako and Ségué and will assume their functions at the end of three years.

For the first year of the project 100 farmers from each area will participate (200 total farmers). During the second year an additional 100 farmers in each area will be enrolled. A preliminary survey conducted by Operation Arachides indicates that 287 farmers in the Koulikoro area would like to participate in the project. A similar inquiry by a team of UNDP sociologists is being made in the Doura area to verify local farmer interest and attitudes.

It is apparent that the sedentary farmer livestock projects are based upon the annual agricultural planting cycle that begins in June each year. If the 1974-75 cycle is to be used, this sub-project will have to begin actual operations by June 1974.

This sub-project is expected to cost \$228,000 in U.S. dollar expenses and to require \$54,000 equivalent Malian contributions in the form of salaries during its three-year life.

Appendix  
Sub-project #1

1. Sedentary farmers account for about 20 % of Malian cattle production.
2. Rainfall in the area is close to 1 meter/year and comes during a 3-4 month period.
3. The sedentary farmer keeps cows for milk production which is consumed by his family. Most of his animals , except the milk producing cows are sent away with herders during the cropping season and then return after the harvest to graze on crop residuws.
4. The prices of animals in the dry season could be 20 % higher than prices in the other times of the year enabling the sedentary farmer to realize a maximum profit if he sells during the dry season.
5. The sale of an animal in the dry season by the sedentary farmers is expected to give him a source of income during the dry season when he has no other sources and hopefully his total yearly income will be increase by 25 %.
6. The farmers will be issued 100 kg of 18-5-31 fertilizer to apply to their hectare of land, the land will then be tilled to incorporate the fertilizer and prepare the seed bed. Then 30 kg of Niebe pea seeds will either be broadcasted or planted in rows.
7. An early cutting of the pea vines can be made without selling back their growth, but the rest of the hay will be harvested at the maximum protein level just before the pods are mature. The hay should then be stored in bundles not exposed to the elements. A portion of the peas will be allowed to mature and harvested as seeds for use the following year.

8. Supplemental feeding of the cattle is in the following form

	Daily ration	UF/kg	UF/day	\$/kg	\$/day
Cotton seed	3 kg	1.1	3.3	.020	.06
Rice bran	2 kg	.32	.64	.025	.05
molasses	1 kg	.75	.75	.0125	.025
mineral mixture	$\frac{1}{2}$ kg			.032	.008

4.69

This ration is then balanced ad lib with pea vine hay. Figuring a consumption of 7 kg/day at .4 UF/kg would add an additional 2.8 UF/day

Hay	2.8 UF/day
Concentrate	<u>4.69</u>
	7.49 UF/day

With a ration of this quality the animal could be expected to gain at least .5 kg/day. or 30 - 45 kg over a 90 day feeding period.

## MALI LIVESTOCK PROJECT

2. Ségou Traders' Cattle Feeding Operation

This sub-project will create a cattle feeding operation at Ségou for use by the Ségou cattle traders' association to standardize the finish of the export cattle supply on a year-round basis.

Ségou is a city on the banks of the Niger River (240 kilometers) 144 miles northeast of Bamako. Population is 32,000. The city is located on a flat plain covered with low shrubs and Andropogon grass. Cotton, millet and peanuts are grown in the surrounding area. There is a cotton mill in Ségou; it is the principal cattle center of Mali. The cattle traders' association of Ségou deals in cattle for export to the coastal countries to the south.

The rainy season in the Ségou area lasts from July to November and its effects provide for forage until January of the following year. By January natural forage is diminished and the condition of grazing cattle begins to decline. If not arrested by supplementary feeding, the condition of the cattle continues to decline until the rains begin in July. Cattle in the resulting poor condition cannot be readily or profitably sold on the export market.

The objective of this sub-project is to construct a cattle feeding facility at Ségou to maintain the condition of cattle during the dry season and thus stabilize the volume of sales of first-class animals, the only kind that can be sold, to the export market. Animals in good condition normally command the highest export prices during the dry season. Increased export sales will also increase revenues to the Government of Mali during this period.

