RIM

LIVESTOCK AND LAND USE

IN

SOUTHERN GONGOLA STATE, NIGERIA

Final Report, Volume II; Main Text

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IN MEMORIAM

DR. KEVIN MILLIGAN

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VOLUME II

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DEFINITIONS OF GEOGRAPHICAL TERMS ADOPTED IN THE TEXT

1. **Adamawa.** A term applied to the whole of the extreme eastern parts of Nigeria between Yola and the Mambila Plateau, and the adjacent parts of Northern Cameroun. 'Southwestern Adamawa' refers to the whole of modern-day southern Gongola State and the neighbouring region of Cameroun Republic.

2. **Benue Lowlands (BL).** This name is applied to all the lowland areas east of the Benue river between Ibi and Lau, as far as the Shebshi and Mambila plateaux. It is also the name of a Development Region, the precise extent of which is shown on Overlay C.

3. **Middle Belt.** The central region of Nigeria, separating more densely populated regions to the north and south. Previously characterised as having a low human and livestock population.

4. **Southern Uplands (SU).** Equally applied to a Development Region shown on Overlay C and the full extent of the Mambila, Fali and Falinga plateaux, two of which extend into the Cameroun Republic.

5. **Sub-Humid Zone (SHZ).** The central region of Nigeria, defined by ILCA (1979) as lying north of the Rain Forest: Derived Savannah interface with a crop growing period of 180-280 days.

ORTHOGRAPHY OF TERMS IN NIGERIAN LANGUAGES

The two Nigerian languages cited in the text are Hausa and Fulfulde. Hausa terms are cited in conventional Nigerian orthography. Fulfulde terms use the orthography in Swift (1984) where glottalised consonants y, b, and d are shown by capitals. Thus 'wodaabe' appears as 'WoDaaBe'. Long vowels are shown by doubling.

ABBREVIATIONS AND ACRONYMS

The following acronyms are used throughout the report as abbreviated forms;

AP. Agro-pastoralists -pastoralists who farm regularly in the same location.
a.s.l. Above sea level.
A.U. Animal Units
AW. All-Weather
BL. Benue Lowlands.
CRCN. Christian Reformed Church of Nigeria.
CVO. Chief Veterinary Officer.
DOS. Directorate of Overseas Surveys.
F. Arable farmers with only small livestock.
FDF. Federal Department of Forestry.
FDPCS. Federal Department of Pest Control Services.
FLD. Federal Livestock Department.
FMA. Federal Ministry of Agriculture.
FMG. Federal Military Government.
FN. FulBe na'i -pastoral nomads.
GIRDP. Gongola Integrated Rural Development Project.
GSSD. Gongola State Survey Department.
GU. Grazing Unit.
HLE. Higher Livestock Extension.
IAI. International Africa Institute
IBRD. International Bank for Reconstruction and Development (The World Bank).
ILCA. International Livestock Centre for Africa.
JK. Jukun.
K. Carrying Capacity.
LDF. Livestock Development Focus.
LDP. Livestock Development Project.
LEC. Livestock Extension Centre.
LGA. Local Government Area.
LPS. Landuse Planning Section.
LRDC. Land Resources Development Centre, Overseas Development Administration, London.
LSC. Livestock Service Centre.
MB. Mambila people.
MEP. Ministry of Economic Planning.
MF. Mixed farmers -arable farmers who have taken up cattle-production on a small scale.
NLPU. National Livestock Project Unit - Formerly Livestock Project Unit (LPU).
NPV. Net Present Value.
OS. Outside Survey area.
RBDA. River Basin Development Authority.
RIM. Resource Inventory and Management Limited.
SE. Standard Error.
SHZ. Sub-Humid Zone.
SLAR. Side-Looking Airborne Radar.
SLDP. Second Livestock Development Plan.
SRSL. Small Ruminant Seasonal Loan.

SU. Southern Uplands Development Region.

TLU. Tropical Livestock Unit. One cow/cattle = 0.7 TLU
One sheep/goat = 0.1 TLU

UBRBDA. Upper Benue River Basin Development Authority.

SECTION I

INTRODUCTION

1.1 Background

As Nigeria's human population continues to grow, so does the demand for food, and there is consequently a need for both greater and more efficient agricultural production. The Federal Government has, therefore, placed a high priority on the promotion of agricultural development and increasing productivity in both the arable and livestock sectors.

Associated with the growth of the human population has been an inevitable expansion of settlement and cultivation, particularly in northern and southern regions of the country where population densities are highest. In turn, this has led to increasing pressure on the land, and greater competition for the natural resources available. Recently, aided by rapid development of Nigeria's major road network, extensive areas of the 'Middle Belt' or 'Sub-humid Zone (SHZ)' - historically characterized by low human population levels at the beginning of the colonial era - have been made more accessible to settlement, and are now being actively opened up by cultivation.

It has long been recognised that human activities in the form of burning, cultivation, deforestation and hunting have influenced and modified many of Nigeria's natural environments. Of late however, the pace of this process of man induced change has quickened, and the effects are becoming much more widespread and profound (Bourn, 1983). It is within this context of increasingly rapid environmental, social and agricultural change, that the Federal Government has adopted a long term strategy of encouraging the settlement of pastoralists, and of relocating the national cattle herd in more southerly latitudes (David West, 1981). Compared with the Arid Zone, the rainfall in the SHZ is higher (Nord, 1982), pasture is more plentiful, and the potential for cattle production is consequently greater (ILCA, 1979a). In the past, however, the presence of tsetse (Glossina spp), and the attendant risks of trypanosomiases, have been regarded as significant constraints to livestock development.

The Federal Livestock Department (FLD) is charged with overall responsibility for the promotion and coordination of livestock development throughout Nigeria. To this end, the National Livestock Project Unit (NLPU) [1] assisted by the IBRD (World Bank) was established as a major implementation agency in the mid-seventies. NLPU is concerned with the identification, planning, management and financing of a wide variety of livestock development projects. These range from the provision of credit for smallholder fattening schemes to the establishment of grazing reserves, and the management of cattle ranches.

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[1] Formerly the Livestock Project Unit (LPU).

The National Livestock Project Unit, in conjunction with the Federal Department of Pest Control Services (FDPCS - formerly Tsetse and Trypanosomiases Division), which has a long and successful history of tsetse eradication, selected the Toungo Block region of southern Gongola State (Map 1) as a primary area of interest. Though parts of the Block were well known to be heavily stocked with cattle, particularly the Mambila plateau, large areas were considered to be understocked, or unavailable as pasture because of an unacceptably high tsetse challenge. This land was therefore identified as a region potentially capable of supporting significantly increased cattle densities, if the amount of pasture available was increased, the productivity of existing herds improved, and new livestock attracted to the underutilised areas.

To evolve development strategies that will effectively realise these long term aims, a considerable amount of baseline data is needed. Surveys undertaken in southern Gongola State over the last two decades (e.g.: Bawden & Tuley, 1966, SOTESA, 1979, LIDECO, 1972, MASDAR, 1980, Volger et al., 1980) are available, but much of the information was approaching 10 years old and did not necessarily cover the whole area concerned.

During the 1982 wet season Gongola State veterinary authorities attempted a complete enumeration of all livestock populations within the state based on simultaneous field registration and recording. Adeoye (1983) has briefly described the methodology and presented a summary of the sheep, goat, horse, donkey, pig and poultry, in addition to cattle populations for each of forty Local Government areas then in existence. The total cattle population during August 1982 was estimated as some 5,129,188 head, an average density of 50 animals per square kilometer for the whole state. This is equivalent to an average statewide stocking rate of 2 hectares per animal or about half the previously estimated national herd. This figure should therefore be treated with caution.

It was recognised that, under the prevailing circumstances of long term and rapid agricultural expansion as well as environmental change, there was a danger that much of the available information concerning southern Gongola State was out of date and inadequate for the purposes of regional planning and project management. There was thus a need for a rapid assessment of the current status of livestock production throughout the Toungo Block, incorporating analyses of ecological, sociological, and economic elements of livestock production into reliable estimates of livestock distributions and densities. From this basis, the priorities for regional development project planning and management could be evaluated.

Resource Inventory and Management Limited was therefore contracted to carry out a natural resource assessment of the region, in order to provide essential up-to-date information on the abundance and distribution of livestock, establish present land use patterns, and describe existing livestock production systems.

1.2 Objectives and Approach

As outlined in the contract agreement between Resource Inventory and Management Limited, and the Livestock Project Unit, the specific objectives of the Livestock and Land Use Study of southern Gongola State were to:

1. **Quantify and map the distribution of livestock populations;**

2. **Determine seasonal movement patterns;**

3. **Map the distribution of vegetation and land use, rangelands, water resources and ecological conditions;**

4. **Map the distribution of pastoral and arable communities;**

5. **Analyse the relationships between the seasonal distribution of people, livestock and land use;**

6. **Examine herd structure information and assess production levels;**

7. **Describe traditional modes of livestock production;**

8. **Assess relations between pastoralists and arable farmers;**

9. **Assess major constraints/requirements of livestock production;**

10. **Interpret results in terms of regional development possibilities;**

The study site of southern Gongola State occupies a total land area of some 43,900 square kilometers (Maps 1 & 2). The conventional approaches commonly used to perform detailed surveys of such a large area are expensive both in terms of the time and the man-power required. This is especially true if a complete coverage of the more remote localities is desired, and access routes are few and far between; or if the data are to be collected from all parts of the survey zone simultaneously so as to provide reliable estimates of population levels and distributions. This problem is further compounded when it is necessary to cover a prospective study area twice in one year, so that the inevitable seasonal variation in the distribution of relevant populations, characteristic of the SHZ, can be adequately assessed.

The approach adopted by **RIM** was specifically designed to overcome or minimise most of these drawbacks. The primary numerical data concerning livestock population levels and distributions, as well as broad scale ecological and land use parameters, were collected using low level aerial survey techniques. These were developed and expanded from the established methodology by the ILCA Aerial Survey Programme, and executed by a team of experienced observers and ecologists. These surveys were flown in both wet and dry seasons, each taking approximately 100 hours flying time. The rapidity of these surveys meant

that the effects of all but very local movements of the relevant populations could be excluded from the estimates collected. Such estimates were therefore likely to produce accurate representations of the situation on the ground, applicable to both wet and dry seasons. Further, these methods quickly provided rapid preliminary results so that subsequent investigations on the ground could be and targeted. The ground based survey personnel were therefore able to concentrate their efforts in areas that were strictly relevant to the regional aspects of livestock production, without first having to identify them. A further advantage of dual surveys is that questions raised in the first can be addressed in the succeeding studies.

The aim of the ground surveys was to collect information that was unavailable from the air - either socioeconomic factors as they affected livestock production and its potential for development, or with detailed analyses of production parameters such as herd structures and herd dynamics. These could then be directly linked to the spatial distributions collected from the air, and regional extrapolations produced.

Once collected, the data gathered from aerial and ground surveys was synthesized to provide a description of both zonal and regional livestock production systems in the Toungo Block, as well as the constraints operating on them. Options for development were then identified, based on discussions with pastoralists about their problems with livestock and their proposed solutions. Mediated by both economic practicality and administrative feasibility, the effectiveness of these options could be quantified by reference to the aerial survey datasets.

Throughout the various phases of the survey, it has been a RIM policy to make as much of the information available as possible. To this end, a series of Working Papers has been produced, concurrent with this report, each covering specific aspects of the work in hand.

1.3 Structure of Report

For ease of reference by administrative and technical readers, this report of a study of livestock and land use in southern Gongola State, has been prepared in three volumes:

The first volume provides an executive summary of the major findings of the livestock and land use study of Gongola State and reviews regional development possibilities, with specific emphasis on the economic evaluation of development options.

The second volume contains the main body of the survey results, and is divided into seven major sections:

SECTION I includes the general background to the survey, its objectives, the approach employed and a summary of the methods used to collect and interpret the necessary information.

SECTION II briefly describes the geography and history of the study area itself, the relevant characteristics of its inhabitants, the particular features of the livestock production systems they use, and the types of animals they possess.

SECTION III presents the results of the quantitative assessment of the abundance and distribution of human and livestock populations within the survey area, and describes the patterns of environmental and land use parameters as estimated from the air. It also contains some of the data concerning cattle herd structures and production parameters that were collected on the ground. This information is then examined in relation to selected strata, and the major potential foci for development planning are identified.

This is followed, in SECTION IV, by a detailed description of the factors affecting livestock production in each of the primary regions of interest as identified from the air, with particular reference to their relevance to possible development strategies.

SECTION V comprises a synthesis of the constraints on livestock production within the survey zone, as inferred from the information presented in the previous Sections, and as perceived by the stockowners themselves. Also considered are the stockowners' own suggestions of the ways in which livestock production in southern Gongola could be improved, and their reactions to technical interventions proposed by NLPU in its Second Phase Preparation Report (NLPU, 1984).

In SECTION VI, a variety of possible livestock development options for the survey zone are identified and evaluated in the light of the ecological, environmental and sociological information available, with specific reference to their regional applicability. Their implementation is then discussed in terms of their acceptability and the size and distributions of the target populations.

Finally, SECTION VII consists of a macro-economic overview of the livestock resources of the Toungo Block and an financial analysis of livestock production models, in the context of a modular form of Livestock Extension Centre and a Pilot Extension Project. assessment of the likely benefits of different strategies.

RIM lays considerable emphasis on the presentation of information in a direct, visual manner and therefore many of the findings of survey group are presented as maps, as well as in the text. A number of transparent overlays for these maps are provided in a pocket, so that various features of the survey zone can be effectively compared with one another.

The third and last volume is made up of a series of appendices dealing with subjects of a more specialised and technical nature referred to in

the preceeding volumes. It also contains much of the tabulated data referred to in this volume. A series of additional maps, indicated by roman numerals in the text are located in Appendix VI.

1.4 Methodology

1.4.1 The Aerial Surveys

1.4.1.1 Flight and Sampling Procedures

The wet season aerial survey was carried out in July 1983, and the dry season survey during February and March 1984. The survey zone centred on latitude 8 00' North and longitude 11 00' East. Designated survey boundaries were provided to north-west by the Benue river; to the south-west by the Donga river; to the east by the border with the Cameroun Republic; and the northern limit lay just to the south of the town of Jalingo (Maps 1 & 2).

Details of the methodology of systematic low level aerial survey are given in Appendix I, but essentially the survey aircraft flew down the centre line of each grid cell, with experienced observers collecting information from sample strips on each side of the aircraft.

1.4.1.2 The Information Collected

1.4.1.2.1 Livestock populations

All cattle herds (grazing units) observed within the two sampling strips were recorded, and a visual estimate of the number of animals they contained was made. Herds were also coded by their predominant colour (see Section III).

When possible, photographs of grazing units containing more than ten animals were taken with 35 mm cameras fitted with zoom lenses, and using 200 ASA colour film. These photographs were used to calculate the daily bias of each observer, and the initial counts then corrected accordingly.

Similarly, all flocks of sheep associated with cattle were recorded, while the goat population was estimated indirectly, using a combination of aerial and ground based information. By establishing the number of goats kept per compound in each region, and multiplying these figures by the number of compounds recorded from the air, overall numbers were calculated.

All other large livestock or wildlife species seen during the surveys were also recorded, but, because they were found to be so few and far between, analysis of their distribution and abundance was not justified.

1.4.1.2.2 Human habitation.

The size of all human settlements lying within the ground sampling strips were also recorded, and the number of dwellings they contained were estimated. A distinction was drawn between arable habitation - dwellings without associated cattle corrals; and pastoral habitation - dwellings with associated cattle corrals. Pastoral dwellings were further subdivided on the basis of structure and apparent degree of permanence. Permanent rectangular structures, or typical, semi-permanent, round, 'beehive' rugas were classified as 'settled' pastoralists; temporary shelters, - either made of cut branches and leaves covered with blue plastic sheeting, or conical structures made from crop stalks - were classified as 'nomadic' pastoralists. During the dry season survey, the pastoralist dwellings were further divided into agropastoral - permanent rectangular buildings with both associated corrals and crops; and 'settled' FulBe with crops - i.e. typical rugas with associated crops nearby. A discussion of these dwelling categories in relation to the owners livestock production system can be found in Section 2.4.3.

1.4.1.2.3 Environmental conditions

For each grid cell the following environmental parameters were recorded during flight: the presence of open water; the degree of gully and sheet erosion; the proportion of land under cultivation; and the proportion of four types of vegetation cover - closed canopy forest; open canopy woodland; lightly wooded savanna; and open grassland. Several types of less critical information was also collected, which was not used extensively for the preparation of this report, but is held in the **RIM** archive and is available on request: the degree of burning during the dry season; the density of deserted corrals and dwellings; the distribution of cattle trails and bush tracks; and the amount of dry season grass cover.

1.4.1.3 Aerial Survey Information Analysis

After completion of the survey the exact number of animals in each grazing unit (GU) photographed was accurately counted from a back projected image of a colour slide in a micro-fiche reader. The figures obtained were then compared with visual in-flight estimates, and the bias of each observer calculated. This bias factor was determined on a daily basis and then used to correct the estimates of larger herds that could not be photographed, or where the quality of the photograph was too poor for counting.

After correcting all the animal estimates made during the survey, the total numbers of animals and GU's seen along each line of grids were calculated by pooling the observations made on each side of the aircraft. Each line was treated as an independant sample of the total animal population, from which an overall population estimate, with confidence limits, was computed using the Ratio Method recommended by Jolly (1969) and covered in detail by Norton-Griffiths (1978) and

described more fully in Appendix I.

Counts of arable and pastoral dwellings, and the proportions of land under cultivation, were treated in a similar statistical manner, using the Jolly Ratio Method to provide overall estimates of abundance.

It is perhaps necessary to point out that the statistical error, or precision, of a population estimate is a measure of the patchiness of the distribution of the population, rather than the accuracy of the population estimate itself. Thus, in this survey, where the variance is high relative to the population total, this indicates that the distribution of that population is very uneven.

1.4.1.4 Cartographic information

For each grid square, a number of essentially geographical parameters were abstracted from published maps to permit the stratification of data collected from the air, and to provide additional information to which population size and distributions could be related.

The predominant land system and geology of each grid cell were determined from maps published by the Land Resources Division of the Directorate of Overseas Surveys (Bawden and Tuley, 1966).

River catchments and altitudes were derived from a map of the river Benue drainage basin published by the Land Resources Division of the Directorate of Overseas Surveys (LRD, 1974).

Vegetation and land use patterns were assessed from Side Looking Airborne Radar (SLAR) maps published by the Federal Department of Forestry (FDF, 1978).

The distribution of Glossina morsitans was derived from current tsetse distribution maps made available by the Federal Department of Pest Control Services, and from discussions with fieldstaff.

General accessibility and water availability were determined by measuring the distance from each grid centre to the nearest major road, towns and rivers as indicated on the base map of the survey zone (Map 2).

For the wet season stratifications, the boundaries of Local Government Authority areas was derived from a map published by the Gongola State Survey Department (GSSD, 1983). However, between the two surveys, the Federal Military Government ordered the re-amalgamation of Local Governments to conform to the pre-1981 boundaries. These were derived from the SOTESA (1979) report.

The baseline map (Map 2, Overlay A), and Map 1, showing smaller tracks and interview sites was compiled from the Ordinance Survey (250,000 series), the Gongola State Map (GSSD, 1983) and subsequently modified on the basis of the groundwork.

Distribution maps within the report were generated by an innovative computerised cartography. A short description of the methods used to produce them is given in Appendix I.

1.4.2 Ground Survey

1.4.2.1 Methods

The method of the ground surveys was to research in detail those regions where aerial survey had indicated greatest cattle concentration. Ground investigation began directly the preliminary results from the wet season aerial survey were available at the end of August, 1983, and continued until October of that year. After the completion of second set of air surveys, groundwork began in the middle of March 1984 and continued until the end of May.

The second ground survey, apart from visiting areas of high cattle concentration and locations that were inaccessible during the wet season because of the condition of the roads, also concentrated on the livestock of arable farmers. Sample interviews were made in arable communities throughout the Toungo Block to determine the incidence and importance of livestock, and the reaction of farmers to the expansion of FulBe pastoralism into new areas. A complete itinerary is provided in Appendix IV, and Appendix I gives an overall summary of field methods. Table I summarizes the interviews undertaken during the course of groundwork.

TABLE 1

SUMMARY OF GROUP AND INDIVIDUAL INTERVIEWS

	FN	AP	MF	F	TOTAL
1. Cattle-owners	1516	890	103	-	2509
% Total	60.4	35.5	4.1	-	100
2. Livestock owners	-	-	-	277	277
3. TOTAL LIVESTOCK-OWNERS INTERVIEWED					2786
4. %Total	54	32	4	10	100

Other Interviews;

	Government Officials	Traditional Rulers	Traders	Local Residents	TOTAL
1. No.	22	57	13	19	111
2. % Total	19.8	51.4	11.7	17.1	100

In addition to the results of general interviews, the wet season groundwork revealed the need for more precise information on herd structures, and causes of animal mortality. During April and May 1984, intensive studies were conducted on cattle-herds in Ganye and on the Mambila Plateau, with co-operation of the State Veterinary Service.

1.4.2.3. Literature Search

The Toungo Block has been neglected in terms of ethnographic, historical, economic and ecological studies, by comparison with other parts of Nigeria. A number of development reports (e.g. LIDECO, 1972; SOTESA,1979; MASDAR,1980; Volger et al.,1980) have been prepared relating to parts of the study area. However, subsequent groundwork revealed that most of them were based on incomplete and out of date archival material, or else prepared from remote-sensing data, and were thus of only limited value for a more comprehensive description of livestock production systems.

After the completion of groundwork, a further review of manuscript and published sources was undertaken. Published sources were consulted in the libraries of Cambridge University, Rhodes House, Oxford, and the School of Oriental and African Studies in London. The Nigerian National Archive, Kaduna, has a number of administrative documents relating to the former provinces of Eastern Nigeria. Manuscripts relevant to the Toungo Block are contained in the Section 'Yola Profiles' and these are listed in more detail in Part I of the Bibliography, 'Archive and Manuscript sources.' There is a limited amount of ethnographic material in English, most of it deriving from work by Charles Meek, who was Government Anthropologist in Nigeria in the 1920's and 1930's. Ethnographies of the nomadic FulBe abound, but none refer to the situation in southern Gongola, where ecological and social conditions are sufficiently remote from the classic Sahel locations, as to make these works unreliable other than as bodies of comparative data. The most valuable and important sources are those in German and French, dealing with those parts of Adamawa immediately adjoining the study area. German forces invaded Adamawa from 1899 onwards, and they controlled both Mambila and the Ganye area until the First World War. Ethnographic material was prepared both by the military captains themselves, and by scholars who came afterwards. These sources have been little explored, but they provide important guides to the movement of nomadic FulBe into Adamawa, and the development of trade and commercial

networks in the area.

French source materials are more complete and sophisticated than those in German. Both historians and geographers have dealt with Adamawa in some detail, and many of their findings have relevance for the general problems besetting the area today. For example, Hurault (1964 & 1969,1970) dealt with the problems of conflict between farmers and stock-rearers in Banyo, only ten miles from the Nigerian border. His descriptions of livestock production and demographic instability correspond closely to the findings of the RIM team. Hurault, moreover, considered various development options, and his valuable suggestions have never been fully explored.

SECTION II

THE STUDY AREA

2.1 Land

2.1.1 General Characteristics

The Toungo Block study area occupies most of southern Gongola State in eastern Nigeria bordering on the Republic of Cameroun. The region is one of varied landscapes and considerable agricultural potential. In contrast with much of the rest of the Nigerian Middle Belt or Sub-humid Zone (Nord, 1982) the Toungo Block is characterised by its geographical diversity, its wide range of environments and natural resources.

The aerial survey zone is centred on latitude 8 00' North and 11 00' East and occupies a total land area of 43,875 square kilometers. The boundaries are the Benue river to the north-west; the Donga river to the south-west and the border of the Cameroun Republic to the east. The northern limits lie just to the south of the towns of Jalingo and Jada.

Over the years a number of geographical and environmental descriptions of the region have been published or reported by consultants (Grove, 1956; Bawden and Tuley, 1966; LIDECO, 1972; SOTESA, 1979; MASDAR 1980; FACU, 1981). Perhaps the most comprehensive study, dealing specifically with land resources and certainly one of the most frequently referred to, is the work of Bawden and Tuley (1966), based largely on the interpretation of aerial photography taken in the 1950s.

2.1.2 Drainage and Physiography

The entire study area falls within the Benue drainage basin and the catchments of the Deo, Donga and Taraba rivers. Physiographically the Toungo Block is extremely heterogeneous with some 23 "land systems" recognised by Bawden and Tuley (1966). These can be simplified into three major categories:

Plains ranging in altitude from 100 meters at the confluence of the Benue and Donga rivers in the lowlands to the elevated Serti-Mayo Selbe-Gashaka plain at just under 1000 meters, which occupy some 63% of the total land area.

Dissected Highlands and Foothills which are generally associated with the escarpments to the east and south of the region, ranging in altitude from 350 to 1700 meters, with slopes varying from 5 to 30 degrees (undulating to steep) and occupying some 26% of the total land area.

Montane Grasslands including the Mambila, Fali and Falinga Plateaux, Chabal Hendu, and the smaller grasslands of the Shebshi range such as the Tiba and Kiri plateaux, ranging in altitude from 1,200 - 1,900 meters, with gently undulating terrain surrounded by very steep escarpments and account for 11% of the total land area.

2.1.3 Geology and Soils

Some 75% of the Toungo Block is underlain by rocks of the basement complex - gneiss, migmatite and granite. Alluvial deposits, accounting for some 4% of the land area, flank the Benue river and the lower reaches of the two major tributaries, the Donga and Taraba. Cretaceous non-marine sediments form a band parallel to the Benue alluvial deposits, occupying approximately 10% of the region. The remaining 10% is made up of four discrete areas primarily of basaltic volcanic rocks, the largest of which occurs on the Mambila plateau.

Ferruginous tropical soils derived from crystalline acid rocks of the basement complex dominate the area, with humic ferrisols derived from both basement and basaltic rocks in montane areas. Soil classification indices (FAO, 1966) indicate that most of the lowland areas have medium to high soil productivity and good agricultural potential. However, Bawden and Tuley (1966) note that many of the soils have a sub-surface horizon with a high content of iron concretions and fossil ironstone occurs in many areas, both in the highlands and in the lowlands. Skeletal lithosols occur in highland areas and mineral hydromorphic soils are present in the Benue valley.

2.1.4 Rainfall and Climate

The north-south rainfall gradient, a typical feature of Nigerian climate, is also present in the Toungo Block but is modified by the influence of the mountainous regions to the south and east. Mean annual rainfall ranges from 1,250 mm at Jalingo in the north, to 2,000 mm at Gembu in the south on the Mambila plateau and to some 2,500 mm at Abong in the lowlands on the western windward side of the plateau.

With the passage of the intertropical convergence zone over the region, southern areas tend to experience a bimodal rainfall distribution with peaks in June/July and September/October (Gembu, Abong and Donga), while further north at Jalingo the rainfall pattern is unimodal with peak rainfall occurring in August/September.

Taking the wet season to include those months with more than 100 mm of rainfall, then in the north at Jalingo, the rains last for six months from May until October; while in the south they last for eight months, from March until October at Gembu and from April until November at Abong. Kowal and Knabe (1972) have estimated the crop growing season to range from 210 days in the north to 240 days in the south.

2.1.5 Vegetation and Land Use

The zonal distribution of Nigerian vegetation has long been recognised as falling into a series of east-west orientated belts, which have been mapped and described by Keay (1953) and Clayton (1957), and placed in a continental perspective by Keay et al. (1959). The vegetation zones are closely related to the rainfall pattern but in areas such as the Tougou Block are distorted by the influence of mountainous areas to the south and east.

Following the terminology of Keay et al. (1959), Bawden and Tuley (1966) distinguished four main vegetation zones:

Guinea Savanna: The most widespread form of vegetation, found in the western lowlands of the Toungo Block. In the south-west typical Southern Guinea Savanna occurs, with abundant **Daniellia oliveri** and **Lophira lanceolata.** This becomes transitional to the north-east and gives rise to Northern Guinea Savanna with **Afzelia/Burkea** woodland and locally abundant **Isoberlinia spp.**

Composite Vegetation: This is the next most extensive zone, occuring to the east of the Tougou block and north of the Mambila plateau. As the name implies it is a complex grouping, containing mixed elements of rain forest-savanna mosaic. Guinea and Sudan Zone vegetation types, very much dependent on orographic influences, with limited local distribution patterns and swift transitions.

Rain Forest-Savanna Mosaic: A Derived Savanna zone of relatively limited extent, confined to the south of the Toungo Block, to the west of the Mambila plateau, resulting from forest encroachment by cultivation and fire, with substantial patches of relict forest.

Montane Communities: This is the most limited vegetation type occuring on land above 1,500 meters. Forest communities are largely confined to stream banks and steep inaccessible areas. On the interfluves and in more amenable terrain, forest communities have been replaced by fire affected sub-climax grassland, typically **Hyperrhenia** dominated, with **Loudetia spp.** Under intensive grazing or trampling by cattle **Hyperhennia** has been replaced by tufted **Sporobolus spp.**

More recently, Side Looking Airborne Radar (SLAR) imagery, acquired in 1976, was used to assess and map vegetation and land use patterns over the whole of Nigeria (FDF, 1978). A simplified categorisation of the various vegetation and land use classes recognised within the Toungo block, indicates that some 62% of the land area is occupied by Wooded-Shrub-Grassland, Woodland Transition and Woodland; 22% by Grassland; 3% by Forest; and 13% by land with 30-60% cultivation, including fallow land.

The Gashaka and Gumpti Game Reserves are the largest area in the Toungo Block preserved from settlement, hunting and livestock-rearing. They include examples of all the types of terrain discussed previously.

2.1.6 Tsetse

Tsetse (**Glossina** spp.) are the primary vectors of animal and human trypanosomiases. Although Nigeria has had a long history of tsetse control and eradication through the application of insecticide (Putt et al., 1980; Bourn, 1983a), the eradication programme has largely been to the north of the sub-humid zone (Davies, 1964; 1971). Control operations within the Toungo Block have been relatively small scale and have been

confined to marginal areas of the Mambila plateau and areas of limited extent in the vicinity of Mutum Biyu during the sixties and on the border with Cameroun, south of Toungo town in the late seventies and early eighties.

As the Toungo Block occupies one of the more remote and least accessible regions of Nigeria, comprehensive tsetse surveys of the entire area have never been carried out. Although numerous local tsetse surveys have taken place over the years and sufficient knowledge exists for a general assessment of tsetse distribution to be made, in view of the continuing lacunae in our knowledge of this region, all statements concerning tsetse must be treated with due caution.

Of the eleven recorded species of Nigerian tsetse (Davies, 1977), five have been found within the boundaries of the Toungo Block. Each of the main species-groups is represented: **G. morsitans** and **G. longipalpis** of the "savanna" dwelling group; **G. palpalis** and **G. tachinoides** of the "riverine forest" group; and **G.fusca** of the "forest" dwelling group. Although not yet recorded within the area, **G. haningtoni** of the latter group has been found slightly further to the south. The limited extent of forest habitat and its general unsuitability for cattle, means that the importance of forest dwelling tsetse may largely be discounted within the Toungo Block. Essentially therefore, four species predominate within the zone.

The actual distribution of each tsetse species is closely related to their respective tolerance to temperature and humidity extremes, the presence of adequate vegetation cover to provide tolerable microclimates and the availability of suitable host animals. Generally, tsetse rarely occur above 1200 meters and plateaux exceeding this height may be considered to be effectively tsetse free. Although individual tsetse may be occasionally found at higher altitudes, they are unlikely to represent permanent populations.

2.1.6.1 Savanna species

Based on experience of their ecology elsewhere in Nigeria, the distribution and abundance of the two savanna species is likely to be closely associated with relatively undisturbed habitats and the presence of resident wildlife populations. The diet of **G. longipalpis** in particular would indicate a virtual dependance on bushbuck, whilst that of **G. morsitans** would suggest a close relationship with warthog.

Of the two species, **G. longipalpis** has the more southerly distribution, is linked to thicker forest vegetation, and is an inhabitant of the forest margin or the forest-savanna ecotone. **G. morsitans** typically lives in more open savannah habitats frequented by game animals and has a more northerly geographical distribution than **G. longipalpis.** However, in the height of the dry season its distribution will be restricted to areas of denser vegetation, where tolerable microclimates are provided.

Both **G. longipalpis** and **G. morsitans** have relatively high trypanosome infection rates. Because of this, and their close association with the wildlife reservoir of the disease, the savanna species of tsetse are generally considered to represent a higher risk of trypanosome challenge to cattle.

Historically the boundaries of **G. morsitans** belts within the Toungo Block have always been conjectural and have varied considerably from one published map to another. According to current tsetse distribution maps (FDPCS, 1982), the present istribution of **G. morsitans** is indicated as one major area of infestation (belts 43 and 44 combined) to the south-west of Jalingo and another much smaller area of infestation (belt 47) on the Cameroun border, near the town of Toungo. This latter belt is in fact the westward edge of a much larger area of infestation centred on the protected River Faro Game Reserve in Cameroun, the boundary of which is but a few kilometers to the east of the Nigerian border.

More recent partial surveys of the Toungo Block, carried out in the late seventies and early eighties, indicate that belts 43 and 44 no longer exist, and that there has been a westward extension of belt 47, through the Gashaka Game reserve, towards the town of Bali. The boundaries of this apparently expanding belt, however, remain conjectural and the distribution of **G. morsitans** within it is likely to be patchy.

As previously mentioned **G. longipalpis** is a species of the ecotone between forest and savannah, where bushbuck persist. Existing records are from locations scattered around the base of the Falinga and Mambila plateaux, where there is some fairly extensive forest vegetation. Recent surveys have also found this species north of the Bali-Serti road, in forested areas.

2.1.6.2 Riverine species

Although the geographcal range of the two riverine species covers much of the lowland region, their actual distribution is, as their group name implies, greatly restricted and closely follows the dendritic pattern of thicker vegetation associated with drainage lines, streams and rivers. Of the two, **G. palpalis** is the less tolerant of arid conditions and is recorded only in more southerly areas of the Toungo Block, where riverine forest is generally thicker and water flow is likely to be permanent, or at least pools of standing water persist throughout the dry season. **G. tachinoides**, however, may be found in suitable habitats throughout the region.

Although both **G. palpalis** and **G. tachinoides** may also be found in wilderness areas, these two riverine species generally have far more catholic feeding habits, which may include man, reptiles, birds or a variety of mammals. Both are therefore also capable of surviving in habitats much disturbed by human activity and in the virtual absence of wildlife. In such modified, or peridomestic settings, both species may become orientated to man and his domestic animals.

In comparison with savanna group tsetse, the infection rates of **G. palpalis** and **G. tachinoides** are generally low, and in the absence of the wildlife reservoir, the degree of trypanosome challenge is of a much lower magnitude than that represented by the savanna species.

2.2 People

2.2.1 Historical Background

2.2.1.1 Settlement by arable groups

There have been no comprehensive historical or ethnographic studies of the Toungo Block, and interviews conducted for **RIM** remain the primary source of information for the location and distribution of ethnic groups and their modes of production. Fremantle (1920) and Migeod (1927) are the primary sources for the early colonial period, and only Meek (1931a, 1931b) provides a bridge with the development reports prepared in the 1970's.

In comparison to other parts of Northern Nigeria, the populations of the Toungo Block are extremely diverse, both socially and linguistically. The migration and interaction of these people is probably responsible for their fragmentation, as much as the varied ecology and the diversity of production systems. Map 2 shows the locations of the more than forty ethnic groups in the Toungo Block.

The original population seems to have been speakers of the Adamawa family of languages, such as Samba, Mumuye and Kam (Samarin,1971), who were arable farmers raising goats and chickens. Subsequent to this, the expansion of the Jukunoid languages from the Baissa region (Shimizu, 1980), pushed Adamawa speakers back to the north and east. More recently, groups from the Cameroun grasslands, speaking Bantoid languages such as Batu, Tiv and Mambila, have moved in as part of a trend towards expansion of arable farming populations. In the nineteenth century, military expansion of Hausa and urban FulBe from north-central Nigeria brought both Islam and humped cattle, as well as the use of Fulfulde as a lingua franca. It also led to the scattering of a variety of Jukun communities, such as the Kona and Jibu. Isolated Muslim populations, such as the communities of Hausa at Ibi, and along the rivers Suntai and Taraba, date from this epoch. Concurrently with this was the westwards movement of raiding parties of the Samba Leeko into the southeastern Benue lowlands. This formed part of the impetus to settle the grasslands, such as the Fali, where Ndoro and Icen found refuge. Historical sources for this period are numerous, although of uneven quality. A complete listing can be found in Blench (1983a), but the most important are Chilver (1981), Fardon (1980, 1983), Frobenius (1913), Garbosa (1960), and Strumpell (1912).

A characteristic of the peoples throughout southwestern Adamawa prior to the incursions of the Samba Leeko and FulBe was an acephalous political organization - that is, their societies were non-hierarchical, with no level of authority higher than a village chief. They were organised by a variety of principles, the most important being the clan

system. Clans are formed of individuals who are related through either their mothers or fathers, and their membership of a clan determines who they can marry. Often the method of forming compounds and the recruitment of agricultural labour is clan-based.

As a result, when attacked from outside by a well-organized military force, there were no coherent mechanisms to mobilize for the defence of these scattered communities. The Samba Leeko raiding parties that moved in from the Cameroun grasslands and established a series of walled towns in the valleys of the Taraba and Benue (for example at Bakundi, Bali, Takum, Tissa, Kungana and elsewhere) which were important foci for trade routes until recently (Map II). The FulBe raiders established settlements such as Gassol, Bantaji and Mayo Ndaga in the same way and took tribute from Wukari with relative ease. A characteristic of the political history of the eastern Benue lowlands in the nineteenth century is the marching of armies back and forth, capturing towns and raiding. The FulBe armies forced peoples such as the Jibu to move from their towns near the Benue to dispersed villages east of Bali. Other groups living at the foot of high-altitude grasslands, such as the Icen and Ndoro, moved up into them for security.

The colonial policy of indirect rule, by supporting established Islamic rulers, tended to weaken the power of non-Muslim chiefs, and so subvert traditional authority structures, furthering the process of fragmentation that had characterised the nineteenth century. The freedom from external pressures in the post-Independence period resulted in a gradual awakening of a more coherent ethnic consciousness. Many peoples have gained a sharpened sense of unity and in consequence have been active in support of their rights and in establishing infrastructure within their home area in a manner impossible under colonial rule. The Samba, the Icen, the Kuteb and others, have formed Development Associations to act as a focus for cultural aspirations. They were also an impetus for improvements in the local infrastructure during the period 1980-4. The increase in the number of Local Governments during the period of civilian rule reflected the pressure for small groups to have direct access to the economic resources of the state.

The period of National Government, and the gradually improving communications and systems of access have encouraged changing patterns of settlement and subsistence. The most important of these from the point of view of planning is the expansion of arable farmers. Groups such as the Mumuye and the Tiv, with rapidly increasing populations must either become more efficient farmers or else be willing to clear fresh areas of bush. The Tiv, for example, have been gradually moving the frontier of their settlements further and further from the original homeland. Map III shows the expansion of Tiv farmers in the Toungo Block over the last forty years. Although decisions on the sites of new compounds are partly based on the availability of roads, communities will act jointly to build bridges and feeder roads if they judge that they will be cost-effective. These roads are used to export their considerable crops and livestock surpluses, particularly yams and pigs

(Maps 4 & I). A similar rate of expansion is found for Mumuye farmers, spreading down from the Jalingo region.

Apart from the colonisation of adjacent territory, the expanding roads network has made it possible for communities suffering from a land squeeze elsewhere in the country to set up a community. An example is the Karekare community in Kungana, set up in 1982. The Karekare live north of Potiskum in an infertile and overused land. Having explored various locales, they came to an agreement with the local Samba Leeko people to form an outlying community, and then a whole village moved in. Over the last five years similar movements have occurred with the Angas from Pankshin, the Waja from northern Bauchi state and the Yandang from Mayo Belwa.

Another method of colonising new regions is along the rivers. In the 1920's, the main stream of the Benue was controlled by the Wurbo, a specialised fishing people related to the Wapan of Wukari (Fremantle, 1920:29). The growth of the population in the intervening years has stimulated a considerable expansion of the activities of fishing groups. Urhobo have migrated from Bendel state, Jukun fishing-people from Wukari have independently begun to colonise the main river, and Bacama from the Numan area have been extending their range further south. In consequence, the Wurbo have begun to move further down the tributaries of the Benue, especially the Donga, Taraba, Suntai and to a lesser extent, the Kam. The settlements they have formed have in turn attracted Hausa farmers, who exchange cereals for fish, and market the surplus produce.

2.2.1.2 Settlement by pastoralists

The first groups of FulBe pastoralists to move into southwestern Adamawa were the Rahaaji clan who entered the Mambila Plateau from Banyo in Cameroun more than eighty years ago. The impetus to settle Mambila and the other grasslands was overpopulation in the grasslands of central Adamawa, which were saturated by the middle of the nineteenth century. Because of tsetse the lowlands were not settled until well into the colonial period.

Map 6 represents isochronically of FulBe na'i movement into the Toungo Block. This shows that the colonisation of the Toungo Block by pastoral nomads is confined to this century. Very few of the urban FulBe were cattle-owners, while the sedentary FulBe living there today came originally as nomads.

Movement into the Benue lowlands was from two directions; from the north, via Jalingo, and from the west, across the river at Ibi. This process continues today, with herders from the arid zone migrating across the Benue flood-plain to the forests at the foot of the Shebshi mountains, in the wake of increasing arable settlement of the area. At the same time, the degradation of the Mambila now compels cattle-owners to send part of their herd to the lowlands, both north and west of the escarpment (Map 7). If pressure on the land continues, then this will be another source of lowlands colonisation additional to the movement from the west

bank of the Benue.

2.2.2 Population

2.2.2.1 Ethnic Groups

Table 2 summarizes the information available concerning the ethnic groups of southern Gongola State, their livestock and means of subsistence. Map 3 locates them as far as the data allow, although many peoples, particularly the Tiv and FulBe, live dispersed among other groups, and so cannot be easily distinguished geographically.

2.2.2.2 The specialised livestock-producers

Certain peoples are of particular interest to a livestock agency, because they specialise in livestock production, and the majority of the cattle are in their hands. In the Toungo Block the most significant cattle-producers are the FulBe, the Samba, the Mambila and the Mumuye. The FulBe are widespread throughout the survey area, whilst the other groups are confined to particular regions. A brief introduction to FulBe society follows, but fuller discussions of Samba, Mambila and Mumuye are reserved for in the description of regional characteristics (Section IV).

The FulBe

The FulBe are the most well-known and widespread group of cattle pastoralists in West Africa. Their original home was in the extreme west in Senegambia, but their dispersal began more than a thousand years ago (Stenning, 1959:20 ff.). Their constant need for new pastures to meet the needs of their expanding herds has created a continuing drift eastwards, and the evolution of diverse livestock management techniques to exploit a variety of ecological conditions.