Pens will be constructed on the south side of Ségou capable of holding 2700 cattle. Water tanks will be installed. A tractor, six hay wagons and an anti-parasite sprayer will be furnished.

The cattle traders' association of Ségou will buy the cattle to be put in the feeding station from nomadic herders north and east of Ségou, and from sedentary farmers around Ségou. Each animal will be held for about 90 days. About 5000 cattle will be fed in the feedlot during the normal six-month period of operations.

Cattle in the pens will be fed cottonseed, hay or rice straw, rice bran, molasses, salt and minerals. The feed supply is assured because the Government of Mali has decided to withhold certain amounts of cottonseed, peanut cake and molasses from the export market to make them avail-

able for cattle maintenance in Mali.

The credit activity that will be part of the Mali Livestock Project will finance the purchase of cattle and feed with group loans to the cattle traders' association. Repayment of a loan will occur when a group of animals leaves the feedlot for transportation and sale in the countries to the south. At that time the trader will also pay a standard service charge to cover the cost of veterinary and other services provided to the cattle in the pens.

All cattle will be quarantined for 21 days prior to entry in the feeding station. Here they will be vaccinated for all the common diseases, tested for tuberculosis, sprayed against external parasites, and closely observed for any symptoms of disease. After entry into the pens veterinary surveillance will be continuously maintained to guard against disease.

The feeding station will be operated by the Ségué cattle traders' association. The association will hire laborers to feed, water and move the animals. The Director of the Veterinary Service at Ségué will oversee the operation of the feedlot. The Veterinary Service will provide the services of a veterinary assistant and a nutrition specialist. The U.S. range management advisor resident at Ségué will provide technical advice as necessary, assisted by a livestock technician provided by the Government of Mali.

At the beginning of the project a Malian official will be sent to the U.S. for participant training. Upon return to Mali he will be assigned to assist the U.S. advisor and assume his functions at the end of three years.

Examination of the differential between the original purchase price of an animal and his sale price net of all feedlot, transportation, interest and tax expenses indicates that a 13 percent profit will accrue to the cattle trader after a 90-day period in the feedlot. The operation will be sufficiently profitable to amortize the capital investment in the feedlot over a ten year period.

This sub-project for the creation of a cattle feeding operation at Ségué is expected to cost \$666,000 in U.S. dollar expenses with a Malian contribution of \$12,000 equivalent in salaried personnel.

**APPENDIX**  
**Subproject #2**

1. The Segou cattle feeding operation will finish cattle for export market at a time when they are not available from the Sahel or the Delta range land.
2. The cattle trader's association of Segou deals in cattle export to Ivory Coast, Liberia, and Ghana.
3. The rainy season in the Sahel of the Segou and Mopti regions lasts from July to November. The cattle use this range and water supply until about December. They then are grazed on the arable staobles and a part of them on the "Delta vif" until March. The "Delta vif" is a unique resource, flooded in the rainy season and producing excellent pastures on the residual moisture in the dry season.
4. Other feedlots have shown very profitable when low grade animals are fed up to an export grade animal. Export grade animals are usually those having a 350 kg. or more liveweight.
5. Loading of the feedlot will hopefully be after the rainy season when there are the greatest number of cattle available on the market at a reduced price--starting November. Unloading would start then when prices are somewhat higher in about March. The feedlot would not be in operation during the rainy season.

6. Ration is as follows:

	<u>Daily Ration</u>	<u>UF/HG</u>	<u>UF/Day</u>	<u>Cost/Unit</u>	<u>Cost/Day</u>
Cottonseed	3 kg.	1.1	3.3	\$ .02	\$ .06
Rice Bran	2 kg.	.32	.64	.025	.05
Molasses	1½kg.	.75	1.125	.025	.0375
Hay	7 kg.	.5	<u>3.5</u>	.0125	.0875
			8.565 UF/Day		

The animals should show a good gain with this type of ration.

MALI LIVESTOCK PROJECT

3. Doukoloma Park Range Management Operation

This sub-project will provide managed grazing for sedentary farmers and nomadic herdsmen in the Doukoloma Park forestry preserve.