FulBe were originally nomadic and prepared to move long distances to obtain favourable conditions for their animals. The literature provides a number of descriptions of the social system of the nomads, for example Dupire (1962, 1970), Stenning (1959) Pfeffer (1936) and Maliki (1981). However, in the Toungo Block, the majority of the FulBe are transhumant pastoralists. They have permanent residences where a core herd of lactating animals remains throughout the year, and the remainder migrates for some months every year to dry-season pastures. Moreover, in Nigeria, there are also FulBe who have become urbanised to such an extent that they have abandoned pastoralism and become traders or taken up crafts. [1]

The FulBe are grouped into endogamous clans known as **lenyol** (pl. **leYYi**), subdivided into **suudu**, or maximal lineages. Among the nomadic FulBe,

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[1] The Fulfulde terms **FulBe na'i, FulBe wuro,** and **FulBe siire** are used to distinguish these groups, referring respectively to 'cow', 'compound' and 'town', in other words nomadic, sedentarized and urban FulBe.

marriage outside the clan is almost unknown, whereas the sedentarized FulBe men frequently marry wives from neighbouring agricultural peoples. Authority among the nomads is vested in an ArDo - usually a respected and wealthy member of the clan. The ArDo is expected to act as spokesman for the community, and can be deposed if he is not seen to fulfil his task. In view of the importance of the clan system both in determining the distribution of FulBe, and its importance in communicating with them, the clans resident in each interview location were recorded, and the names of the ArDos with authority over them even if they were not present. These are listed in Appendix IV.

Among the sedentarized and urban FulBe, authority systems are more various, as they tended to take on the colour of the peoples among whom they are living. In Adamawa, the usual figure was the Lamido, a post corresponding to the Emir in the states of Northern Nigeria.

2.3 Internal Communications in the Survey Zone

An aspect of the Toungo Block that has contributed to its relatively sparse population and slow economic growth is the poor communications (Bawden and Tuley, 1966:21-2). They mention the adverse effect of the political changes consequent after the Plebiscite of 1961 on road construction schemes, and with the benefit of hindsight this appears to be true. Roads linking major settlements have been allowed to decay, for example the Toungo-Karamti road, and there are no major crossing-points to Cameroun for commercial traffic.

Fremantle (1920: 59) and Migeod (1927:38) list the principal trade routes in the Toungo Block, before any motor roads were constructed. The first motor road built to open up the Toungo Block was from Jalingo to Bli, and thence to Mararaba, Donga and Takum. It was completed at the end of the 1950's and was soon connected with the Mambila escarpment road built shortly afterwards. A number of towns such as Garba Chede, grew up on this road, and settlements like Gassol and Mutum Biyu declined because of the disappearance of the through traffic. With the construction of the tarmac road from Wukari to Jalingo at the end of the 1970's the pattern was reversed, and recently Mutum Biyu has been expanding again. The construction of the tar road is a major factor in opening up the Toungo Block to the cattle-trucks and thereby expanding the volume of the livestock trade.

Apart from government roads, there are numerous bush roads built by community labour that are passable in the dry season. These have been built to facilitate the marketing of both cattle and surplus agricultural produce. An outline of these bush roads appears on Map 1, although because they are not signposted and have not otherwise been mapped, their full extent is unknown.

Many of the earth roads usable in the 1960's have recently deteriorated, and one response to this has been community road-mending, particularly by Tiv farmers, who have a vested interest in keeping the roads open to the trucks which take away their yams. The bridge between Mararaba and

Takum has been down since 1981, and the inaccessibility of the area east of Takum has already caused some of the more commercially oriented smallholders to leave. The escarpment road from Serti to the Mambila Plateau is barely passable at the height of the rains, and in consequence the cost of living there is high and surplus agricultural produce is expensive to send to the national market.

Both Federal and State governments are clearly aware of this situation and road construction contracts are out both on the main escarpment road from Serti to Mai Samari, and on a new escarpment road via Abong from Baissa (see Map 1), on the Bali-Mayo Selbe road, and on the road between Jada and Mayo Belwa. The road that previously ran south from Toungo to join the Bali-Serti road has been impassible for twenty years but was recently surveyed for construction. If these roads are completed according to schedule, improved communications will make possible a variety of economic developments both via national and international agencies, and through normal internal trade mechanisms.

2.4 Production Systems

2.4.1 Hunting and Fishing

Until this century, hunting and fishing together probably constituted the principal sources of protein for arable farming communities throughout the Middle Belt of Nigeria. Hunting was practiced by all agricultural communities to some extent, although professional hunters could make an additional living by selling meat. The expansion of urban populations during this century has increased the demand for protein, and the corresponding exploitation of both wild animals and fish as a source of income. Throughout most of central Nigeria, hunting pressure has been so extreme that animals larger than the cane-rat have been virtually eliminated.

Migeod (1927:32) testifies to the importance of the smoked fish trade in the early colonial period, and since then it has undergone considerable expansion. Because their interests do not conflict, pastoralists and fishing communities usually have good relations, exchanging grain for meat, and the herdowners grazing on the fishing-peoples' cornstalks. In view of the important contribution fish protein makes to the diet in rural areas, its supply should not be jeopardised by projects that do not take it into account.

A consequence of the close relations between the fishing communities and the FulBe is that their house types have undergone a certain convergence. On the banks of the Benue and its tributaries all the migrant communities build camps similar to those associated with pastoral nomads in the arid zone; rough circular shelters, conical 'wigwams' built from dried reeds and cereal stalks and square shelters consisting of upright poles shaded with grass mats. As these are often built in close proximity to FulBe encampments, a consequence may be the overestimation of pastoralist numbers.

2.4.2 Arable Farming

Arable farming is the principal means of subsistence of all the peoples of the Toungo Block with the exception of an increasingly small percentage of pastoral nomads. The usual method of agriculture was swidden, or shifting cultivation, where the bush was burnt to provide ash fertilization, and the sites of villages shifted periodically when the soil was exhausted. The high-altitude grasslands have a limited amount of earth terracing to prevent erosion, but nowhere was there an elaborate hill-agriculture such as was practiced in other parts of the Middle Belt (e.g. the Kofyar region, v. Netting, 1967). The Mambila Plateau has both valley farms, that remain fertile for many years and upland farms that must be changed frequently. The valley farms regularly support complex cropping patterns combining cereals and tubers.

Although peoples such as the Tiv practice crop rotation in their homeland, the low agricultural densities has meant that shifting cultivation have been retained in the Toungo Block. Fertiliser and tractors have so far made little impact on agricultural practices, mainly because of the logistical difficulties of distributing them. Greater investment in houses and manufactured goods has recently been a stimulus towards agricultural techniques that allow for a longer residence in one place, particularly the use of manure to keep land fertile. Only the Tiv and Mumuye are willing to continue clearing new areas of bush, while other groups such as the Samba and FulBe wuro prefer to work already fallow land.

The distribution of cultigens is affected by altitude and by the higher rainfall in the southern parts of the survey zone. Throughout the southern lowlands, the yam is the principal tuber with lesser quantities of sweet potato, cassava and water-yam. Maize is the only cereal crop with the exception of rice in flooded regions. Further north, cereals account for a greater part of the repertoire, and guinea-corn is the main staple of the northern lowlands, although maize is becomingly increasingly important in the Ganye region, because of its higher rainfall. The principal vegetables grown are pumpkin, groundnuts, Bambara groundnuts, roselle, okra, eggplant and a variety of green leaves. In the highlands, the principal staple is maize, although the farmers in the Shebshi grasslands descend annually to plant sorghum in the lowlands. Two important tubers found widely on the Mambila Plateau are rizga, **Solenostemon rotundifolius**, and taro, **Colocasia esculenta.**

Cash crops were not common in the Toungo Block because of the poor communications, and the cola that came from the Bamenda grasslands was until recently almost the only export crop. However, the availability of land to enterprising farmers and the high demand for staples in the cities has led to considerable production of yams and maize for external sales. Moreover, cassava is extensively grown in the Mutum Biyu region, and dried for use as both food and starch. Map I shows the routes used to export these crops. If the present level of demand from the cities persists, the southern part of the Toungo Block will soon become a major

contributor to the national supply of staple foods.

Although the houseforms of arable farmers are extremely diverse, they are always characterised by permanent constructions from mud. Throughout most of the Toungo Block the buildings belonging to a family group are linked together by an outer compound wall, thus making it possible to relate the number of individual buildings to the number of compounds; the most significant conceptual unit used by farmers and livestock-owners to assess land and livestock holdings. Such compounds are generally adjacent to fields, except on the Mambila Plateau, where the farmers frequently live on the uplands and farm in the valleys, and around large towns.

2.4.3 Pastoralism

2.4.3.1 Nomadism

Pastoralism is usually considered to be the mode of production where a substantial part of the household income derives from stock-keeping. Although a wide variety of animals have been domesticated across the world, in the Toungo Block, only cattle are kept in numbers sufficiently large to qualify for this. [2] This section therefore deals exclusively with cattle-producers - arable farmers keeping other livestock are treated as farmers.

For the purposes of this report, 'nomadism' is defined as the form of livestock production practised by pastoralists who have no regular or permanent homes, and whose migrations follow the availability of pasture and the incidence of disease. The term 'Bororo' is frequently applied to FulBe who manage their livestock in this way, but it is inappropriate for general use, both because it has pejorative connotations, and because it does not in fact have a fixed reference. The herders use **FulBe na'i** to refer to themselves, and in this report the term is applied to all pastoralists whose principal subsistence base is derived from cattle. The term 'Bororo' is frequently used by one FulBe clan to refer to others who came to an area more recently than themselves. On Mambila, for example, it is used to refer to FulBe who originally came to the Plateau as nomads, even if they have been settled agro-pastoralists for more than eighty years.

One of the most persistent ideologies of nomad society is the dependence on milk and dairy products for a subsistence base. Until the mid-1960's it was possible for a small family group to depend on the profits from sales of the dairy products of a herd of 100 animals for subsistence. Today, this would be impossible, and this state of affairs is viewed with nostalgia.

The fall in the relative value of dairy products during the last thirty

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[2] A few FulBe pastoralists specialized in keeping sheep are found on the northern boundaries of the Toungo Block during the dry season.

years is difficult to measure precisely because the same period has seen a change from direct bartering of milk for grain to cash sales. In the same period, the price of grain relative to consumer items such as radios and cloth has risen sharply. In the Toungo Block, in 1983-4, an entire calabash of milk was sold for 3-5 Naira, a price of 30-50 kobo per litre. This contrasts with Kano and Kaduna where milk is sold for 1-1,50 Naira per litre.

Discussions with older FulBe women revealed the magnitude of the change in relative prices for dairy products over the last thirty years. In the early 1950's, a mudu [3] of sorghum could be bought for one halfpenny, whereas an entire calabash of soured milk would sell for one shilling. At present in the Benue valley, a mudu of sorghum costs 1 Naira. Therefore a full calabash of milk is equivalent to 3-5 mudus of sorghum as opposed to 24 in the past. The prestige of dairy products is closely related to the degree of Islamization in a population. In southern Gongola state, the arable farming populations are either Christian or traditionalists and consequently rarely buy dairy products. As a result, the market for milk and butter tends to be limited to settled FulBe and Muslim traders. At the same time, pasture is abundant and herds are relatively large, so available milk is increased. The effect is to force down the prices of dairy products thus contrasting with the populated Muslim regions of Hausaland. Herd-owning settled FulBe in southern Adamawa do not usually send their wives to market to sell milk, because they say that 'Bororo' migrants undercut them. This contrasts with Southern Zaria, for example, where the principal source of dairy products in the markets is settled FulBe.

FulBe have therefore had to sell stock directly in order to continue to buy cereals for subsistence. Interviews with stockowners throughout the Toungo Block indicated that animal sales to purchase grain began between 1970 and 1975. Initially only one or two animals were sold annually but this has now risen to 15 animals for an average family group. This level of offtake can only be sustained by an average herd under normal Middle Belt conditions, if the incidence of death from disease is low. In the Toungo Block the high tsetse challenge and, more recently, the rinderpest have posed considerable problems for herdowners. In order to decrease the offtake cattle-owners throughout the survey area have begun subsistence farming.

It is easy to establish, however, that the level of offtake bears no relation to the size of the herd. In the Suntai system, where there are herds as large as 700 animals, a herdowner will still sell only 15-20 animals a year if that provides all the cash he needs to supply his family. Nomads have further devices to restrict offtake, in particular, circulating loans. When anyone kills an animal in an encampment, other men will borrow money from him, to avoid selling stock to meet small cash

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[3] A hemispherical bowl, originally a calabash but today usually enamel, holding ca. three litres.

needs. There is a general agreement that the next stock sale should be by a different individual. He will use part of the proceeds to pay off debts accumulated in this way, and part to make further loans.

Two important conclusions can be drawn from these practices that are important in livestock development planning. The first is that the majority of the cattle in the Toungo Block are in the hands of pastoralists whose goal is to maximize herd size. They will therefore respond only to development inputs they perceive as likely to further this aim. Secondly, since offtake and herd size do not show any correlation, development inputs should be planned not to increase the absolute numbers of cattle in the Toungo Block, but to make the stock already there managed more productively. **There is no evidence that increasing overall numbers would increase the supply of meat to the market.**

Although nomads are commonly defined as pastoralists who do not farm but depend entirely on their herds for subsistence, FulBe of this type are today rare, both in the Toungo Block and throughout the Nigerian Middle Belt, and they account for only a small proportion of the wet season stocking in the survey area. Only around Mararaba, and east of the new Wukari-Jalingo road were substantial numbers of FulBe na'i without farms encountered. A more common situation today is for the FulBe na'i to plant small farms of cereals, wherever they are when the first rains fall. These farms are often geographically isolated from the nomadic encampments and cannot therefore be identified as belonging to nomads from aerial survey. This should **not** be treated as indicative of a desire to settle - the function of the farms, as herders emphasized, was to decrease the offtake presently necessary to purchase grain, in order to pursue their nomadic strategies more effectively.

Nomad farms are always established on fallow land, for FulBe are unwilling to expend the labour required to clear bush. These farms are usually separate from their corrals, as corrals are established in locations where the pasture is most abundant. The planting and harvesting is usually done by the FulBe, but other tasks, such as weeding and scaring animals, are commonly performed by local arable farmers. This may either be a service they perform for cash payments, or because they have a relationship with the herdsman in question, for the manuring of fields or the supply of dairy products. The characteristic feature of this mode of production is that the herd is not split and that the farm is not looked after by a section of the family who are resident in one place all year round. This is in contrast to the transhumant systems, where the lactating females are left in one place with part of the family, while the body of the herd moves elsewhere.

The flexibility in the definition of 'nomads' raises concomitant problems about the relationship of specific houseforms with modes of production. In the Toungo Block, some types of camp associated with FulBe na'i, such as the rough circular ruga covered in a sheet of plastic, are equally used by settled pastoralists, who take their cattle to a nearby

river basin in the short transitional period between the end of the cereal residues and the flushing of the new grass. In reverse, the well-constructed 'beehive' rugas, usually associated with sedentary or transhumant pastoralists are built by FulBe na'i on the Benue flood plains, because the unusually favourable conditions allow them to remain for eight months of the year.

The simplified categories used by the aerial survey to record housetype (Section 3.1.3) should therefore be interpreted as measuring modes of production in the sense that they reflect the amount of time a livestock-producer expects to spend in an area. As far as livestock development is concerned, this is the most important factor, since it will correlate with the degree of commitment to new inputs.

It is difficult to estimate the exact percentage of stock in the hands of the nomads, but our informants asserted that they had larger herds than any of the transhumant pastoralists. FulBe na'i frequently refuse to state the numbers of animals they own, both because it is 'bad luck' and because they are afraid of interference by the Government. The numbers given in Table 12 were elicited by using stated rinderpest losses, and so should be regarded with caution. However, they strongly support the contention that the FulBe na'i have larger herds. Even on the Mambila Plateau it remains true that the FulBe of 'Bororo' descent maintain larger herds than the FulBe wuro despite their long established sedentarization. They were probably under-represented at public meetings because they kept to the 'far, far bush'.

FulBe na'i strategies with respect to disease are quite different from sedentary groups. For example, among the transhumant FulBe of Ganye and Mambila, we met few who did not believe in principle that the rinderpest vaccination should work, whatever doubts they may have had about it in practice. In Mararaba, however, the nomads interviewed had not had their herds vaccinated, and in fact expressed their intention to avoid vaccination. Their strategy was instead to conceal their herds in remote areas and risk the depredations of tsetse.

Nomadism is often viewed as an archaic strategy, and sedentarization is considered to be the inevitable long-term fate of this type of livestock producer. Sedentarization is often regarded as equivalent to the inception of agro-pastoralism, but where herds are large, this may not be so. In the Ganye region, for example, FulBe who built rectangular mud-brick houses and stayed in one location all year round used this as a central location to direct the movement of their various herds and made no moves towards mixed farming.

There is no doubt that central Nigeria over the last two centuries has seen the sedentarization of large numbers of pastoralists who originally depended on livestock alone for subsistence. However, the conclusion often drawn from this, that nomadism will therefore disappear is not self-evident. It depends on two assumptions; that FulBe have a

fixed population, and that they remain within a circumscribed geographical area. In practice, the impact of modern medicine has allowed the population to expand along with that of the arable farmers, and in some cases, in excess of them (Hurault, 1969, 70). It is likely that settlement takes place in proportion to this expansion and the consequent pressure on resources. Thus, as FulBe gradually colonise new areas, a proportion of the total population settles and the rest continue as nomads.

Pastoralist colonisation of new regions is inevitably in the hands of nomads, since they have less investment in a delimited 'home' area. Within Nigeria, the last few decades have seen extensive movement across the Benue from all parts of the Middle Belt. Nigerian FulBe have also traversed established settlements in Cameroun, to Central African Republic, where plenty of land is still available to nomad groups. The corresponding emigration of nomads, both from southern Zaria and the arid zone in general, should therefore not be taken as evidence of an absolute decline in their numbers, but as an indicator of the gradual relocation of nomads and their herds.

Nomadism continues to be a viable strategy because of the flexibility it allows the stock-owner, in the face of harsh and adverse environmental conditions, particularly drought and disease. Studies in Mauretania after the Sahel drought of the mid-1970's revealed that some nomadic herders were far more successful in preserving their herd than settled farmers (Hervouet, 1977:79 ff.). This is confirmed by the low incidence of rinderpest among nomads interviewed in Mararaba and Bibinu. All the stock-owners present had moved their herds to isolated areas of bush and few had consequently been affected. Nomadism will continue to be an option for a certain percentage of FulBe while conditions remain as they are.

2.4.3.2 Transhumance

'Transhumance' is defined here as a livestock production system involving the regular movement of all or part of a herd between a homestead and a camp or second homestead annually, in order to exploit resources, especially pasture and water, that are scarce in the 'home' area. It frequently involves the division of a cattle herd into a 'core' of animals, mostly lactating females, resident at a permanent homestead throughout the year, and a movable herd that is taken to pasture elsewhere for some months, when fodder is scarce. The pattern of transhumance, where settled agro-pastoralists send their herds on regular seasonal migrations to dry-season pastures, is dominant throughout most of southwestern Adamawa, and only in the Benue lowlands were substantial numbers of nomads encountered.

A principal determinant of this type of production is herd size, [4] - the larger the herd, the more difficult it is to find sufficient pasture in the dry season. In the Ganye area, informants stated that a herder with less than fifty cattle would be unlikely to consider going on transhumance. However, excess animals might be sent with a herder whose herd size made transhumance imperative. A significant difference emerged between Samba and FulBe strategies in this respect, since some Samba farmers produce dry season fodder [5] for their stock to avoid the need to go on transhumance. This is, however, only possible if their herd is still small enough to provide with fodder from the collective effort of their kin group. However, FulBe in the Ganye area rejected the idea of either growing dry-season fodder, because of its association with low-status agricultural labour, or buying, because of the cost.

Choice of a grazing area for transhumance is determined mostly by considerations of ecology, land rights and disease incidence. Depending on whether the migrant herd contains a significant proportion of lactating females the pastoralists will also consider the proximity of markets. Because they are not commited to a 'home' area, the nomads are more flexible and adventurous in exploring possible new pasture zones. Transhumant FulBe like to establish routes and semi-permanent dry-season grazing areas that can be used year after year (Map 7). Occasionally, however, exterior events force changes upon them. For example, the creation of the Gashaka and Gumpti Game Reserves has changed the patterns of dry-season transhumance in the Ganye area. Map 7 shows the traditional routes to the south, which have been abrogated in recent years, and replaced by routes across and north around the Shebshi mountains Similarly, migration to the banks of the Faro and Deo rivers in Cameroun, was more common in the past, but a conjunction of the creation of the Faro Game Reserve and conditions along the border have constricted this possibility. It is often assumed that dry season transhumance takes place over long distances; but in many places in the Toungo Block, herders do not travel more than 50-100 kilometres from their permanent home, allowing for the definition of 'cattle-systems'. Cattle-systems are geographically defined regions, in which the majority of cattle within that area, stay within its boundaries throughout the year. Overlay C shows the boundaries of the systems examined within and adjacent to the Toungo Block, and Chapter IV deals with the particular characteristics of each system in greater detail.

The pressure exerted by immigrating FulBe na'i throughout the eastern Benue lowlands in the last two decades has led to increased competition with transhumant herders. Transhumant FulBe and Samba from Ganye now encounter WoDaaBe and Bokolooji from Bornu and the Jos Plateau, as well

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[4] For the purposes of this report 'herd' is defined as the overall number of cattle owned by an individual or group of individuals. 'Herding group' or 'grazing unit' is used to cover the actual groups of cattle herded by individuals, visible during aerial survey.

[5] This consists of dried grasses and crop residues.

as other transhumant FulBe who have crossed the Benue from Wase and nearby areas. There are, moreover, an increasing number of FulBe resident along the line of the Wukari-Jalingo road and around Wukari and Takum. The isochronic map of FulBe movement, Map 6, shows that the settlement of the Ganye area occurred considerably before substantial FulBe migration into the eastern Benue. Traditional transhumance routes of the Ganye FulBe have thus been altered by the presence of resident FulBe in the Benue lowlands.

The more gradual changes in tsetse infestation also affect these routes. Informants in the Toungo area almost unanimously asserted that tsetse infestation had increased substantially in the last two decades. [6] The Kiri Plateau, cited by herders as an ideal location for stock-raising, was reported to have a substantially reduced cattle population as a result of increased tsetse. The alleged high degree of tsetse infestation on the traditional trek routes southeast of Shebshi to the Donga have contributed to its disuse in recent years.