Doukoloma Park is a (10,600 hectare) 27,100 acre forest preserve about (40 kilometers) 24 miles southeast of Ségou on the north bank of the Bani River. The terrain is flat and covered with grass, small shrubs and large trees. The Malian Forest Service has agreed to its reclassification from a forest reserve for wood production to a grazing reserve for livestock production.

During November-December of each year, depending upon the seasonal ending of the rainy period, nomadic herdsmen move their herds into Doukoloma Park from open grazing areas north of the Niger River. They normally leave their herds in the park for about eight months, that is, until just before the beginning of the next rains in June. Sedentary farmers in the surrounding area also use the park to graze their work animals and brood cows during the dry season.

The direct objective of this sub-project is to improve the amount and quality of forage in the forest preserve grazing area so that cattle carrying capacity will be increased by about 30 percent during the second year of the project and by about 60 percent thereafter. This will eventually permit more cattle to be maintained there during the dry season. Cattle owners will be able to market more high quality cattle when they command the highest prices.

The indirect objective of this sub-project is to demonstrate to the Malian cattle industry the degree to which modern range management methods in a controlled area can increase forage and animal production per acre. This modern method will be contrasted with present under-utilization of available forage by constant movement of cattle across an open, uncontrolled range. This sub-project will provide a model for managed grazing areas in Mali.

To create the controlled grazing area, bush and scrub trees will be removed from the range by local laborers, and it will be seeded where necessary with a superior local species of forage grass. To establish grazing boundaries and provide routes for range management personnel and boundary patrols, roads will be improved and fire breaks

constructed. A 100-head holding corral will be constructed for veterinary treatment and marking. Cattle scales will be installed near the corral. A pond for cattle water will be excavated.

The project will be supervised by a U.S. senior range manager resident in nearby Ségou. He will work in close coordination with officials of the Malian Cattle and Meat Office (OMEEVI) and the Malian Veterinary Service (Service d'Élevage). The U.S. advisor will be provided with a vehicle and an interpreter; he will be assisted by a Malian livestock service trainee.

At the beginning of the project a Malian official will be sent to the U.S. for participant training. Upon return to Mali he will be assigned to assist the U.S. advisor and assume his functions at the end of three years.

The Malian Veterinary Service (Service d'Élevage) will provide the services of a veterinarian for this project as required. The Malian Forest Service will provide four range patrolmen and will assist with the selective cutting of trees and shrubs. The patrolmen will eject unmarked cattle from the controlled range.

The new grazing reserve will be managed by the most advanced techniques successfully used in the United States. A range inventory will be made to provide detailed information for range development and management decisions, and to provide base data for the range research effort that will be part of this sub-project. The initial grazing system envisages division of the range into four units that will be used on a rotational basis. Livestock will be concentrated on one unit and the forage will be completely grazed before the animals are rotated to another unit.

This range management system is a marked departure from customary Malian grazing patterns. Direct inquiry to sedentary farmers and nomadic herdsmen in the Douk-oloma area is being made by a team of UNDP sociologists to evaluate their willingness to participate in the program and their ability to adapt to the changes required.

The project will require the fullest cooperation of all Malian officials and the support of the Malian Government to enforce control of the range. During the first year of controlled management the number of cattle on the

range may be reduced from the number now grazing there. Rotation of cattle to controlled grazing areas requires total exclusion of stray cattle from areas not selected for managed grazing.

Cattle entering the new grazing preserve will be subjected to a comprehensive veterinary health program. They will be quarantined for 21 days before entry, vaccinated against the common cattle diseases, and dipped or sprayed for external parasites. Livestock on the range will thereafter be continually observed to guard against disease.

Supplementary rations of cottonseed and minerals will be provided at cost to cattlemen using the range. Initial purchase of cottonseed will be financed via the credit association to be formed as part of the Mali Livestock Project.

The U.S. range management advisor at Ségou, assisted by a Malian counterpart, will also conduct range research to evaluate native and introduced species, optimum brush control methods, range and fallow land seeding procedures, and forage cutting and drying time and methods.

This sub-project for range management at Doukouloma Park is expected to cost \$377,000 in U.S. dollar expenses with a Malian contribution of \$28,000 equivalent in salaried personnel. Mali will also contribute a large forest reserve with an unknown but significant value.

If this sub-project is successful, an additional (25,000 hectares) 87,500 acres will be available for possible follow-on projects to convert forest reserves into managed grazing areas.

**APPENDIX**  
**Subproject #3**

1. The 10% largest trees will be preserved regardless of species. All of the Khaya Senegalais, Vitellaria Paradoxa, and Pterocarpus Erinaceus will be preserved. The large trees will serve as shade and the others are either valuable for lumber or produce fruits useful for animal feed.
2. Initially grass seeding will be with locally hand harvested seed of Andropogon Gayannus. If better species or varieties are identified in the research program, they will be used. It is estimated that 10% of the area will need to be seeded.
3. Fire breaks will be constructed by clearing two 6 meter swaths about 15 m apart and controlled burning of the brush and grass in between. This has to be done on an annual basis, but it requires less labor after the first year.
4. Veterinary service will ensure that immunization is provided against rinderpests, blackleg, coccidiosis and pasteurellosis. De-ticking by spray or baths may be needed if infestation is bad; herders will pay for this. Internal parasites will be treated at the expense of the herders. The grazing reserve itself will be free from tsetse but animals that enter may need treatment; the herders will also pay for this. The division of payment is that currently used by the veterinary service.  
  
Need for treatment for internal parasites may be reduced by the improved nutrition. Animals will be checked daily (probably at the watering points) by the veterinary assistant to reduce the probability of spread of disease.
5. Land clearance experience shows that a crew in dry season clears 3 ha/man month. Removal of the stumps is done at a rate of 2/3 ha per man month. A man with a chain saw will lay the trees on the ground on a minimum of 20 ha per man month. It does not seem practical to get the land cleared for the value of the fire wood. On the existing forest area, the Forest Service wants to remove the wood when cut down and to sell it on its own account.
6. Supplementary rations.  
A phosphate/micro element misc. will be provided at cost for all cattle using the reserve. Cotton seed will be supplied to animals that effectively use this if the herder wishes to buy it; cows in milk gestating and adults that are to be sold before the next rainy season can most profitably use the cotton seed.

## MALI LIVESTOCK PROJECT

4-1

### 4. Cattle Holding and Feeding Station at Tienfella

This sub-project will create a cattle feeding operation at Tienfella Forest Reserve that the Bamako wholesale butchers' association will use to maintain animals for the Bamako market.

The Tienfella Forest Reserve is located (15 kilometers) 9 miles east of Bamako on both sides of the main road and railroad connecting Bamako and Koulikoro. The Reserve consists of (3000 hectares) 7500 acres that are managed by the Malian Forest Service to provide a firewood reserve for the Bamako area. The Reserve is also used by the Société Malienne de Retail Forum of Guinea (SOMERFO) for a livestock holding area. The southern end of the Reserve abuts on the Niger River. The (1700 hectares) 4250 acres south of the road is relatively flat. The north portion, (1300 hectares) 3250 acres, runs into hills and escarpments. The entire area is covered with grass, shrubs and trees. Sedentary farmers in the vicinity normally graze about 200 cattle in the Reserve.

The Bamako butchers' wholesale association consists of 29 beef butchers and seven sheep or goat butchers. They buy animals in the local bush markets and bring them to the Bamako area. Some are grazed in the immediate outskirts of Bamako for a week or two when grass is available. They are then brought to the holding yards of the Bamako slaughter house, where they are held for another week prior to processing. The cattle lose some weight during this period because they are not fed in the holding pens.

During the rainy season (approximately July to November) the animals are in good condition and are taken directly to the slaughter house. With the approach of the dry season (March to June) the animals' condition declines. During this period there is no forage in the Bamako area so the animals are taken directly to the slaughter house holding pens. Due to the underweight condition of the animals during this dry period, more cattle must be slaughtered to maintain the normal delivery rate of about 130 metric tons of meat per week.