Most transhumant FulBe interviewed regarded the seasonal movements as a necessity but were without exception in favour of any improvements that would lead them to becoming obsolete or less arduous, for example, dams or the clearance of tsetse infested areas. A common solution to this dislike of transhumance is to hire others to do the actual work of herding, whether Samba or FulBe.

'Transhumance' and 'mixed farming' are the modes of production that can be identified with 'agropastoralism' recorded by the aerial survey (Section 3.1.3). Although they derive from different sources, pastoralists becoming farmers and farmers beginning to raise cattle, their eventual mode of production must tend to converge. Initially FulBe who settle place their farms around a well-built 'beehive' ruga; after some years, however, they replace this with a rectangular mud house.

2.4.3.3 Mixed Farming

Table 2 indicates that all ethnic groups in the Toungo Block raise some types of livestock, and could thus be said to practice mixed farming. In the majority of cases, livestock do not form part of an integrated subsistence strategy. The FulBe, Samba, Mumuye, Tiv and Mambila combine cattle-raising with arable farming to form a productive unit. However, compared with the degree of integration present in more arid regions, such as Azare, livestock could not be said to form part of a cohesive production strategy.

Neither oxen nor other draught animals play a significant role in the economy of the area. This is surprising in view of the importance of oxen in the household economy of sedentarized FulBe elsewhere in Nigeria, for example in the Azare and Gombe regions of Bauchi State. Arable farmers

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[6] This is the region south of the zone regularly sprayed by the FDPCS.

are aware of the uses of ploughs, since most of those interviewed had seen them elsewhere. There are two possible explanations for this; the prevalence of root crops in the cultigen repertoire has meant a lesser incentive to make the necessary capital investment; and that the important role played by women in agricultural labour divides surplus capital between the sexes and thereby militates against its investment in agricultural technology.

Farmers in the Ganye region are aware of the value of cattle manure for the fertilization of their land. Maize responds well to fertilizer applications, and the primary importance of maize as a staple in the Ganye area has led to the evolution of co-operative relations beneficial to graziers and farmers. In other areas, FulBe regard maize residues as the lowest preference graze for animals (Waters-Bayer, 1983), but in the Ganye region they are apparently acceptable. Exchange relations of the type that have been characterized in many parts of Nigeria, where a farmer will allow the cattle on his fields in return for the manure, also exist around Ganye, although of course many farmers are also cattle-owners.

2.5 Livestock

2.5.1 Species of Domestic Animal in the Toungo Block

The principal domestic animals of the survey zone were cattle, horses, donkeys, goats, sheep, pigs, dogs, chickens, ducks,guinea-fowl. Of these, the cattle, sheep and equines associated with moving herds can be counted from the air. Groundwork concentrated on the production systems of cattle, in view of the major economic contribution these make to the national economy, but sample surveys were also made of non-cattle-keeping arable communities to discover their livestock production strategies.

In assessing the reasons for the distribution patterns of the various types of livestock and their contribution to the economy a number of factors must be taken into account. The most important of these is historical; the relative antiquity of a species in an area will determine the degree of penetration into the culture of the resident ethnic groups. For example, the establishment of pig-breeding in southern Gongola State has occurred over the course of only the last thirty years. As a result, populations unfamiliar with them have had no more than a limited exposure to the techniques of pig husbandry. As a result the distribution of pigs is restricted. Similarly, zebu cattle only reached the Toungo Block about a century ago, and although they have become extremely widespread because of the wanderings of the FulBe, they have only been sporadically adopted by the arable populations. The following sections deal systematically with the species of large livestock and the modes of production associated with them.

2.5.2 Cattle

This section provides a survey of the breeds, distribution and ascribed qualities of the cattle in the Toungo Block, and should be used in conjunction with the cattle distribution maps (Maps 11, 12).

2.5.2.1 Dwarf Cattle

There are two races of dwarf cattle in the Toungo Block; the dwarf West African shorthorn, or muturu, kept by the Tiv in the southwest, and by the Tal on the west bank of the Benue, and the Mumuye cattle. Such cattle have also been reported by Fricke (1979) from the Tangale-Waja area in southern Bornu, and may once have been more widespread in Adamawa. They are of a type unidentified, but perhaps a stabilised cross between a savannah shorthorn and the humped cattle of northeastern Nigeria.

The black **muturu** cattle kept by the Tiv are traditionally considered trypanotolerant (ILCA, 1979) and this was confirmed by Tiv farmers, who claimed that their cattle were not bothered by trypanosomiasis in the lowlands. A major perceived disadvantage of the **muturu** is its small size, and even though it is known to be more prolific than zebu and to gain weight faster, it has a low prestige on this account. FulBe also claim that **muturu** have a poor temperament, and have to be tethered because of the damage they cause. It is certainly true that they have higher labour costs than zebu cattle, but then tethering in the wet season is a method of management appropriate to mixed farming.

The Mumuye cattle have been subject to considerable interbreeding with zebu over the last twenty years, and consequently do not have a readily identifiable conformation. Their smaller size, short horns and reduced hump sets them apart from the zebu. Unlike the **muturu**, however, they can be herded in considerable numbers.

2.5.2.2 Zebu Cattle

Humped zebu cattle were originally brought into southern Adamawa by the FulBe from the north. They are divided into four breeds; the **bodeeji**, **daneeji**, [7] **gudali** and **bokolooji**. These correspond to 'red' cattle, white Bunaji, Adamawa gudali and Sokoto gudali (Epstein, 1971 & Fricke, 1974). **Bodeeji** cattle may be easily identified from their colour, a rich, burgundy red, and from their long, lyre-shaped horns. **Bodeeji** are the highest status breed among almost all FulBe, but they are characteristic of the arid and semi-arid zones further north, and have only extended their range into the Toungo Block because of the unusually favourable conditions presented by the high-altitude grasslands.

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[7] This is the white cow often referred to as Bunaji in animal production literature (e.g. Pullan, 1979). This name is unknown in Adamawa and other areas of the Nigerian Middle Belt. The term **yakanaaji** is used throughout the Benue valley to apply to the **daneeji** breed.

Sokoto gudali or **bokolooji** are equally identifiable because of their lack of horns, white hides and smaller stature. They have been brought to the Benue lowlands by migrating pastoralists from the arid zones of the northwest, who have been forced from their traditional territories by land scarcity.

Daneeji and **gudali** are difficult to tell apart, and FulBe are often unable to give a consistent account of their qualities. Both are white, with heavy dewlaps, but the **daneeji** has a different conformation from the **gudali**, while the latter has shorter horns. It is likely that in southern Adamawa, at least, a considerable amount of interbreeding has occurred.

FulBe are usually concerned to maintain the purity of their breeds of cattle, partly because they base their herding strategies on their ascribed qualities, and partly because the breeds of cattle were traditionally linked with clan identity. The Raahaaji clan, for example, herded the red cattle they were named for, and similarly the Daneeji. The exigencies of moving cattle into areas where the disease challenge is unfamiliar has meant that the identification of clan with breed of cattle has gone by the board in the last few decades. The Raahaaji clan in the Benue valley today herds exclusively white cattle. However, the process of switching a herd from red to white is normally performed by introducing one or several bulls of the preferred breed and selectively selling the offspring with evidently hybrid qualities. This process is widespread on the Mambila Plateau at the moment and the result is numerous herds with mixed-breed cattle. These animals will gradually disappear as the herds become more uniformly 'white' throughout the grasslands.

Bokolooji cattle are confined to a particular FulBe **lenyol**, the **Bokolooji** or **Sulebawa**, and their appearance in this area is relatively recent. **Bokolooji** have been migrating across the Middle Belt from the Sokoto area towards Bauchi and Adamawa over the last twenty years. They reached the area north of the Benue in 1971, and have been passing through the Toungo Block since 1974. The region where they are most common are the forests west of the Shebshi range, and between the Bali-Serti road and the Taraba. This is partly because these areas are not heavily exploited by other FulBe clans, and partly because **bokolooji** cattle are trained to exploit browse plants and so can survive well where there is little grass cover. Although the cattle come from the arid zone, which has a very low tsetse challenge, they do not seem to be suffering the high mortality from trypanosomiasis that might be expected in such a heavily forested zone.

Gudali and **daneeji** are both white, with long, curving horns and heavy dewlaps. They are said to be trypanotolerant, to resist hunger and drought, but to gain weight more slowly and produce less milk. These features have become increasingly attractive to pastoralists, both in Adamawa and throughout the Middle Belt, as pressure on resources

increases and less pasture is freely available. Even in the high-altitude grasslands, the degradation of pasture has made conditions increasingly difficult for graziers, and many herders of **bodeeji** cattle are in the process of gradually switching to **daneeji** or **gudali.**

2.5.3 Sheep

There are two breeds of sheep in the survey zone, the Uda and the Balani or Bornu sheep. Both of these are technically hairy, thin-tailed sheep. The Uda may be easily identified from its pied body, usually half-black and half-white. Although much larger than the Bornu sheep it is less resistant to the stresses of high rainfall areas, and is particularly susceptible to footrot. As a consequence it is found mainly along the northern edge of the survey area.

Farmers keep small flocks of sheep around the compound and they are generally taken out to graze in the daytime by younger boys. Sheep are more popular in the regions influenced by Islam - the Tiv, for example, do keep few sheep. However, they are prone to more diseases than goats due to being less well adapted to the wetter climate. There is, moreover, a bush, locally known as **sambeeru,** that poisons sheep and in some places, Mayo Kam for example, mortality has been sufficiently high to discourage farmers from keeping them at all.

Sheep are kept both by settled, transhumant and nomadic FulBe in preference to goats. Because sheep are herded together with cattle they can be effectively counted from the air unlike goats. FulBe prefer sheep because they will 'run' with cattle, and so the labour costs of maintaining a mixed herd are not correspondingly higher. Apart from this, the role that sheep play in Islamic ceremonial is significant enough to influence many FulBe to keep them preferentially.

The northern frontier of the Toungo Block is also the southern limit of the Uda'en, a group of FulBe specialised in herding Uda sheep. These individual herdsmen make their way down from Bornu and Katsina every dry season and return to farm in the wet season. Unlike other migrant FulBe they do not travel with their family, for they must depend entirely on stock sales for subsistence while en route. Their herds are between 50-200 sheep, and the comparatively large size of the animals means that they fetch a high market price.

2.5.4 Goats

The principal races of goat in the area are the black dwarf forest goat and the larger brown or white savannah goat. The dwarf goat has been long established throughout this area, especially in the forested parts and this is a reflection of its alleged trypanotolerance. The more southern groups such as Mambila, Tiv, Jibu and Kuteb still keep these goats in large numbers. However, the brown goats, 'Red Maradi', and the white goats were brought, probably in the eigtheenth and nineteenth centuries, by successive Hausa and FulBe siire invaders from the northern regions. The larger size of these goats has encouraged many livestock owners to

switch to them, even though they are reputedly more susceptible to disease.

Unlike other parts of the Middle Belt, FulBe na'i do not herd goats with their cattle, and indeed the goat is a taboo animal for many clans in the Benue valley. Goats are exclusively in the hands of the arable farmers. Goats are usually kept inside the compound at night and sent out with small boys during the day. Elsewhere in Nigeria, the scarcity of labour due to the attendance of children at primary school has meant tethering goats in the daytime, but in Gongola they can be sent out. The manure is not valued by farmers and so no effort is made to collect it. Fences against the depredations of goats are rare because of the system of human control, and are found only in the region of Mutum Biyu, where cassava is an important cash crop.

Goats play an extensive role in social and ceremonial life and throughout the zone marriages, naming-ceremonies, funerals and religious rituals are accompanied by the slaughter of goats. If a compound owner sees that he will have surplus animals after meeting his obligations in this direction then he is able to sell some of his herd every year for cash. A typical herd might be 15 animals, and it is generally said that up to six animals can be sold every year, if none are lost to sickness.

2.5.5 Pigs

Although pigs were evidently introduced on the sea-coast as long ago as the sixteenth century, their penetration into the interior of Nigeria has really only taken place during this century. The principal agent of their introduction has been the missions, and thus the stock from which the various pigs derive is extremely varied.

Statistical evidence on pigs in the former Sardauna province (MEP, 1966:78) showed that during the 1950's no pigs at all were recorded in the Toungo Block. By 1964, 746 were present - and the population has certainly multiplied many times since then.

Pigs are restricted in their distribution by the opposition they face from Islamic prohibition. Therefore only ethnic groups that are predominantly traditionalist or Christian will keep them. Even so, many groups such as the Samba Leeko, the Icen and the Mambila have taken no interest in them. The principal groups specialised in pig-keeping are the Mumuye, the Jukun and the Tiv. Each of these three groups has a different production system. The Mumuye keep their pigs in specially fenced enclosures along the sides of rivers and feed the animals on spent grain, **dusan giya,** left over from the beer-making process. The Jukun fishermen's wives who live in camps along the shore of the Benue feed them on cereal chaff and fish scraps and do not fence them. The Tiv pigs are fed on household refuse and specially grown cassava and allowed to wander freely around all year. The use of soya beans, fishmeal and other diet supplements is apparently unknown.

Pigs harbour **Glossina palpalis,** a type of tsetse fly that thrives in

peridomestic habitats, and the expansion of the pig may have contributed to the prevalence of this species of tsetse. Because pigs must be fed, and are unable to graze, smallholder production is inevitably limited by the amount of food available. The usual production strategy is to keep one breeding pair of pigs and allow them to have a litter every year, and to sell the majority of the offspring when they are between six months and one year old. Pigs are nowhere sold for local consumption, and must be sent to Enugu through various entrepots, the most prominent of which is Ibi, somewhat surprisingly, in view of the fact that it is a Hausa town. Pigs are transported either in small lorries or in canoes down the river in the wet season.

2.5.6 Horses and Donkeys

Horses were once a major trade item throughout the whole region of southern Adamawa, as can be seen on Map 4. They were originally brought in by the FulBe siire in the nineteenth century as both mounts in warfare and to reinforce ceremonial authority. They replaced the smaller ponies then current in the area, used by such peoples as the Samba. Horses never flourished in the lowlands, and they are not seen there today. However, on the high-alitude grasslands, particularly Mambila, and the adjacent Bamenda hills, horses became a major item of trade. In 1964, 6,953 horses were recorded in Sardauna province (MEP, 1966:78) but this number has fallen considerably today. They are only bred in the southern parts of the Mambila Plateau for riding and for sale to the Igbo traders who trek them to Enugu. Motorbikes have largely replaced them as a means of transport in rural areas.

Donkeys are used only by pastoralists to carry loads alongside herds on the move. Because of their susceptibility to trypanosomiases they are only used in the northern regions, around Ganye and Mutum Biyu. They are traded informally between herders and so rarely come on the market.

2.6 Commercial Networks and the Livestock Trade

2.6.1 Change and Development of Trade Networks

The effects of these changes in communications can be clearly seen by a comparison of patterns of trade past and present. Maps 4, 5 and I, II are intended to illustrate the changes in both the trade-routes and the types of goods traded during the course of this century. Map II, prepared from the work of early geographers such as Nugent (1914) and Detzner (1913, 1923) shows the patterns of trade in southwestern Adamawa at the beginning of the colonial period. Trade-routes were determined by the routes of foot-paths and the courses of rivers, as well as the location of productive regions. Because the principal traders were either Hausa, Kanuri or town FulBe, trade-routes tended to link Muslim settlements. Map 5, by contrast, indicates the routes used to export cattle from the Toungo Block in 1983-4, based on the statements of cattle-traders. Map 4 shows the export routes of the other domestic animals, while Map I shows the exports of fish and agricultural surpluses.

It is evident that since the late precolonial period trade routes have

altered dramatically. In the last century, traders crossed and recrossed southwestern Adamawa taking goods from the Benue to the Cameroun grasslands. Today, all routes lead from the interior out to the markets of the North and Igboland, taking primary produce such as smoked fish, yams, cassava and maize for sale elsewhere. Southwestern Adamawa is no longer on any significant economic axis, but is merely the catchment area for a route joining Bornu to the East. This situation has been exacerbated by the construction of the Wukari-Jalingo road, which allows for goods to move between Yola, Maiduguri and other northern towns, and the south directly. Towns in the Toungo Block have thus not had the opportunity to expand by capitalising on the entrepreneurial requirements of through traffic.

2.6.2 The Livestock Trade

2.6.2.1 The Animals Traded

No statistics are available on the current volumes of animals traded in the Toungo Block. Veterinary certification statistics or records of the **tike** provide figures, but these do not reflect the volume of the informal trade and so can be misleading. For example, the closure of the official cattle markets on the Mambila Plateau after the reports of rinderpest led to the greatest outflow of cattle from the Plateau in memory. Since the entire flow was clandestine, its volume remains unknown.

It is possible to gain an impression of the relative importance of the various species of livestock from observation of the trade. The livestock trade is dominated by cattle, which are exported in small quantities from all regions, and in some areas, they are almost the only livestock sold externally. Internal consumption is small, partly because of the low population, partly because the roasted meat that forms the main method of consumption in more strongly Islamic areas is less popular elsewhere.

Pigs are raised entirely for trade purposes, and so almost all surplus animals are sold externally. Trade in small ruminants is frequently done on an informal basis within a village, so that the numbers at a market do not always reflect their position in the economy of a particular region.

2.6.2.2 The Mechanisms of Trade

Almost the entire livestock trade in the area is in the hands of entrepreneurs, who may well not be indigenous to the area. The principal buyers of stock are Shwa Arabs, FulBe without cattle, Hausa and Bole. In some cases they are working for themselves, when they have built up enough capital, but frequently they act on behalf of a better-capitalised buyer.

They buy cattle, either in the markets or by moving from camp to camp in the bush, until they have built up a herd of appropriate size. In places accessible to trucks, this need only be 20-25 animals, because this constitutes a single truck-load and can be put on the road immediately.

However, elsewhere, particularly the grasslands, it is more usual to build up a herd of 60-70 animals, as these have to be trekked to a trucking point.

Map 5 shows the truck and trek routes in southern Gongola state during the period of the groundwork. It should be noticed that the broken bridge at Manya on the Takum road means that cattle moving to Katsina Ala must now make a long detour in order to cross the Donga at Gindin Dorowa. The repair of the bridge would alter trade patterns in the southwest quite substantially.

The transition from trekking to trucking is recent in Gongola state. Most dealers stated that before 1980, the majority of animals were still trekked. The trade-off between trucking and trekking, is between the stress on animals that trek, and possible losses from sickness en route to the East, and the cost of trucking. A study by Cohen (1965) on comparable trade-offs between cattle trekked and brought by train to Ibadan market showed that the shorter survival time of trekked animals at their destination mean that they were sometimes sold at lower prices. Trucking costs from Gongola state depends directly on distance from the Igbo markets. Standard prices are;

From	**Wukari**	**Jalingo**	**Ganye**	**Yola**
Naira	600	900	1, 200	1, 200

to Enugu.

This gives a cost of between 36 and 45 Naira per animal for an average route. The cost of hiring a truck is equivalent to the loss of only one fat bull, something that is common enough when cattle are trekking across the tsetse-infested lowlands.

2.6.2.3 Markets

Official cattle markets, **tike**, are irregularly distributed across the Toungo Block (Map 5), presumably because the changing pattern of internal communications within the survey zone has yet to be reflected by the official bureaucratic structures. The advantage of markets from the settled stock-owning community is that they represent some sort of public validation of the health of animals brought to the market. There is considerable social pressure not to try and sell sick animals.

However, this situation impels the nomads, who regularly sell unhealthy animals to both butchers and settled stock-owners as part of their management strategy, to avoid the markets. Unfortunately, there are always bush traders willing to exploit this situation, and meet them in the camps to buy stock. The extension of official markets to all parts of the survey zone would assist in control of this situation.

Although butchers can buy stock at official markets, they may also operate outside them. Often they will meet FulBe at their camps in the bush, and give them cash in hand for animals, as this often allows them to buy stock cheaper than if they wait till it is brought to market, where they must compete with other buyers.

2.6.2.4 Livestock Prices

As part of the ground survey livestock prices were collected throughout the Toungo Block for cattle, sheep, goats, pigs and horses. These are tabulated in Tables 9,10 and 11 in Section IV. Some immediate conclusions can be drawn from this data;

a) Livestock prices are subject to substantial variation even within a confined geographical area.

For example, on the Mambila Plateau, the price of a **gambaye** or infertile female cow varied from 200 to 800 Naira in the 1984 dry season. In the lowlands, the price of a male goat varied from 35-100 Naira. This suggests that there is no mechanism to control for a uniformity of pricing structures. Very often, the reason for an especially high price for a type of stock in a given area is a reflection only of the effect of disease in the previous year. The high incidence of rinderpest on the Mambila Plateau in the months preceding the dry season ground survey meant that owners were unwilling to sell any type of stock, and that calves, as potential multipliers of the herd were at a premium. Under other conditions, where calves are abundant, they may well be cheap, since they demand a high labour investment to bring them to maturity.

The prices of goats and sheep are affected by the ideologies local breeders have concerning them. If a large flock of goats is a necessary adjunct to high status, as among the Icen and related groups, then the price of female goats will be higher than the males, because these act to increase the herd. If, however, goats are seen as essentially to be sold to butchers, then males will fetch a higher price, as they put on more weight. Prices of pigs, since they are not for local consumption, reflect the amount of labour put into rearing them. The Tiv, who grow cassava specially for their pigs charge more for them than the Mumuye, who have sufficient spent grain to feed them without additional supplements.

b) Livestock prices are subject to various types of seasonal variation.

Variations in particular species of domestic livestock throughout the year depends on the role they play in the culture of the peoples who raise them or upon their seasonal availability. The price of sheep doubles in the weeks preceding Sallah; in Ganye in 1983 the price of sheep rose from 20-40 Naira under 'normal' conditions to 60-120 Naira, an increase of nearly 200%. Similarly, in the Tiv areas of the southern Benue Lowlands, it is usual to slaughter a goat at Christmas. At Kungana, the ordinary cost of goats was 30-40 Naira, but before Christmas this rose to 60-100 Naira. On the other hand pigs and horses do not give rise to seasonal demands, so there is little variation in price during the

year.

The price of small ruminants can also be affected by the relative availability of beef for slaughtering. Many parts of the Benue lowlands are only visited by FulBe for a few months of the year, during the dry season, when the risk from tsetse is at its lowest. When FulBe are present, butchers will be able to buy cattle from them and sheep and goats will command a lower price. When the FulBe leave, the price rapidly increases. In Daka, for example, the FulBe are present between December and May, and the price for small ruminants is ca. 60 Naira for sheep and 20-50 Naira for goats. After May the corresponding prices rise to 120-140 Naira and 50-100 Naira.

As with the LPU loans developed to buy sheep for fattening in the months before Sallah, these variations could similarly be used as the basis for a credit scheme. Possible small ruminant loans are outlined in the discussion of development options in Section VI.

c) Livestock prices have been rising rapidly in the last few years.

There are no comprehensive guides to livestock prices in the Toungo Block for the last two decades, but some evidence relating to the Plateau may be drawn from LIDECO (1972).

TABLE 3.

CATTLE PRICES ON THE MAMBILA PLATEAU, 1971-84.

Wet Season	Calf	Bull	Barren Female
1. 1971 (LIDECO)	40	160	70-100(85)
2. 1984 (RIM)	331	822	331
% Increase	827.5	513.75	389.4

All figures are in Naira. Complete listings of stock prices for Mambila are in Section 4.4.5.2.

There a number of forces acting to create this situation. As FulBe increasingly sell stock to meet their subsistence needs, they have become more knowledgeable about fluctuations in market prices and more anxious to obtain the best possible prices for their animals. Demand for meat in the cities has proved relatively inelastic during the past decade, because of the rapidly increasing level of overall wealth. This has forced prices much higher, and led to a massive influx of animals from other West African countries, especially Chad and Cameroun.

SECTION III

QUANTITATIVE ASSESSMENT OF THE LIVESTOCK AND HUMAN RESOURCES OF THE TOUNGO BLOCK

A wide variety of domestic livestock is kept in southern Gongola State, but only certain species are appropriate for enumeration by means of aerial survey. Cattle and sheep herded with them can be counted from the air, while the numbers of goats associated with arable dwellings can be estimated by indirect methods (Appendix I). The cattle represent a variety of breeds (Section 2.5) but these cannot all be easily distinguished from the air. All cattle recorded were assumed to be zebu, and were divided into simplified categories 'red' and 'white'. 'Red' corresponds to **bodeeji** cattle, while 'white' conjoins **daneeji, gudali** and **bokolooji.**

The human populations are highly diverse (cf. Table 2 and Map 3), but for the purposes of aerial survey they have been divided into three categories on the basis of house types. The basis of these, and their relation to modes of production, is more fully explained in Section 2.4.

The aerial survey results are presented in two ways; initially, the abundance and distribution of three major parameters, environment and land use, livestock and human populations. The second level of analysis gives the interrelationships between livestock and land strata derived from various sources including Bawden and Tuley (1966) and other development reports (e.g. SOTESA, 1979).

Aerial surveys were undertaken in both the wet and dry seasons, but certain observable features have been assumed to be aseasonal. These are; all types of dwelling except those ascribed to FulBe pastoralists, degree of cultivation and vegetation density. The tables of abundance in each case represent the total populations of the areas surveyed. They are cited together with the % standard error (SE), partly representing the degree of patchinness in the distribution of a given population.

In addition to the tables, the distribution maps are a way of assessing quickly the general patterns of high and low population density. They also provide a means of mapping the results calculated from the interaction of variables. For example, it would be inappropriate to locate a grazing reserve in a region where the land was steeply dissected, or there was thick tree-cover. By eliminating grid squares where these are present using previously available cartographic information it is possible to calculate and site appropriate locations through computer mapping. The interaction of variables determined from ground surveys can also be sited in this way; for example, estimates of goat numbers are derived from household data combined with aerially-observed arable farmers' dwellings.

3.1 Overall Distribution and Abundance of Resources

3.1.1 Environment and Land Use

3.1.1.1 Vegetation Density

An index of vegetation density has been calculated for each grid, based on the proportion of forest, open canopy woodland, savanna woodland and open grassland as seen from the air (see Appendix I and Appendix Map IV). Generally speaking, the tree cover is thicker towards the south and on steeply dissected land, and close to rivers and streams. Open grassland is only found on the uplands and in the river flood plains. The majority of the lowlands are wooded savannahs or savannah grasslands.

3.1.1.2 Water Availability

Water was widely available throughout the survey zone in both wet and dry seasons (Map 8). Even in the dry season, 48% of the grid squares contained open water and no grid was further than 15 kilometres from water. Northwest of Bali, near Zudei, there are a number of lakes with perennial water which elsewhere in the pastoral zone would undoubtedly attract herds. However, pastoralists preferred to take their cattle to the rivers as they claimed that the semi-stagnant water carried potential livestock infections. It should be noted that this situation is in contrast with generally more arid pastoral zones elsewhere in the world, where access to water is often a limiting factor on animal production.

The extreme northern edge of the survey area is observably drier than other parts of the Toungo Block, and it was only in these regions that livestock-owners complained specifically of water-shortage as opposed to difficulties of access (Section 5.5). Pastoralists on the Mambila Plateau also requested the construction of dams, but this was because the expansion of the arable farming population in the river valleys has made access to drinking points difficult.

3.1.1.3 Erosion

The distribution of combined sheet and gully erosion recorded during the dry season aerial survey is shown in Map V. Significant and widespread gully erosion was also recorded on the Mambila Plateau. Sheet erosion was also found to be most severe on the Mambila Plateau where it extended further to the northwest than gully erosion. This probably results from the extensive movement of trade cattle off the Mambila through the Fali and down to the lowlands. There was also localised sheet erosion in the Falinga and Fali uplands, and close to Suntai. In the case of Fali and Suntai these can be attributed to the movement of trade cattle rather than overgrazing. The process of erosion and species replacement in grassy uplands has been dealt with more fully elsewhere (Bawden & Tuley, 1966:113 & LIDECO, 1972:27).

3.1.1.4 Burning

Most of the survey area had been burnt during the dry season, and indeed fairly large bush fires could be seen from the air on the edge of the Fali Hills, south of Bali, and in the heavy forest north of the Falinga Plateau. Burning was less evident on the Mambila plateau and westward towards Abong and Baissa. In the case of the forest zone, this reflects a high rainfall and a relatively low farming population. On Mambila, the river-valley farming and the use of green manure means that farmers do not burn the grass to fertilize the soil. In the past, the grass on Mambila was regularly burnt to cause animals to break cover (Schneider, 1955), but with the decline in hunting stocks and increased friction with upland farmers this has largely disappeared.

The allocation of responsibility for bush fires that have been deliberately set was a matter for considerable dispute. Pastoralists generally accuse the farmers, who do it either to scatter game to hunting or for fertilise their fields. However, bush fires may also be set by FulBe na'i in order to 'flush' or encourage the new grass to sprout, although the herders claim to have discontinued this practice.

3.1.1.5 Cultivation

Much of the Toungo Block was uncultivated, and even those regions that were farmed appeared to be only lightly cropped (Map 9). In these localities, cultivation levels were usually between 5% and 15%. The few limited patches where cultivation commonly reached 30% - 50% were mostly in the north of the survey area, especially surrounding Ganye; as well as along the new Jalingo - Wukari road, along the Donga river, and around the major towns on the road from Jalingo to Bali. The Mambila uplands are lightly but evenly cultivated, despite relatively high densities of arable dwellings. This reflects the Mambila farmers' preference for using the more fertile river valleys to grow their crops, contrasted with the FulBe agropastoralists, who have small plots of maize adjacent to their compounds on the uplands.

3.1.1.6 Availability of Suitable Land

Combining the data from the aerial survey with cartographic information makes it possible to calculate the proportion of the Toungo Block that is suitable for cattle. The difference between these figures and the actual distribution of cattle makes possible some estimate of the potential for expansion. [1]

In some places, topographical or administrative characteristics make it possible to eliminate parts of the survey zone immediately. An index of land suitability for cattle has been calculated for each grid, based on

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[1] This should **not** be taken to imply that expansion of cattle numbers in the Toungo Block is the best strategy for development (cf. Sections IV and VI).

vegetation density, land dissection, arable farmer habitation density, distance from permanent water and Game Reserve status (see Appendix 1.1.3). A rise in any of these parameters was assumed to reduce the suitability of land for pastoralism, a 'suitability score' of 500 or above being taken as unsuitable. Neither cultivation intensity nor erosion were included in the index on the grounds that the former needs to be very high in order to exclude cattle altogether, [2] and inclusion of the latter would cause much of the Mambila Plateau to be unsuitable for cattle rearing - which is manifestly not the case.

In all, some 31% of the survey zone qualifies as unsuitable for cattle (Map 10), excluding the parts with a significant tsetse challenge. Because of its status, the Gashaka Game Reserve is the single largest region unsuitable for cattle, although apart from the Falinga Plateau much of it would also qualify because of the dense vegetation and steeply dissected terrain it contains. The exclusion of the remainder is due primarily to steep dissection located around the edge of the Mambila and Fali uplands, around the perimeter of the Shebshi Hills, and in the region between Serti and Bali. All of the northwestern lowlands were identified as being potentially suitable for cattle, as are the upland regions to the south. Of the former region, many have an index score of 140 to 220 (Map 10), reflecting partial suitability.

Tsetse was not included in the calculation of the unsuitability index as the most recent information on its distribution from FDPCS (Map 19) suggest that G. morsitans is largely limited to the Gashaka Game reserve, the forest regions immediately due west of it, and a small area to the south of Toungo; - in other words, largely an area that qualifies as unsuitable for cattle for reasons other than tsetse.

The range of the two riverine tsetse species extends throughout the lowland areas, but their actual distribution is discontinuous and very dependent on the availability of suitable habitats. These are not precisely known, and therefore the degree of infestation of any particular grid cell could not be adequately assessed.

3.1.2 Livestock

3.1.2.1 Abundance

3.1.2.1.1 Cattle

Table 4 provides estimates of the cattle population of southern Gongola State during the two survey periods. It shows that the total cattle population of southern Gongola State fell slightly between the wet and dry season surveys. This appears to contradict the conventional assumption that there is an influx of cattle into the survey zone during the dry season (Bawden and Tuley, 1966:23 & Map 11). However, ground

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[2] Indeed, cultivation and cattle densities are usually interlinked (cf. Bourn & Milligan, in press).

investigations strongly suggest that 1983-4 should be regarded as somewhat atypical. Some of the wet season cattle population belonged to pastoralists who migrate from Plateau and Bauchi States every dry season, returning there in the wet. However, in the 1983 wet season they remained in the Benue lowlands, avoiding the rinderpest epidemic by isolating themselves in remote areas of bush and avoiding contacts with other herds. As a consequence, the cattle population during the 1983 wet season was higher than may normally be the case.

To compound this problem, the delayed advent of rinderpest on the Mambila Plateau introduced further perturbations of the normal dry season movement patterns. Cattle were sold on the Plateau in large numbers both in anticipation of rinderpest and after it had begun. This created a movement of unprecedented proportions along the Abong-Baissa road in January-March. Some herd-owners sent their herds either across into Cameroun or down into the heavily forested lowlands to isolate their stock. Reduced figures for Mambila in the dry season combined with unusually high figures for the Lowlands in the wet season to produce an atypical homogeneity.

This should **not** be taken to imply that after the rinderpest epidemic has finished the patterns of migration and herd management will revert to the previous patterns. Evidence from elsewhere in the pastoral zone (Gallais, 1977 & Swift, 1984) demonstrates clearly that major catastrophes, such as epizootics or drought have irreversible effects. In the case of the Toungo Block, FulBe na'i who have lost their cattle have begun to farm; whereas others who explored new regions in the process of fleeing the rinderpest may choose to remain. The patterns of livestock production in subsequent years are likely to be a transformation and development of those recorded in 1983-4.

Although the overall numbers of cattle remained comparatively constant from one season to the next, considerable changes in the composition of the cattle populations had obviously occurred. The numbers of white cattle (as implied by predominant herd colour) increased by some 13% during the dry season while the numbers of red cattle fell to about 55% of their wet season levels (Table 4). These changes reflect a marked reduction in dry season populations of red cattle on the Mambila Plateau and a simultaneous increase in the numbers of white cattle found in the Benue lowlands (see also section 3.2.1 below). Thus, in the wet season the two colour types were more or less equally abundant within the survey zone as a whole, while in the following dry season, the majority (70%) of the cattle were white. This unequal distribution was partly a consequence of the massive sales of stock from the Mambila Plateau, where there are predominantly 'red' **bodeeji** cattle. At the same time the annual migration of 'white' herds from across the Benue and from Jalingo into the lowlands increased the proportion of 'white' breeds, thus creating the disparate ratios of white to red in the wet and dry seasons.

These population figures correspond to an overall density of 15.7 per square kilometer, or 8.3 white cattle per square kilometer and 7.3 red

cattle per square kilometer during the wet season and 13.6, 9.4 and 4.2 head/square kilometre during the dry season. This represents wet and dry season stocking rates of approximately 6.4 and 7.4, 12.1 and 10.6, 13.6 and 23.9 hectares per head for total, white and red respectively.

This stocking rate is well below the probable carrying capacity of the Survey Zone as a whole, which suggests that there is a considerable potential for increase in cattle population levels. This initial observation must be modified by at least two important factors - the fact that much of it is effectively unsuited to cattle rearing because of topography, incidence of disease, heavy forest and other factors; and much of the areas biologically suited to pastoralism are unavailable because of competing social, agricultural or conservation interests.

If the proportion of land unsuitable for cattle is eliminated the overall effective cattle density is approximately 23 head per square kilometer - equivalent to a stocking rate of about 4.4 hectares per head. The effective cattle density is therefore rather higher than the initial census figures indicate. This figure is not significantly modified if the present conjectural limits of tsetse (G. morsitans) are taken into account, as most of its range coincides with areas already eliminated on other grounds.

The potential carrying capacity of regions like southern Gongola is unknown - no studies have to date been undertaken in similar ecological conditions. A widely used figure of 2 hectares per head (de Leeuw in Putt et al 1980), assumes a live weight of 300kg and a predominantly grassland pasture. If this figure is adopted, the Toungo Block as a whole could support an increase in overall density of about 27 cattle per square kilometre of suitable land, bringing the potential total to some 1.5 million.

This is undoubtedly an unrealistic figure as several regions within the survey zone already support effective cattle populations in excess of the carrying capacity quoted above - notably the Mambila Plateau (at 1.06 hectare/head in the wet season and 1.93 hectare/head in the dry season) and some of the flood plains during the dry season (Tables 4 & 5). Also such a potentially sustainable maximum figure would depend on many factors, including optimal animal husbandry techniques and an even distribution of cattle through the survey zone, both of which are unlikely to be met. Given these caveats, and the low percentage of grassland pasture in the survey zone, a more appropriate figure for carrying capacity might therefore be somewhat below 2 hectares/ head.

Table 5 shows the potential for increase in cattle densities within the areas defined as suitable for cattle within each Cattle System (See Sections 3.2.9 and 4.2 for a full definition of this term), and within the three major foci of livestock distributions. Three possible carrying capacities (K) are considered: the maximum 2 hectares per head of de Leeuw, and two lower levels which assume progressively less optimal pasture and husbandry parameters. A K of 3.5 allows an increase of 5.9

TABLE 4. CATTLE POPULATION ESTIMATES FOR SOUTHERN GONGOLA STATE 1983-1984*.

	Total Population Size**	Population Density per sq km	Stocking Rate ha/hd	Total Number GU's	Mean GU Size
ALL CATTLE					
wet season	686,700 (18)	15.7	6.4	15,800	43
dry season	596,700 (16)	13.6	7.4	14,500	41
difference	-90,000	-2.1	+1.0	-1,300	-2
RED CATTLE					
wet season	321,700 (26)	7.3	13.6	8,300	39
dry season	183,200 (15)	4.2	23.9	6,000	31
difference	-138,500	-3.1	+10.3	-2,300	-8
WHITE CATTLE					
wet season	365,000 (10)	8.3	12.1	7,500	49
dry season	413,500 (17)	9.4	10.6	8,500	48
difference	+48,000	+1.1	-1.5	+1,000	-1

Wet season survey: July 1983
Dry season survey: February/March 1984
* Area Surveyed: 43,875 square kilometers.
** Figures in parenthesis are % standard errors.

TABLE 5. POTENTIAL FOR EXPANSION OF CATTLE POPULATIONS INTO SUITABLE LAND* WITHIN SOUTHERN GONGOLA STATE IN RELATION TO POSSIBLE CARRYING CAPACITIES, BY CATTLE SYSTEM**.

Cattle System		Effective Cattle Density/sq km		Change in maximum density/sq. km. if carrying capacity is: (ha/hd)		
		Wet	Dry	2	3.5	5
Ganye	I	18.8	17.9	+ 31.2	+ 9.8	+ 1.2
Shebshi	III	21.9	5.6	+ 28.1	+ 6.8	- 1.9
Mambila	II	93.6	51.8	- 43.6	- 65.0	- 73.6
Fali	IV	12.0	6.0	+ 38.0	+ 16.6	+ 8.0
Falinga	V	173.1*	143.9*	- 123.1	- 144.5	- 153.9
Kam/Serti	VIII/XII	3.1	6.6	+ 43.4	+ 13.4	+ 13.4
Wase-Jalingo	VI	11.6	27.2	+ 22.8	+ 1.4	- 7.2
Suntai	VII	21.6	18.3	+ 28.4	+ 7.0	- 1.6
Takum	IX	34.4	22.1	+ 15.6	- 5.8	- 14.4
Wukari	X	27.1	166.2	- 116.2	- 137.6	- 146.2
Development Region***						
Ganye Lowlands		20.3	12.0	+ 29.7	+ 8.3	- 0.3
Southern Uplands		62.2	35.3	- 12.2	- 33.6	- 42.2
Benue Lowlands		16.6	23.7	+ 26.3	+ 4.9	- 3.7
Remainder		7.2	4.3	+ 42.8	+ 21.4	+ 12.8
Total Area Surveyed		22.7	19.7	+ 27.3	+ 5.9	- 2.7

* Suitabilty as defined by index described in Section III. Figures for Falinga System distorted as it lies within Gashaka Game Reserve.

** Cattle system as described in text.

*** Development Region as described in text.

TABLE 6. PERCENTAGE OF LAND IDENTIFIED AS SUITABLE* FOR CATTLE WITH ESTIMATED AND EFFECTIVE CATTLE DENSITIES, BY CATTLE SYSTEM**.

Cattle System		% Suitable	% Not Suitable	Cattle Density/sq km			
				Estimated		Effective	
				Wet	Dry	Wet	Dry
Ganye	I	87.1	12.9	16.4	15.6	18.8	17.9
Shebshi	III	39.2	60.8	8.6	2.2	21.9	5.6
Mambila	II	72.1	27.9	67.4	37.3	93.6	51.8
Fali	IV	75.5	24.5	9.0	4.6	12.0	6.0
Falinga	V	2.6*	97.4*	4.5	3.7	173.1*	143.9*
Kam/Serti	VIII/XII	65.1	34.9	2.0	4.3	3.1	6.6
Wase-Jalingo	VI	96.8	3.2	11.3	26.3	11.6	27.2
Suntai	VII	100	0	21.6	18.3	21.6	18.3
Takum	IX	94.4	6.6	32.5	20.9	34.4	22.1
Wukari	X	100	0	27.1	166.2	27.1	166.2
Development Region***							
Ganye Lowlands		54.8	45.2	11.1	6.6	20.3	12.0
Southern Uplands		54.7	45.3	34.1	19.3	62.2	35.3
Benue Lowlands		98.0	2.0	16.3	23.2	16.6	23.7
Remainder		54.1	45.9	3.9	2.3	7.2	4.3

* Suitabilty as defined by index described in Section III. Figures for Falinga System are distorted as it lies largely within Gashaka Game Reserve and so qualifies as unsuitable.

** Cattle system as described in text.

*** Development Region as described in text.

cattle per square kilometer of suitable land or 180,000 head. If it is increased to 5 hectares per head then the region as a whole is fully stocked.

Taken in conjunction with the finding that 65% of the land that is potentially suitable for livestock supports less than 5 cattle per square kilometer (Map 10). This argues that there is significant room for expansion or relocation of cattle populations within the lowland regions of the survey zone. If 3.5 hectares per head is taken as the most applicable carrying capacity then the cattle populations rise to 0.8 or 0.9 million, an increase of some 200,000 or 30%, over current levels. The focus of this relocation or expansion would be concentrated in the northwestern lowlands, where there is still potential grazing land to be exploited (Table 6). It must be borne in mind that this figure depends on a nutritional status for the livestock deemed acceptable by the pastoralists, which may not coincide with theoretical levels.

3.1.2.1.2 Size of Cattle Grazing Units

Aerial survey produces estimates of groups of animals herded together, defined as a 'grazing unit' (GU), as distinct from 'herd' applied to the total number of animals owned by an individual pastoralist. The importance of this distinction is illustrated by herding practices on the Mambila Plateau. FulBe cattle-owners with large herds will divide them into smaller grazing units of 60-120 animals. Mambila cattle-owners, who generally have small herds of only 5-20 animals combine these together into larger grazing units.

Table 4 shows that the average size of grazing unit is 42 cattle and that this is subject to only slight seasonal variation. The size of a grazing unit reflects the number of animals that can be conveniently handled by a single individual, a factor that does not change appreciably from season to season. The fall in the number of **bodeeji** cattle in a GU between the wet and dry seasons reflects the impact of rinderpest on the Mambila Plateau rather than management practice. This contrasts with WoDaaBe herds in Niger (Swift, 1984:58) where there is a pronounced increase in the size of grazing units in the rainy season. This constitutes a neat demonstration of the fact that water is not a constraint on herd management in the Toungo Block.