Although there is a nominal government ceiling on the retail sale price of meat per kilogram, that price is inflated when a greater number of cattle must be slaughtered to maintain the normal volume of meat delivery to the Bamako market.

The objective of this sub-project is to create a

feeding station near Bamako that will assist the wholesale butchers to maintain the normal volume of meat delivery during the dry season without increasing the number of animals slaughtered, thus stabilizing retail beef prices in the Bamako area. In addition, the wholesale butchers will be able to keep their cattle in the feedlot until the day when they will be slaughtered and thus avoid the loss of animal weight that otherwise would occur during the seven-day holding period without feed at the slaughter house.

Pens capable of holding and feeding about 1000 cattle at a time will be constructed. New fire breaks will be constructed around the grazing preserve on both the north and south sides of the highway. A truck dock, chutes, working alley, catch pens, and feed storage sheds will be constructed south of the highway and near the Niger River. The receiving and shipping area will be designed to permit receipt of cattle either in trucks or on foot. Scales and a scale house will be provided. A tractor, gyromower, and six hay wagons will be provided, and an equipment barn will be constructed to house them. A small office building and parking area will also be constructed. A fence will be installed around the feedlot.

The feeding station will be operated from November through the following June. Each animal will normally be held for about 60 days. About 3000 cattle will be fed in the station during the normal eight-month period of operation. The animals will be watered by pumping water from the Niger River for the feedlot. Transportation expenses may be eliminated by walking the cattle to Bamako when they are ready for slaughter.

Feed for the cattle in the feeding station will be cut by local laborers in the forage areas on both sides of the highway. The grass will be cut in late September or early October when it is green and stored on curing poles in the feedlot. Supplementary cottonseed and minerals will also be provided to the animals in the feeding station.

Upon arrival at the feeding station all cattle will be quarantined for 21 days in a holding area north of the highway. During this period they will be observed for any signs of disease, tested for tuberculosis, vaccinated against all the common animal diseases, and dipped or sprayed against external parasites. After entry into the feeding station continuous surveillance will be maintained to guard against disease.

The portion of the reserve north of the highway will be subjected to modern range management methods to the maximum practical degree. A range inventory will be made and rotational grazing units defined and delineated by fire breaks or existing roads. Thereafter quarantined cattle

in the north portion of the Tienfella Forest will be rotated to a new forage unit only after they have completely grazed the first unit.

The credit activity that will be part of the Mali Livestock Project will finance the initial purchase of cattle and supplementary feed with a group loan to the five largest wholesale butchers of Bamako.

The Government of Mali will provide a full time agricultural technician to supervise and manage the feeding station. He will be assisted as necessary by the U.S. livestock advisor resident at Bamako. Veterinary services will be provided by the District Veterinary Office. Nutritional support will also be provided.

At the beginning of the project a Malian official will be sent to the U.S. for participant training. Upon return to Mali he will be assigned to assist the U.S. advisor at Bamako and will assume his functions at the end of three years.

Examination of the differential between the original purchase price of an animal and his sale price net of all feedlot, transportation, interest and tax expenses indicates that a 10 percent profit will accrue to the cattle butcher at the end of a 60-day period in the feedlot. The operation will be sufficiently profitable easily to amortize the capital investment in the feedlot over a period of ten years.

This sub-project to create a feeding station at Tienfella Forest near Bamako is expected to cost \$430,000 in U.S. dollar expenses and to require \$25,000 equivalent Malian contributions in the form of salaries during its three year life. Mali will also contribute the use of a large forest reserve with an unknown but significant value.

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APPENDIX SUB-PROJECT NO. 4

1. The feedlot has 36, 20 x 20 m., pens, each with a capacity of 25 head and one 20 x 80 m. (making 1000 head).
2. Cattle will be quarantined with veterinary inspection and immunization on the extreme north section of the area (north of the railroad). There will be four grazing pastures separated by five breaks, which will be used on a rotational basis. After a 21-day quarantined period, with the herds fed on the dry grass supplemented with 2 kg a head a day of cottonseed plus a salt-mineral mix, the animals will be regrouped and put into the feedlot in the southern part of the park for a 60-day period.
3. The middle section of the park (north of the road and south of railroad) will be provided as a corridor for trek animals and a place for the cattle owned by sedentary farmers that now graze in the park.
4. The design of this feedlot is similar to that of the Segou lot except that there are 7 fewer pens.