3.1.2.1.3 Goats and Sheep

Ground surveys showed that goats were not herded by pastoralist FulBe and that those owned by the arable farmers were all kept in close proximity to the compounds. This means that all the small ruminants observed from the air were sheep. Both arable and pastoral farmers kept sheep but it is likely that only those herded with groups of cattle were easily visible during the aerial surveys. This was because the relatively dense vegetation that covers much of southern Gongola is likely to obscure such small animals unless they are in fairly large groups. Such concentrations are characteristic only of pastoralist sheep flocks. It is likely, therefore, that the small ruminants recorded from

the air were sheep belonging to cattle owners and were probably underestimated because of the dense vegetation cover. The estimates obtained are nevertheless likely to reflect their relative distributions within the survey zone with reasonable accuracy.

The total number of sheep estimated from the air was 57,200 (+/-9% SE) during the wet season and 16% higher, at 66,500 (+/- 13% SE), during the dry season. This corresponds to a wet season population density of 1.3 per square kilometer and a stocking rate of 76.8 hectares per head; and a dry season population density of 1.5/square kilometres, which is equivalent to a stocking rate of 66.2 hectare/head. Flock sizes in both seasons were very similar at 23.9 and 22.7 in the wet and dry seasons respectively.

To obtain an indication of goat populations within the survey zone, the numbers per compound were investigated on the ground (see Appendix I). These figures, when combined with the human habitation estimates, suggest that the total goat population within the survey zone is approximately 845,800 (+/- 27% SE). Goats are generally associated with sedentary human populations and so their numbers do not fluctuate seasonally. It should be emphasized that this is contrast with other regions of Nigeria, where goats do form part of pastoralist's domestic livestock. These figures suggest that there are approximately 3 goats for every 2 cattle within the Toungo Block.

The above results suggest that in the dry season, the Toungo Block supports about 510,000 TLU [3] of which 80% are cattle. During the wet season this rises to 580,000 of which 85% are cattle.

3.1.2.2 Seasonal Distributions

3.1.2.2.1 Cattle

In general, the distribution patterns of the cattle, in both seasons, closely coincide with those of the land defined as suitable for cattle by the index described in section 3.1.1.6. Figure I shows this relation graphically, cattle densities dropping off sharply as the index approaches 500, indicating very thick vegetation or highly dissected land. Map 11 shows the wet season distribution of total cattle densities within the survey area. They reach maximum values of between 300 to 350 per square kilometer in several regions: the northern part of the Mambila plateau; to the south of Sabon Gida; and to the north of Takalafiya.

Three major zones of cattle concentration are readily apparent from Map 11: the Mambila Plateau; the lowlands surrounding Ganye and the adjacent plateaux to the west; and the entire lowland region in the northwest of the Toungo Block. In the wet season cattle are also clustered on the Fali Hills, and north of the Falinga Plateau. These grassy uplands resemble

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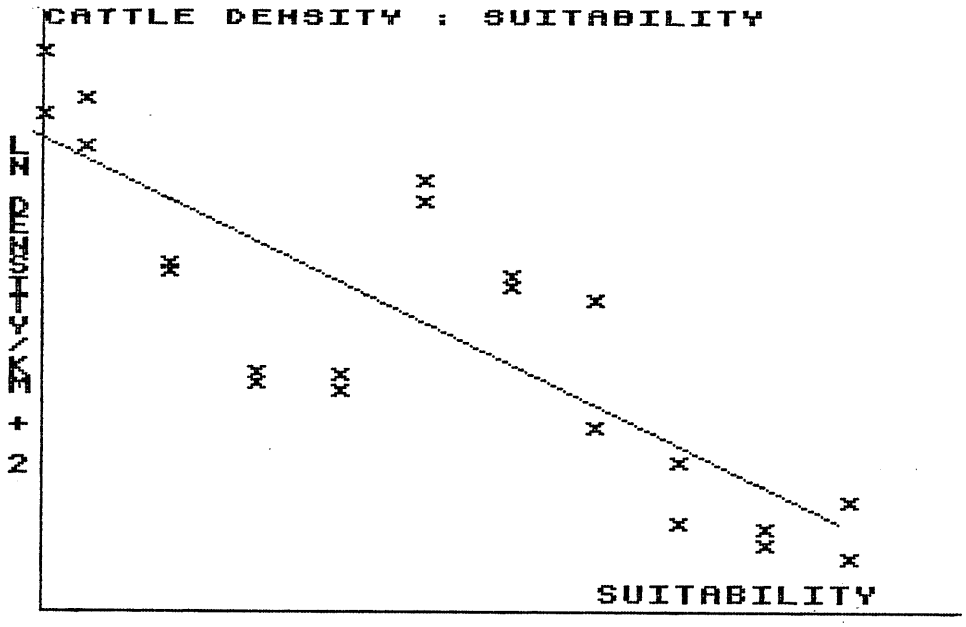
[3] Tropical Livestock Unit: single cattle = 0.7; sheep or goats = 0.1.

FIGURE I



r= -0.838 F= 47.072 df= 21
a= 3.860 b= -0.003

the Mambila Plateau, but they are less attractive to pastoralists, both because of their isolation and because they are more dissected. Their inaccessibility has caused arable farmers to move away thereby discouraging the development of markets and roads.

The LRDC survey (Bawden and Tuley, 1966: Map 11) shows the Benue lowlands as dry season grazing. Map 6, showing the movement of FulBe na'i into the Toungo Block suggests that this would have been correct in the late 1950's when most of the data used to prepare that report were collected. Their settlement by FulBe na'i has taken place since 1960 and cattle are present throughout the year. The relatively small variation between the seasons illustrates the degree of permanent establishment by the pastoralists in the Benue Lowlands. The tracts of land that remained devoid of cattle in the wet season were either covered in dense vegetation, steeply dissected or heavily cultivated.

Map 12 shows that in the dry season the centres of cattle concentration remained similar but that within these regions the herds were more dispersed. Thus concentrations remained in the lowlands surrounding Ganye; on the Mambila Plateau; and in the low lying areas forming the northwest quadrant of the survey zone. However, the majority of the cattle in this latter region had moved close to the Benue, Donga, Taraba and Suntai rivers (cf. Section 3.2.4), though the River Kam was largely avoided because its banks are particularly steep and heavily wooded. During the dry season aerial survey a high cattle density was recorded some 45 km to the west of Bali (the "Suntai Triangle", see Section 4.4), due to the newly flushed grass. Shortly after this, herds of cattle moved into the whole region adjacent to the Bali-Mararaba road in search of the new grass. Some cattle remain in the Fali and Falinga grasslands, although part of their populations regularly move down to the lowlands in the late dry season because of a shortage of pasture. Along the Jalingo-Bali road smaller groups were recorded; these were WoDaaBe and **Bokolooji** pastoralists who had migrated from further north. Relatively few cattle were seen in the remainder of the zone, although apart from the Gashaka and Gumpti Game Reserves in the southeast, no large area was completely devoid of cattle.

In general terms, therefore, the dry season cattle distributions in the survey zone were similar to those in the wet season. This can be accounted for by the predominantly self-contained nature of many of the production systems and allows for the definition of Cattle Systems as relatively discrete geographical zones. These are shown on Overlay C and described in more detail in Section IV. In general, the majority of the cattle today circulate within the Toungo Block, rather than migrating from outside its boundaries. During the dry season, cattle move from the uplands to the flood-plains of the major rivers, particularly the Benue. Otherwise they disperse more broadly throughout the Toungo Block, and are therefore in lower concentrations, a response to the widespread availability of permanent water.

Aerial survey demonstrated clearly that the Toungo Block divides into regions that support predominantly red or white cattle (Maps VI-IX). If the two major cattle types are considered separately, it can be seen that on a regional scale, the relative distributions of the two colour types are remarkably similar in both wet and dry seasons. Thus white cattle predominate in all areas except the southern uplands, while the red cattle were largely limited to the Mambila Plateau. This similarity between dry and wet season distribution patterns of the two cattle colour types does not, of course, mean that no movement has taken place but that the same areas are favoured by each colour type in both wet and dry seasons.

In both seasons there is a high concentration of white cattle around the edges of the Mambila Plateau. The reasons for this are historical rather than ecological; the less desirable uplands were colonised later than the Donga valley by FulBe na'i migrating across the Benue lowlands (Blench, 1983b). The lower numbers in the dry season partly reflects the impact of rinderpest, and partly the practice of sending the cattle living close to the escarpment down to the thick forest at the foot during the dry season.

In the lowland areas, the resident white cattle relocated within the Toungo Block, while FulBe na'i from outside were forced into the less favourable regions, such as the forests east of the Bali-Jalingo road. In the wet season they tended to be spread out, while in the dry season, they cluster around the rivers, on the the Benue, Taraba and Donga and also on the Faro flood-plain south of Ganye.

3.1.2.2.2 Other livestock

The pastoral sheep distributions (Maps 13 & 14) recorded by the aerial survey correspond closely with those of the cattle, although there is a slight tendency for them to congregate further north in the dry season. This is because both transhumant and nomadic FulBe may leave their sheep at their semi-permanent rugas with their wives and families, while they take their cattle in search of the new grass. The danger from footrot, in the more southerly lowland areas with higher rainfall, means that during this period herds of sheep may occasionally be observed without cattle. The major wet season concentrations were on the Mambila Plateau, the Ganye region and the north western lowlands reaching a maximum of 76 per square kilometer to the south of Gassol.

Information from ground interviews during the dry season suggest that more goats are kept by individual lowland farmers than by their counterparts in the uplands (Map 15) and by those living close to roads. Particularly high numbers per compound were claimed in the Ganye lowlands, near Toungo; to the west of Baissa; around Suntai; along the roads to the west of Bali; and to the south west of Mutum Biyu.

3.1.2.3 Interrelations between Livestock and Land Use

Figures II and III present some examples of the way that the interrelations between livestock and land use can be demonstrated using aerial survey data. Figure II illustrates the interdependence of FulBe pastoralists and their arable farming neighbours. Although pastoralists like to profess their independence from farmers, the close relation between the two emerges clearly from the histogram; in all seasons cattle and cultivation are closely linked, up to the highest density of cultivation recorded in the Toungo Block. Evidence from elsewhere in the Middle Belt (Blench, 1984 & Bourn, Milligan and Wint, in press) shows that where the incidence of cultivation is > 60%, the numbers of cattle begin to fall; at a certain point mobile exploitation of land resources will be displaced by the relatively static arable cultivation. In the wet season FulBe must be close to towns and markets in order to sell their dairy produce, while in the dry season they will stay nearby the farms in order to exploit the cereal residues.

A vegetation index (Section 3.1.1.6) was used to correlate cattle and goat populations with vegetation density. Figure III shows these relations as a histogram. Goats are at their greatest densities in regions with medium vegetation indices; these are the partly cultivated regions of the Benue lowlands and Ganye. The grasslands, with the lowest vegetation index, support fewer goats because they are preferentially used for cattle and sheep. Cattle, therefore show the greatest densities in the grasslands and their numbers drop rapidly as the vegetation becomes thicker. The imbalance between wet and dry seasons in the lowest vegetation category reflects the movement of cattle from the grasslands to the forest regions below in the dry season, accentuated in 1983-4 by the impact of rinderpest. In the lowland areas with medium vegetation, the higher cattle figures for the dry season represent the movement across the Benue and southward from Jalingo into lowland pastures.

3.1.3 Human populations.

The categories used in this section refer to the types of habitation that can be observed and categorized from the air. The links between habitation type and mode of production are dealt with more fully in Section 2.4.

3.1.3.1 Abundance

Table 7 summarizes the human habitations within the survey area. The permanent dwellings (i.e. those assigned to the arable and agropastoral categories) are assumed to be constant throughout the year. The arable dwellings were counted in both aerial surveys to provide an internal check on accuracy, which revealed that the two estimated differed by approximately 10%, the dry season estimates being the higher. This indicates remarkably close agreement between the two surveys as, in the dry season, the numbers of dwellings within large villages was estimated and included in the population counts whereas in the wet season they were recorded simply as villages present. As the dry season survey included specific estimates of agropastoralist dwellings, it was on

TABLE 7. RURAL HABITATION IN SOUTHERN GONGOLA STATE** 1983-1984.

	NUMBER OF DWELLINGS*	DENSITY per 10 sq km
ARABLE	527,200 (18)	120.1
AGRO-PASTORAL	13,400 (20)	3.1
PASTORAL		
wet season	25,100 (11)	5.7
dry season	16,800 (11)	3.8
difference	-8,300	-1.9
SETTLED/TRANSHUMANT		
wet season	16,500 (16)	3.8
dry season	14,700 (12)	3.3
difference	-1,800	-0.5
NOMADIC		
wet season	8,600 (17)	2.0
dry season	2,100 (17)	0.5
difference	-6,500	-1.5

* +/- % Standard Error in brackets. ** Total Area 43,875 square kilometers.

these counts that the calculations of abundance and distribution patterns of the permanent dwellings were based.

The reduction in the numbers of habitations ascribed to FulBe na'i (hastily built circular shelters) in the dry season is initially surprising because at this period there is undoubtedly an influx of both nomadic FulBe and their cattle. There are two reasons for this; during the dry season, many FulBe divide their herds and send the young men to graze by rivers. Instead of constructing houses these young men simply unroll their mat under a tree. Also, the favourable conditions for FulBe na'i along the banks of the major rivers allow them to remain there for the full extent of the dry season, eight months. This exceptionally long stay makes it worthwhile to invest the labour in building semi-permanent 'beehive' rugas, where part of the family will stay throughout the dry season.

Moreover, enquiries on the ground established that some of the cattle present within the Toungo Block, particularly in the Benue region during the dry season, were owned by FulBe resident outside the survey area. The dry season figures may therefore underestimate the pastoralist populations which actually use, as opposed to live within, the study area.

These results suggest that the pastoralists, including the agropastoralists, amount to about five percent of the total human population, of which between a third and a half live in permanent dwellings. [4] Given the estimates of livestock numbers within the survey zone, the average cattle holdings are about 30 cattle and 2 sheep per pastoral hut, and one to two goats per arable dwelling.

3.1.3.2 Distribution

3.1.3.2.1 Arable Farmers

Map 16 provides a convenient visual summary of the distribution of the compounds of arable farmers. The relationship between the construction of roads and the siting of farms is clear - Maps 4 and I illustrate some of the agricultural produce exported from southern Gongola State and the concomitant importance of the road network. The Gashaka/Gumpti Game Reserve was cleared of farming populations after its creation; the related decline of roads in that area has caused a migration of population away from the whole region. The rivers also support a network of towns, especially the Taraba and Donga, although the Kam and the lower Suntai are too inaccessible to encourage immigration of population. The flood plains of the Benue are too consistently inundated to support

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[4] This assumes approximately equal numbers of occupants in each dwelling unit. This assumption is more likely to be correct for pastoralists, whose constructions tend towards maximum occupation, than for arable farmers, whose villages include buildings not intended for habitation, such as kitchens, livestock shelters and ritual structures.

FIGURE II . CATTLE DENSITY IN RELATION TO % CULTIVATION

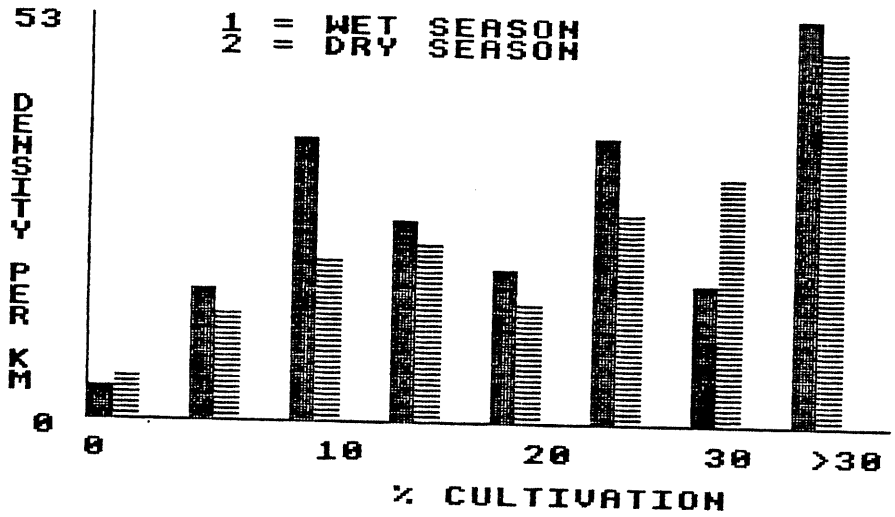
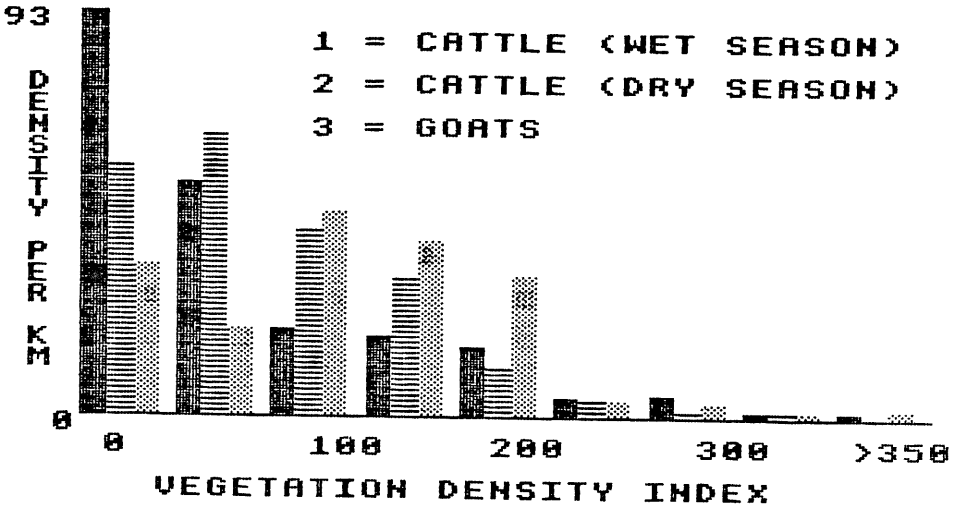


FIGURE III . LIVESTOCK DENSITY IN RELATION TO VEGETATION DENSITY INDEX



permanent arable communities, although there is a substantial seasonal population. The Mambila Plateau is densely populated because of a variety of access routes, while the other grasslands, the Shebshi, Fali and Falinga are avoided.

3.1.3.2.2 Agropastoralists

Agropastoralist dwellings, i.e. permanent structures with associated cattle corrals and crops, were found almost exclusively on the Mambila plateau and on the Ganye lowlands, which correlates closely with the presence of the FulBe Wuro, Mambila and Samba peoples who practise this mode of production (Section IV). The distribution of the agropastoralist compounds recorded suggests that the majority of the pastoralists in the Ganye region also grew crops, and only a few were restricted to pastoralism alone. This is a relatively recent phenomenon, and in many places FulBe pastoralists in the Ganye region said that they had only begun to farm in 1983 as a result of losses from rinderpest.

3.1.3.2.3 Pastoralists

Pastoralists are defined by the lack of associated cultivation; they divide, however, into two distinct types. On Mambila, and to a much lesser extent in the Ganye region, there are some FulBe who have permanent dwellings where they live throughout the year, but do not farm. This may either be because they depend entirely on the produce of their herds throughout the year, or in the case of Mambila, because they have a plot of land away from their homestead in a more favourable location, and they hire the arable farmers to grow cereals for them. The distribution of this type of dwelling shows little seasonal variation, as such pastoralists are effectively settled.

During the wet season, dwellings of the settled or transhumant pastoralists were to be found mainly on the Mambila plateau, with smaller, scattered populations surrounding Ganye and along the Donga river. There were also localised centres in the Fali Hills, to the north of the Falinga Plateau and on the Kiri plateau to the west of Ganye. In the dry season, these areas were still occupied, though to a lesser extent and additional concentrations were recorded along the Benue and the Taraba.

The wet and dry season patterns are broadly similar, though as might be expected from the cattle distributions, groups of pastoralist dwellings were found along the major river courses, particularly the Benue and the Taraba near Gassol and Bali. The nomadic pastoralists, as represented by temporary dwellings, were well dispersed during both wet and dry seasons but, unlike the more settled cattle farmers, were found only in the northern half of the study area. The largest wet season densities, of up to 57 per square kilometer, were found in the lowlands to the west and north of Bali. Other centres of nomad concentration during the wet season were: to the west of the Fali hills, within 30 kilometers of the new Jalingo to Wukari road and to the south and east of Ganye close by the Cameroun border. All these were areas not inhabited by settled or

transhumant pastoralists and indeed little occupied by the arable farmers.

3.2 Stratified Distributions and Abundance

The stratifications described below serve two purposes: to provide population figures relevant to specific applications and to particular development agencies; and to identify characteristic divisions within the survey zone that are closely related to the variations in livestock distribution patterns. The data described is tabulated in Appendix II.

3.2.1 Cattle and Goat Populations in the Principal Land Systems

The abundance and distribution of cattle were analysed by Land Systems, using the categorization in the LRDC report (Bawden and Tuley, 1966). Appendix II summarizes the analysis of these results and tabulates the population figures for cattle and goats.

3.2.2 Cattle and Goat Populations in Major Vegetation and Land Use Types

The most recent and comprehensive vegetation and land use maps of Nigeria are those derived by interpretation of Side Looking Airborne Radar (SLAR) imagery published by the Federal Department of Forestry (FDF, 1978) as a set of 69 1:250,000 scale maps covering the entire country. Seven of the nine major vegetation and land use formations identified in Nigeria are represented in **RIM**'s survey zone in southern Gongola State. Two of these, however, covered areas of less that 500 square kilometers: Shrubland and Thicket - 25 square kilometers; Cultivation >60% intensity - 50 square kilometers and have therefore been excluded from the analyses.

The highest densities and numbers were found, in both wet and dry seasons, in the grasslands, with considerable numbers but progressively lower densities in the highly cultivated and moderately wooded vegetation types. These relationships are set out in Tables 5A & B in Appendix II. In the dry season, the forest areas support dense, though small cattle populations. The ground survey showed that these consisted almost entirely of **bokolooji** (Sokoto gudali) cattle that have have been trained to eat browse cut from trees.

3.2.3 Cattle and Goat Populations at Various Altitudes

The LRD/DOS (1972) relief map of the Benue valley was used to divide the study area into four altitude categories at intervals of 500 meters above sea level. Tables 6A & 6B, Appendix II, set out the relationships of cattle numbers to the altitude belts.

The Toungo Block is characterised by grassy uplands and forested lowlands separated by steep, heavily forested escarpments. As a result, few cattle were present in the 500-1000 m. belt, and the majority were either in the lowlands, below 500 m. or above 1500 m. in the grassy uplands of Mambila, Fali, Falinga or Shebshi.

In the dry season, the proportion of cattle in the lowlands belt (below 500m), rose from 40% to 60%. This reflected the influx of 'white' breeds into the Benue lowlands. At the same time the overall numbers above 1000m declined sharply. This is directly correlated with the drop in cattle population on the Mambila Plateau, due to both sales and the incidence of rinderpest.

Goat densities closely reflect the distribution of arable farmers and as the majority of these are situated in the lowlands, goats reach maximum levels in the lowest altitude belts. Goat densities were lowest, with respect to altitude, between 500 and 1000m a.s.l., reaching 8.1/square kilometer. Both below and above this band, the densities were fairly constant, ranging from 21 - 24/square kilometer, though because of the land area involved, over half the goats were recorded below 500 m. a.s.l..

3.2.4 Cattle and Goat Populations in Relation to Rivers and Catchments

The abundance and distribution of cattle in relation to major rivers was calculated using the 1:250,000 topographical maps from Nigerian Federal Surveys. In addition, the study area was also divided into 11 river catchments, on the basis of the boundaries indicated in Bawden and Tuley (1966: Map 3). Tables 7A & 7B, 11A & 11B in Appendix II set out the precise figures for goat and cattle populations.

Of the three major river catchments within the survey zone - the Donga, the Taraba and the Benue, the most densely stocked during the wet season was the Donga, the upper regions of which include the Mambila uplands. The Donga catchment held 65% of the total cattle population of the Toungo Block and the Taraba catchment approximately a quarter, though at very low densities when compared to any part of the Donga. The remaining catchments of the Benue, Deo, Ini and Belwa rivers held about a tenth of the total cattle population between them, though as their areas are relatively small, the stocking rate was rather higher than that found in the Taraba area.

In the following dry season, only 45% of the cattle were found within the Donga Catchment, 35% within the Taraba Catchment and 20% in the remaining catchments. It must be remembered when interpreting these figures that the Benue flood plains are, in this context, divided between the Taraba and Donga Catchment Areas.

In terms of goats, the Taraba, Donga and Benue Catchments are stocked at very similar densities (28 - 30/square kilometer), though the Benue Catchment (i.e. the area to the north and west of Ganye) contains the greatest absolute numbers.

The relationship between cattle density, GU density, GU size and distance to major rivers during the wet season is more complex. Figure IV charts the relationship of cattle density to distance from major rivers in the wet and dry seasons. A quarter of all cattle were seen further than 20 kilometers from major rivers during the wet season and

approximately 40% were within 10 kilometers. The dry season data shows that 80% of all cattle were within 20 kilometers of a major river, which means that a similar proportion as in the wet season (i.e. 20%) were recorded further than 20 kilometers from a large river. However, in contrast, 60% of the dry season cattle populations were within 10 kilometers of a major river course and 40% within 10 kilometers. In broad terms, more cattle, in more, though smaller herds were found in areas further than 20 kilometers from the major river courses. However, the density of both cattle and cattle herds were higher nearer these permanent water courses, the threshold distance being approximately 27.5 kilometers. This distance also seems to be critical in relation to wet season grazing unit size in that mean recorded herd size falls to 30-35 from 40-45 in regions closer to rivers.

In the dry season, as might be expected, the cattle are concentrated in the largest numbers, highest densities (23/square kilometer) and the largest grazing units (55) within 5 kilometers of river courses. As distance from major rivers increases, cattle numbers fall linearly and GU size remains fairly constant at 34-38 head. Cattle density also drops markedly away from flowing water, to 7-12 animals/square kilometer, but peaks again, if temporarily, at 20-25/square kilometer, at a distance of 30 - 35 kilometers.

Figure V synthesizes data on the relations between goat densities and rivers, towns and roads. It shows that goats are more directly linked with towns and roads, because of their close association with arable habitation. 95% of all goats were closer than 20 kilometers to rivers, 65% within 10 kilometers and 38% within 5 kilometers The maximum density in the closest category is only 31 animals/square kilometer. However, goats are rare further than 30 kilometers from rivers because towns are usually sited with some access to flowing water.

3.2.5 Cattle and Goat Populations in Local Government Areas

The LGA's within southern Gongola have recently reverted to the pre 1979 boundaries. There are presently eight LGA's represented within the survey zone:- Mambila, Bali, Ganye, Takum, Zing, Mayo Belwa, Jalingo and Wukari (Overlay B). The first three of these are wholly or largely contained within the survey area, while comparatively small sectors of the remaining five are present, particularly Zing, of which only 100 square kilometers lie within the Toungo Block.

In both wet and dry seasons, 70 to 75% of the total cattle population was found within the boundaries of Mambila and Bali LGA's which, between them occupy 69% of the survey zone (Appendix II, Tables 8A & 8B). During the wet season Mambila supported the higher densities, (22.6/square kilometer) whilst during the dry season Bali LGA was most populous (17.3/square kilometer). In both surveys, Mambila contained almost exclusively red cattle and the lowland LGA mostly white. Wukari LGA was particularly heavily stocked during the wet season, reflecting the concentration of animals around Bantaji.

In contrast to the cattle, goats were relatively sparse in Mambila and Bali LGA's, though Bali LGA did contain relatively large numbers because of its size. The LGA's most densely populated by these animals were in the northern half of the survey zone: Wukari, Mayo Belwa and Zing.

3.2.6 Cattle and Goat Populations in Relation to Major Towns

Trends in cattle density, GU number and therefore GU size, are also apparent with distance from towns and markets. Using the 1982 Gongola State Map as reference, the distance from the centre of each grid square within the survey zone to the nearest major town was determined and the wet season cattle populations at various distances from these towns were estimated.

Figure VI shows the relations between cattle densities and distance from towns in both wet and dry seasons. It illustrates clearly both that cattle are closely associated with towns, and that there is little seasonal variation. In both wet and dry seasons nearly 90% of the cattle population was within 20 kilometers of a town of significant size, 70-75% within 15 kilometers and 45-50% within 10 kilometers. Sixty percent were observed between 5 and 15 kilometers from major towns. Goats were more closely associated with towns than were cattle, 40% being within 5 kilometers, 65% within 10 kilometers and 95% within 20 kilometers. In the wet season, both cattle and herd density peaks at about 7.5 kilometers from towns, at 25-30 head per square kilometer or approximately 90 herds per 100 square kilometer. Either side of this peak, cattle and herd densities are markedly lower, reaching as little as 2 head or about one herd per ten square kilometers. In contrast, mean herd size increases more or less linearly with distance from towns, reaching a maximum at some 30 kilometers from towns.

In the dry season, total cattle density falls rapidly from 26/square kilometer to 3 -4/square kilometer as distance from towns increases. In contrast, GU density shows much the same pattern as during the wet season, peaking at a distance of 5 - 9 kilometers. As a result, mean GU size increases slightly, from c.40 in close proximity to mjor towns, to about 50 some 15 to 20 kilometers distant. Thereafter, it drops sharly to less than 30.

Goat numbers and densities show a very similar relationship to distance from towns as they do to distance from roads, again reflecting the location of the arable dwellings (Figure V). Their mean density falls exponentially from a maximum of 91/square kilometer to 0-1/square kilometer

3.2.7 Cattle and Goat Populations in relation to Major Roads

In both the wet and dry seasons, the results suggest that the numbers of cattle (and therefore densities) are highest close to, but not actually along major roads (Figure VII). Using the 1982 Gongola State Map as an initial reference, supplemented by information gathered in the course of the ground surveys, the distance from the centre of each grid square

FIGURE IV. CATTLE DENSITY IN RELATION TO DISTANCE FROM RIVERS

1 = WET SEASON 2 = DRY SEASON

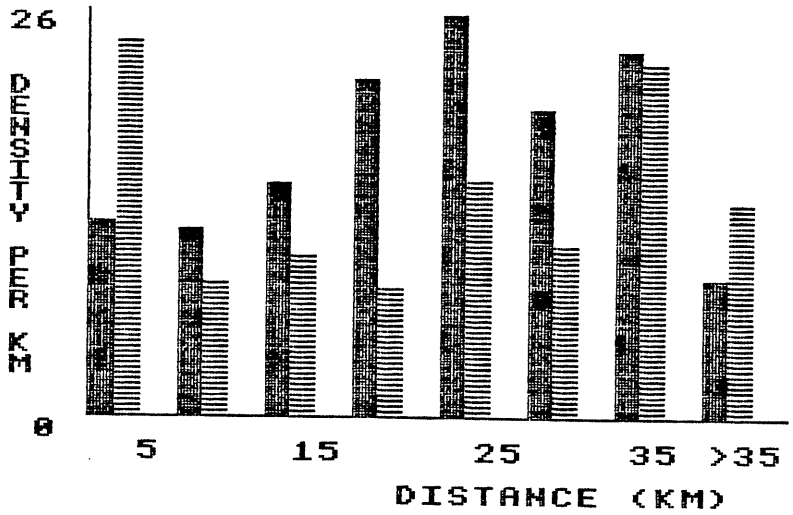


FIGURE V. GOAT DENSITY IN RELATION TO DISTANCE FROM ROADS, TOWNS AND RIVERS

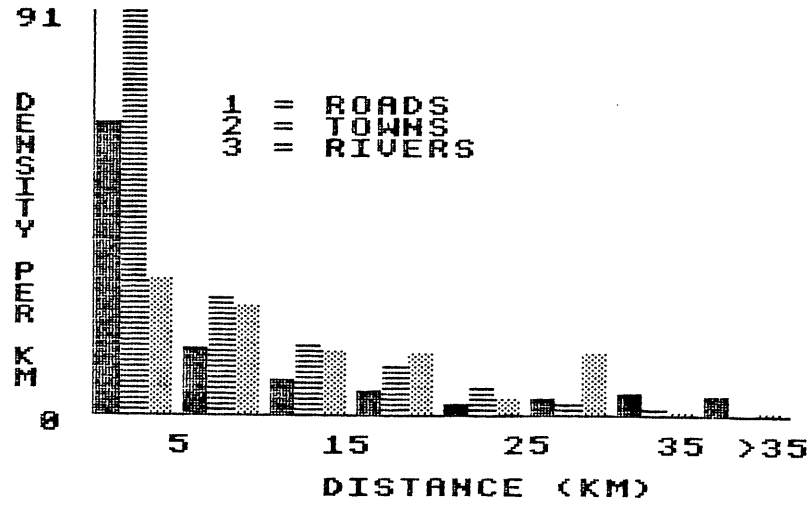


FIGURE VI . CATTLE DENSITY IN RELATION TO DISTANCE FROM TOWNS

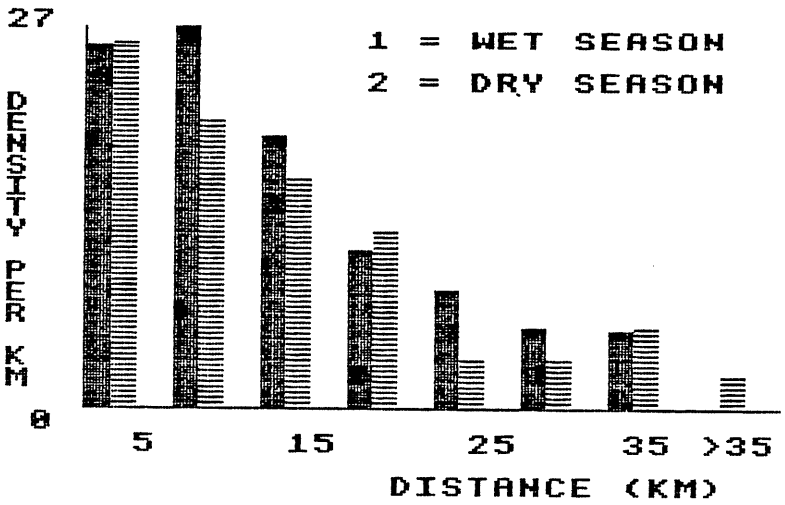
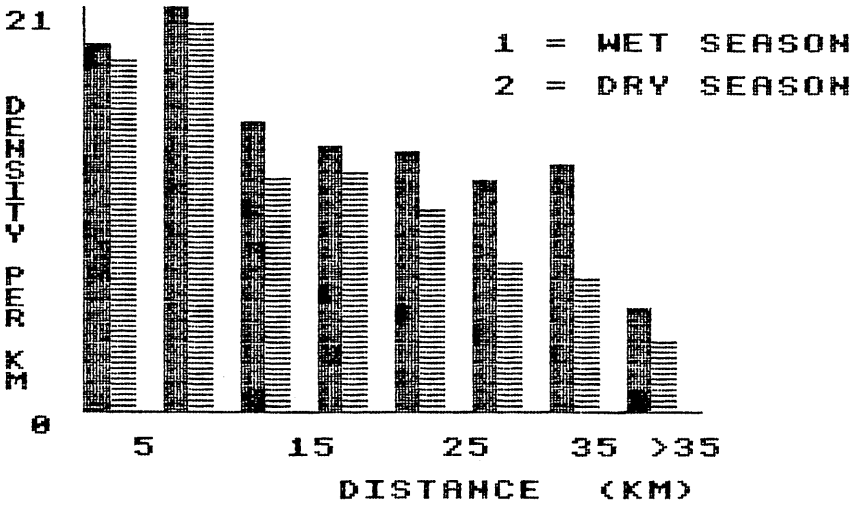


FIGURE VII . CATTLE DENSITY IN RELATION TO DISTANCE FROM ROADS



within the survey zone to the nearest major road was determined, from which the wet season cattle populations at various distances from major roads were estimated (Appendix II, Tables 9A & 9B). In the wet season, some two thirds of the cattle recorded were within 20 kilometers of a major road, and approximately half within 10 kilometers During the dry season, just over 80% of the cattle were recorded within 20 kilometers of roads and some 55% within 10 kilometers

In both seasons, cattle numbers and densities were highest close to major roads where they range from approximately 17.5 to 22.5 head per square kilometer. Beyond some 10Km. from major roads, cattle densities dropped to about 12.5 head per square kilometer and thereafter changed little with availability of conventional access routes. This analysis is essentially similar to the relationship between cattle numbers and large towns, because all cattle markets are situated on roads and access routes (Map 5).

In both seasons the maximum number and density of cattle GUs peaked around 7.5 kilometers from the major access routes, at 3500 GUs or 55 GUs per 100 square kilometers. Areas both closer and further to roads than this apparent optimum distance, supported a remarkably constant mean GU density of approximately 30 GUs per 100 square kilometer.

Mean grazing unit size, when calculated on a grid basis, appeared to decline with distance from roads during the wet season from 55 to a minimum of about 40. In the dry season, GU size peaked at approximately 70 at five to nine kilometers from roads and fell linearly to a minimum of 20 thereafter.

Over four-fifths (83%) of the goats were within 10 kilometers of a major road and some two-thirds were within 5 kilometers. Goat densities were also highest (66/square kilometer) near to roads (Figure V), reflecting the distribution of arable farmer dwellings. Unlike cattle however, goat densities fell very rapidly further than 5 kilometers from major access routes, to 15/square kilometer at a distance of 5-9 kilometers, and 3-8 per square kilometer thereafter.

3.2.8 Cattle populations and Tsetse Distribution

According to the most recent tsetse information on the distribution of G. morsitans made available by FDPCS (Map 19) the fly is confined to the Gashaka/Gumpti Game Reserve and a westward extension in the thick forest around Bali. As there are extremely few cattle in these regions no numerical analysis was made of cattle populations in tsetse-infested areas.

3.2.9 Cattle populations in Development Regions

Throughout the quantitative descriptions of the livestock populations of the survey zone, three geographical sub-units have repeatedly been identified as epicentres or major concentration areas of the animal production within southern Gongola State in both wet and dry seasons. On

this basis, the survey zone has been divided into three Development Regions (DR's):- the Ganye Lowlands, the Southern Uplands and the Benue Lowlands forming 78% of the survey zone. These in turn can be subdivided into Cattle Systems, according to the patterns of movement of the majority of the cattle within them (Overlay C). The justification and exact definition of the Regions and Cattle Systems is given in Section IV. Table 8 shows the abundance of cattle, goats and sheep in both seasons in both the Cattle Systems and Development Regions. It indicates that the great majority of the cattle in the Toungo Block are located in the Development Regions. Although the remaining land area (Systems XII-XIV) make up 21% of the survey zone they contain only 7% of the total cattle population in the wet season and 5% in the dry season. The corresponding densities are below 4 animals per square kilometer. Similarly, 93% of the estimated goat population lies within the three Regions.

TABLE 8. ABUNDANCE AND DENSITIES OF LIVESTOCK, BY CATTLE SYSTEM**.

Cattle System		Cattle No.	Cattle /sq km	Cattle % White	Goats* No.	Goats* /sq km	Sheep No.	Sheep /sq km
Ganye I	Wet	34800	16.4	83			1300	0.6
	Dry	33100	15.6	82	237200	111.6	2200	1.0
Shebshi III	Wet	37700	8.6	85			1000	0.2
	Dry	9700	2.2	83	40700	9.3	1100	0.2
Mambila II	Wet	301800	67.4	15			7700	1.7
	Dry	167200	37.4	12	99400	22.2	21000	4.7
Fali IV	Wet	11100	9.0	100			300	0.3
	Dry	5600	4.6	92	700	0.6	700	0.6
Falinga V	Wet	8600	4.5	54			300	0.2
	Dry	7100	3.7	40	0	0	1600	0.8
Kam/Serti	Wet	5500	2.1	85			200	0.5
VIII/XII	Dry	11400	4.3	77	45000	17.1	500	0.2
Wase-Jalingo	Wet	79600	11.3	85			1100	0.2
VI	Dry	185800	26.3	94	97700	13.8	22800	3.2
Suntai VII	Wet	125200	21.6	81			1700	0.3
	Dry	106300	18.3	97	203100	35.0	10500	1.8
Takum IX	Wet	29200	32.5	91			400	0.4
	Dry	18800	20.9	96	64200	71.3	2000	2.2
Wukari X	Wet	3200	27.1	100			40	0.3
	Dry	20800	166.3	99+	26400	210.9	2300	18.1
Development Region***					314400		14040 64700	
Ganye	Wet	72500	11.1	79			2300	0.4
Lowlands	Dry	42900	6.6	82	278000	42.6	3200	0.5
Southern	Wet	325200	34.0	20			8300	0.8
Uplands	Dry	184300	19.3	17	107300	11.2	23400	2.4
Benue	Wet	239000	16.4	84			3300	0.2
Lowlands	Dry	338700	23.2	95	429300	29.4	37900	2.6

* Goats densities assumed to be aseasonal (see text).
** Cattle system as described in text.
*** Development Region as described in text.

SECTION IV

LIVESTOCK PRODUCTION SYSTEMS

Livestock production systems can be analysed using a series of different parameters; regional systems, altitude, administrative area, ecology and production type. This section presents a discussion of the methods and variations in animal production in the lowlands and high-altitude grasslands. The specific features of the three Development Regions are then analysed. Finally, detailed quantitative figures on cattle production in Ganye and Mambila are presented, and contrasted with comparable data from studies elsewhere,in the light of particular features of the Toungo Block.

4.1 Ecological systems

4.1.1 Uplands

The upland systems of the Toungo Block are the high-altitude grasslands described by Bawden and Tuley (1966). They are the Mambila, Fali, Falinga and Shebshi grasslands, Systems II, III, IV & V on Overlay C. They have been settled preferentially by FulBe pastoralists in the course of the present century, because of their high rainfall, good grass cover and low incidence of disease, particularly trypanosomiasis.

A major feature that all the upland systems have in common is poor access. There are no roads leading to Shebshi, Fali and Falinga, and indeed, these are so dissected that it would be hard to construct a road that would make accessible more than a limited number of settlements. Because of this, the grasslands have tended to have very low population densities. Except for the Mambila, the agricultural peoples of the other grasslands appear to have been forced up there by slave-raiding in the last century, and they have nearly all moved down to the plains in the last fifty years. As a consequence, FulBe that settle in the grasslands neither have a market for their dairy produce, nor can they obtain grain from arable farmers through stock sales.

FulBe that decide to ascend the grasslands must therefore farm, and the fact that only a limited number are prepared to do so on the steep hillsides of Fali and Falinga, explains why erosion is still at low levels there compared with Mambila (cf. Map V). The high price of manufactured goods and the absence of mosques were cited by FulBe as contributory factors in the decision not to settle there, both aspects of the poor communications. Obviously these reservations do not apply to Mambila, where the undulating terrain makes access from one region to another easier. The multiplication of horses on Mambila and in none of the other grasslands also suggests this.

At peak stocking rates the grasslands do not have enough pasture to keep all the herds fed throughout the year. At the height of the dry season, graziers will take their non-lactating animals to the foot of the hills in the case of Shebshi, Fali and Falinga, and either to the lowlands or

to river valleys on Mambila. However, these excursions rarely last more than a couple of months and therefore do not resemble the larger scale transhumance practiced by lowlands stock-owners.