It is proposed to fence round the feed lot area a sufficient distance to isolate the feedlot cattle from any strays. This will require 422 x meters of fencing.

5. The animals might be watered from the river or by pumping or hauling water. The daily use is estimated at 3 gallons/head (6-10 more likely).
6. The feedlot could be expanded by adding groups of pens next to the existing pens (i.e. not by adding pens near the office and equipment store).
7. The rations are similar to those fed at Segou, differing only in quantities. As at Segou, the hay will be cut and stacked ready for use.

The rations are:	<u>Kg/head/day</u>	<u>FM/kg</u>	<u>FM/head/day</u>	<u>FM/head</u>	<u>Tons</u>
Cottonseed	3	8	24	1440	540
Rice bran	2	10	20	1200	360
Lolasses	1	10	10	600	180
Hay	<u>7</u>	<u>5</u>	<u>35</u>	<u>2100</u>	<u>1260</u>
	13		89	5340	
Vet Salt minerals				2000	
21 days of cottonseed at 2 Kg			16	<u>336</u>	126
				7676	

## MALI LIVESTOCK PROJECT

**F. Training**

The purpose of this paper is to recapitulate the training increment in each of the four direct livestock sub-projects of the Mali Livestock Project.

Five Malian Government officials will be sent to the United States for approximately 16 to 18 months of training, including three months of English language training and 11 months of academic and on-the-job training. Enroute back to Mali the trainees will visit feeding stations and holding areas in the U.S. and in other African countries.

Two of the participants will be feedlot specialists, two will be range management specialists, and one will be a range research specialist. Upon return to Mali one of the feedlot specialists will be assigned to the Tienfalla feeding station and will also work with sedentary farmers in the Koulikoro area. The other feedlot specialist will be assigned to the Ségon feeding station but will, however, devote most of his work effort to the sedentary farmers in the Doura area. He will also spend some time on the Doukoloma Park range management activity.

One range management specialist will also be assigned upon return from participant training to the Tienfalla feeding station and will devote part of his effort to the sedentary farmers in the Koulikoro area. The other range management specialist will be assigned to the Doukoloma range management activity.

The range research trainee will be assigned to the range research effort that is part of the Doukoloma Park range management sub-project.

This cadre of trainees is expected to mature with on-the-job training alongside the U.S. livestock technicians assigned to the project and to assume their functions at the end of the three-year life of the Mali Livestock Project. There will be another important but unmeasured increment of training on the part of the four Malians assigned as direct assistants to the U.S. livestock technicians.

The total cost of participant training for the four direct livestock sub-projects of the Mali Livestock Project is expected to be \$109,000. Malian salaries for the trainees will approximate the equivalent of \$38,000.

## Addendum to Training

The proposed project for livestock grazing in the higher rainfall, tse-tse fly zone discussed in paper No. 7 requires a cadre of Malian technicians trained in tse-tse fly surveying, range management, and ranch development planning. These technicians will also be used to acquire information for Malian policy and planning decisions for utilization of additional grazing land.

The following U.S. participant training is proposed:

Senior tse-tse officer (entomologist)	24 months
Agricultural engineer (surface water specialist)	24 months
Two range management officers	24 months each

The following third country (Nigeria and Tanzania) participant training is proposed:

Tse-tse research officer	3 months
Tse-tse survey officer	3 months

The following local training in Mali is proposed:

Six survey teams of two men each (12 Malians)	
Draftsman	
U.S. entomologist advisor (NOTE: The entomologist assigned in paper No. 7 to evaluate fly spraying technology can also perform this work)	1 month

This tse-tse related training is expected to cost \$90,000. All trainees' salaries will be funded by the Government of Mali. It is anticipated that the salaries of the Malian personnel involved in the training will amount to \$32,000.