4.1.2 Lowlands Systems

The lowlands regions of the Toungo Block closely resemble one another in terms of modes of production, although the Ganye Region remains separate in comparison to the Benue Lowlands. A major percieved constraint on livestock production throughout the lowlands is tsetse fly, and management strategies are designed to minimize its effects on the cattle.

In the eastern Benue lowlands the best pasture and easiest available water are along the numerous river valleys, and all types of FulBe will settle there throughout as much of the year as possible. Along the Benue and Taraba, FulBe actually live on the sandy shores of the river. When the river rises, their **ruga**s are swamped, and surviving tsetse populations tend to increase and expand their distribution. For most pastoralists, this period corresponds with the farming season, and all those in the Wase-Jalingo system, for example, will move up towards Iware to farm and keep their cattle in a region of low tsetse challenge.

The Ganye region has been settled by pastoralists for longer than the Benue flood-plain, and and the higher density of arable farmers has decreased the tsetse challenge. As a result, many more herds stay close to the permanent settlement all year round. However, larger herds must still send excess animals either to the rivers running along the frontier with Cameroun, or else around the Shebshi mountains to the Benue or Taraba.

Because all the lowland regions were only recently available to cattle, most of the arable farming populations there are unfamiliar with milk. The FulBe do not therefore have the same market for milk that is available in the North, and around the large towns. Although dairy produce is more saleable than on the grasslands, prices are still low and sales to the arable farmers are not a reliable source of income. As a result, almost all pastoralists must farm, whether they are nomads or not.

4.2 Regional Cattle Systems

One of the most significant features of most cattle production systems is the movement of the animals themselves. Pigs, goats and other livestock kept by arable farmers remain in one place throughout the year, but the majority of cattle have to be moved, both to provide them with adequate grazing and water and to minimize losses from disease. Sheep may move alongside the cattle, when the FulBe are the herders, but sheep are also kept by arable farmers around the compound especially in the north of the Toungo Block.

In building overall models of the cattle production systems, movement

patterns are analysed for the extent to which they are restricted to discrete geographical areas. At every interview with the herders, the cycle of movement between pastures was recorded. In the majority of cases, migrations are confined to particular routes so that specific known resources can be exploited. This allows for a fairly strict definition of 'cattle-systems', that is zones within which most of the observed cattle migrate. A certain number of cattle will fall outside these systems, particularly those belonging to nomads exploring new pasture resources, but interview figures show that some 85% of the cattle observed in the aerial survey can be assigned confidently to one of these cattle-systems.

It is commonly assumed that nomadic and transhumant pastoralists have wet and dry season grazing areas and thus cattle distributions fall into a bipartite pattern. However, throughout most of the lowlands areas of the Toungo Block, cattle have a three-part migration cycle. The basis of the cycle is that the dry season is divided into the period when crop residues can be exploited and the period when the fresh-sprouting grass is available in the more southerly locations. For example, herders throughout the whole of the southern Benue lowlands kept their cattle around the arable farms between December and early March, grazing on crop residues, or if these were exhausted, taking the cattle to nearby riversides. However, as soon as the first reports of rain come from the southern regions they move there for a period of 1-2 months, until grass is available further north. The aerial survey data, collected during March, reflects this late dry season movement, showing a high concentration in the 'Suntai triangle' (Map 12). A similar tripartite movement occurs in the Ganye region among sedentarized FulBe and Samba. After the cattle in the zone between Sugu, Jada and Kojoli have eaten the crop residues, they move down south of Toungo, in the valley of the Yonga and Faro rivers. The cattle then return around May and graze in nearby river valleys.

Table 8 summarizes the numbers of cattle, sheep and goats in each system, based on the aerial survey results. The abnormal distribution in the Takalafiya area (Map 11) was caused by WodaaBe herdsmen from Plateau State fleeing the rinderpest epidemic then current. It should not be considered as forming part of the Wase-Jalingo system, although if these pastoralists should decide to remain they will become incorporated within it during the next few years. The WoDaaBe and Bokolooji herders, who are specialised in **bodeeji** and **bokolooji** cattle, are recent migrants to Gongola State, and have been arriving over the course of the last ten years. They are found throughout the lowlands in small numbers, but are in their highest concentrations in the forested area east of the Jalingo-Bali road. Herders from these groups encountered on the roads said that they were experimenting with new migration strategies in order to discover a satisfactory grazing place for a more settled management system.

Cattle-systems such as those described above derive from a series of historical and ecological factors, and do not obviously respect state or

national boundaries, nor are they arranged for administrative convenience. Thus several of the cattle-systems described below fall only partly within the Toungo Block. They are included because movements within them have significant effects on overall production patterns within the survey area. In order to plan for livestock development, more practical zones must be defined if the planned infrastructure is to reach the maximum number of herders. Obviously these must be consonant with indigenous livestock systems as far as possible. On the basis both of cattle distributions observed through aerial survey and groundwork it has proved possible to divide the Toungo block into three Development Regions.

These Development Regions are referred to as Ganye, Southern Uplands and Benue Lowlands, and their boundaries (Overlay C) are defined as follows;

a) **GANYE.** Consists of the Ganye and Shebshi cattle-systems, Nos. I and III.

b) **SOUTHERN UPLANDS.** Consists of the Mambila Plateau, the Fali and Falinga Plateaux, and the associated lowlands, including the lower section of the Kam-Serti system, below Bali.

c) **BENUE LOWLANDS.** Consists of all the remaining systems, nos. VI, VII, VIII (North), IX, X, XI, west of the Shebshi and Mambila.

The remaining land has been divided into systems XII-XIV for the purposes of analysis, but since less than 6% of the cattle were recorded in these regions, and they cannot be equated with specific production systems, they are not discussed further in the text.

4.3 The Ganye Development Region

4.3.1 The Cattle Systems

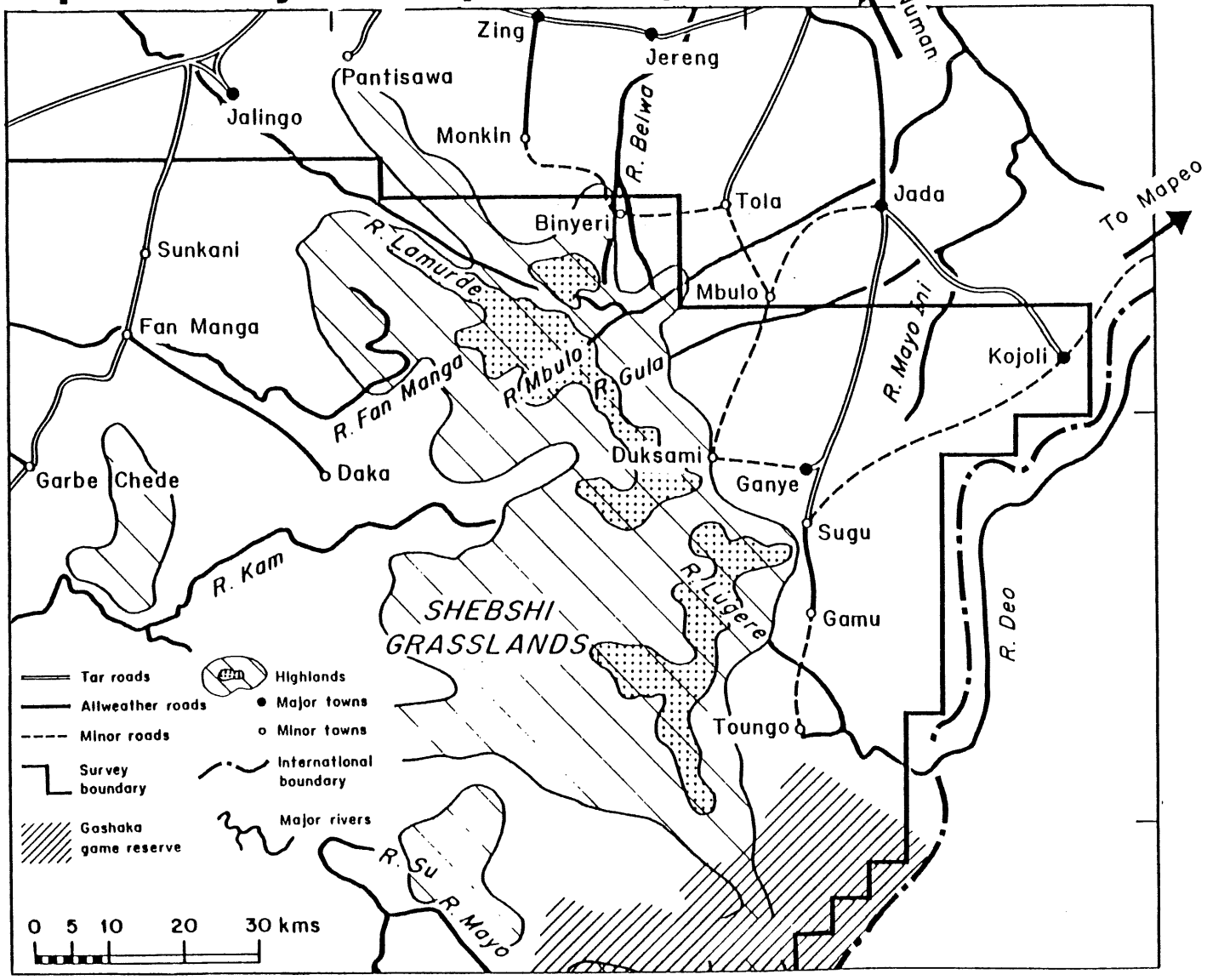
4.3.1.1 System I:Ganye

The Ganye region forms a coherent cattle-system, bounded in the west by the Shebshi grasslands, in the East by the Faro river system, in the south by the Gumpti game reserve, and in the north by a line stretching from Jada to Lando, representing approximately the southernmost limit of 'red', Rahaaji, cattle.

In the Ganye region, cattle are raised by both the Samba and the FulBe, who constitute the majority of the population of the lowlands. The Lamja, who form a number of small communities west of Tola, only raise goats. In the adjoining Shebshi grasslands the traditional inhabitants, the Samba Jangani, do not raise cattle despite the suitability of the terrain. However, to the northeast of the Toungo Block proper, the Koma people, who live on the Koma Plateau, have 'muturu', or the dwarf West African shorthorn.

The readily available pasture also attracts a large number of nomads every dry season. These nomads come from many parts of the north, both from within Nigeria, and until recently from Cameroun. Some of those

Map 20 Ganye Development Region



interviewed were from Bornu, others were Jaafun from the are northeast of Yola. Given the prevalence of transhumance as a livestock production strategy among the settled FulBe in the area, it is something of a paradox that when the local FulBe have moved out in the dry season, their place is taken by nomads from further north. The explanation may be that transhumant FulBe prefer to migrate between a succession of well defined grazing sites, and then set up a seasonal base at their wet-season pasture. Nomads, on the other hand, are prepared to keep on the move the whole time, ready to move into new and unfamiliar areas, if they hear that pasture and water are available. They can thus exploit an ecology that a more conservative sedentarized FulBe would regard as marginal.

4.3.1.2 System III: The Shebshi Mountains

The Shebshi Range consists of a number of dissected grasslands isolated from each other by deep valleys. Bawden and Tuley (1966) devoted part of their report to these plateaux, but at that period they had not yet begun to be exploited by pastoralists in sizeable numbers. The principal plateaux are the Kiri, Jangani and Tiba and adjacent grasslands also used by herdsmen.

The indigenous populations of these grasslands consist of various sections of the Samba people - the Samba Daka, the Samba Jangani and the Tiba. The length of time they have been resident in the grasslands is unknown, but their settlement may have been a response to the endemic slave-raiding of the 18th. and 19th. centuries. The earliest European travellers to pass through this area, Zintgraff (1895) and Detzner (1923) reported that they were already resident. The only livestock they keep is goats, and these are only in small numbers.

The arable farmers cultivate the steep hillsides by means of earth terraces, but the poor quality of the soil has led to a system where the adult males come down to the foot of the Shebshi in the growing season, plant and harvest cereals and hand-carry the harvest to their homes above. Only the indigenous trade is the expensive oil of Canarium schweinfurthii has been an inducement to remain on top of the plateau.

These grasslands make very attractive herding areas for FulBe because their altitude means that there is a low incidence of disease. The Shebshi is less well supplied than Mambila with water, so the majority of the herds are brought down the escarpments to graze either in the Ganye district or near to Daka. These relatively favourable conditions have caused migrant FulBe to come from many places in the arid zone and settle the grasslands over the last twenty years (Map 6). The absence of any market for milk on top of the Shebshi means that it is imperative to farm for cereals and all the FulBe who have immigrated in the last two decades have accepted this consequence. FulBe keep sheep in smaller numbers but no goats. Competition for arable land might have been a problem, except that outmigration by the arable farmers almost balances the immigration of FulBe. The Shebshi range is unlikely to ever support the high densities characteristic of Mambila because the small surface area of the individual grasslands, and their greater degree of

dissection suggests that to build access roads will never be cost-effective, and therefore their isolation will continue.

4.3.2 Livestock Breeds

The great majority of the cattle in the Ganye region are humped zebu, but in the extreme northeast, there is a small population of **muturu** shorthorns kept by the Koma people, on the uplands of the Atlantika range. These animals appear to live under semi-feral conditions, and some animals that were brought down to the lowlands died shortly afterwards.

All four recognised zebu cattle breeds are known in the Ganye district; **daneeji, bodeeji , bokolooji** and the **gudali. Bokolooji** are only seen in the hands of migrant groups from further north, and few resident pastoralists had any opinion about their qualities as a breed. Although most of the transhumant FulBe in the area were familiar with the **bodeeji** they claimed to have systematically switched their herd from **bodeeji** to **daneeji** over the last thirty years. **Daneeji** are said to be generally more hardy and tolerant of trypanosomiases and to be able to eat dry grass. This last quality is particularly important if there is a drive to cut down the necessity for transhumance.

Goats are very common throughout the Ganye region with an estimated density of 42.6 per square kilometre and an overall figure of 278,000. The Samba farmers originally kept the black dwarf goat, but more recently they have adopted the red and white goats from their FulBe neighbours. However, the black goat is kept preferentially in the Toungo area, apparently because of its greater trypanotolerance. Sheep are almost always kept by the settled FulBe, and they are raised and marketed to supply the demand during the Sallah period. There are a few Uda sheep, although the majority are of the Balani type. Although pigs are unknown in the Ganye region, they are increasingly kept by the Mumuye, northwest of the Toungo Block proper.

4.3.3 Traditional Livestock Management

4.3.3.1 Cattle

Cattle-rearing is not a longstanding practice among the Samba, who only became acquainted with zebu cattle when FulBe herdsmen began pasturing in their territory after 1914. Samba began to acquire cattle either through working for FulBe or buying them in the market soon after the First World War. As a result, cattle do not have the same prestige among Samba as they do among FulBe; and this is the origin of Samba attitudes to dairying and transhumance (See below).

The FulBe now resident in the Ganye district came there originally as nomads from a variety of locales further north, particularly Camerounian Adamawa, Bornu and the region between Kano and the Jos Plateau. Their migrations are described in more detail in Working Paper VIII (**RIM**,1983b). Although its high rainfall has made the Ganye district susceptible to tsetse infestation, the free availability of water and

pasture seems to have made the region sufficiently attractive for the former nomads to settle. Most Samba villages are 'twinned' with FulBe villages -that is, there is a settlement of FulBe a short distance from the Samba, with whom they have exchange relations, and among whom are the herders who employ Samba.

Samba regard cattle as an investment of both surplus wealth and labour. The high rainfall and low population of the Ganye region meant that until recently, there was a surplus of labour, and no means of investing it in surplus production as there was no way of marketing it. However, cattle can bring a high rate of return, especially since the end of raiding, and the decline of wild animal tsetse vectors. Cattle and smaller stock are regarded as flexible stores of wealth. They can be sold whenever there is a need for cash, such as for weddings, naming ceremonies or the roofing of a house. Samba do not value dairying highly and cows may be milked by anyone from their household who is available. Milk products are consumed within the household rather than taken to the market, but their availability has the effect of driving down the price of FulBe dairy products.

As the Samba are essentially arable farmers they have a considerable motivation to avoid transhumance in order to be available to prepare their farms at the end of the dry season. They have developed a system of preparing dry-season fodder for their cattle so that they will have adequate nutrition around the compound. This fodder consists of bundles of dried cut grass, leaves from groundnuts and beans, and stalks of sorghum. Although maize stalks are a low preference graze for cattle, they can be made more acceptable by leaving them to soak over the course of the wet season and then allowing them to dry out thoroughly during the harmattan period.

Many FulBe around Ganye originally settled but did not farm, living entirely on the income from their herd. However, in interviews in August, 1983, FulBe held up their hands to show work callouses, and indicated that they had only recently begun to farm, an activity they tend to associate with low-status. Their distaste for farming has been overcome by the falling value of their stock both as meat and as a source of dairy products, and by stock losses in the recent rinderpest epidemic. Farming is likely to become a permanent feature of their subsistence strategy if present conditions continue.

4.3.3.2 Other Livestock

Domestic livestock are confined to sheep and goats. Sheep are largely in the hands of the FulBe, while the arable farmers specialise in goats. Although the FulBe na'i who visit the area 'run' their sheep with the cattle, most of the sedentarised FulBe in Ganye keep their sheep around the compound when the cattle are sent on transhumance. In the southern part of Ganye region, around Toungo, goats are kept in great numbers. Goats are herded by younger sons, being taken out in the morning and brought back every evening.

4.3.4 Land Tenure and Farmer-Grazier Relations

The principle of land tenure among the Samba was that all land was 'owned' by the **Gang**, the chief, who had the power to awards rights in it. The chief would normally have no reason to refuse a request for land, and a man or a woman could claim rights in an area of bush merely by clearing it. When the first FulBe stock-rearers entered their territory, they approached the local Samba chiefs for land, and it was awarded to them in the traditional manner. The practice of shifting cultivation has meant that rights in land were only ever weakly enforced, and this remains the situation today, partly because the Ganye zone does not produce an exportable agricultural surplus, and therefore there is no major pressure to accelerate cash-crop production.

The situation in terms of rights in grazing land is more complex, as such areas are less easily defined than the cultivated land. In the wet season, when the cattle are around the farms and compounds, both Samba and FulBe demarcate portions of land quite closely as their own. Pressure on grazing areas is probably only extreme in the case where nomads from other areas come down and pasture their cattle, but in this case, both Samba and FulBe combine to claim primacy for the 'owners' of the land. The sale of land in the Ganye area is still confined to urban zones, and Certificates of Occupancy are not widely sought after.

Relations between Samba and FulBe have been discussed at greater length elsewhere (Blench, 1983a), but they can be summarized as generally harmonious. FulBe graziers provide a market for Samba produce, manure for their fields, and a means to invest the surplus labour of their sons. FulBe are settled on land assigned by Samba chiefs, and the low population densities mean that there is no major competition for land. The appointment of FulBe chiefs in Samba villages, (a major source of irritation in the colonial period), has ceased, and disputes between the two groups are usually settled amicably.

4.3.5 The Livestock Trade

4.3.5.1 Livestock marketing

The present-day accessibility of the main towns in the Ganye district means that the majority of cattle sold in the markets leave by truck today. The choice between trekking and trucking cattle to the Enugu and other large Igbo markets has only become economically significant since 1980, and some traders still use the traditional trek route from Jada to Jalingo-Bali-Ogoja or Katsina Ala. The major commercial centres, such as Jada, Ganye and Kojoli, were also the largest cattle markets, because of their access to the main roads.

At the time of the wet season survey, this pattern had altered because of the rinderpest epidemic. The state veterinary service had closed all cattle markets since April, 1983 in an attempt to prevent the spread of the disease. Mortality from rinderpest declined after the onset of the rains, and permission had been given for the market at Jada to open at the end of August that year. However, the volume of trade was low as

cattle-owners were still afraid to travel to market. By early 1984, the markets had fully reopened, and more usual patterns re-established.

Such preventive measures did not halt the cattle trade in this area, for animals purchased singly were collected together and secretly trekked around or across the Shebshi range. After that they could be put in trucks operating along the Wukari-Jalingo road and sent to the markets as part of the large-volume trade. There is no doubt that this clandestine trekking is likely to spread rinderpest: however, without co-operation from the herdsmen, there does not seem to be any obvious way of preventing it.

4.3.5.2 Stock prices

Rinderpest has also had a dramatic effect on stock prices. It was generally, but incorrectly, believed that animals infected by rinderpest were unsafe for human consumption. At the height of the epidemic all animals offered for sale were assumed to be infected, and thus only token amounts were paid for them, for example five to ten Naira. One consequence of this was a brief appearance of smoked-meat traders, who bought the animals at these low prices, dried the meat, and then transported it to the other side of the country, where it was sold to consumers apparently unaware of its source.

When cattle mortality began to decline and animals sold were again assumed to be 'clean', prices escalated rapidly to as much as 1,000 Naira for a breeding female in the Ganye district. There was a 'knock-on' effect on goats and sheep still available for butchering, and the prices of these were generally considered to have doubled. By August 1983, prices of cattle had begun to fall and a large bull was selling for the more usual price of 500 Naira, breeding females for 6-700 Naira and a calf for rearing for 60 Naira.

TABLE 9

LIVESTOCK PRICES IN THE GANYE DEVELOPMENT REGION

April, 1984

REGION	BULL	BAFE	CALF	MAGO	FEGO	MASH	FESH	PIG
GANYE								
Average	750	-	-	50	50	77	45	50
Maximum	750	-	-	80	60	100	45	50
Minimum	750	-	-	30	40	35	45	50
TOWNS								
Monkin	750	-	-	30	40	35	45	-
Sambung	-	-	-	80	60	100	-	-
Zing	-	-	-	40	-	-	-	50

KEY
BULL= Mature animal 3+ years old.
BAFE= Barren Female **MAGO**= Male Goat
FEGO= Female Goat **MASH**= Male Sheep **FESH**= Female Sheep

4.4 The Southern Uplands Development Region

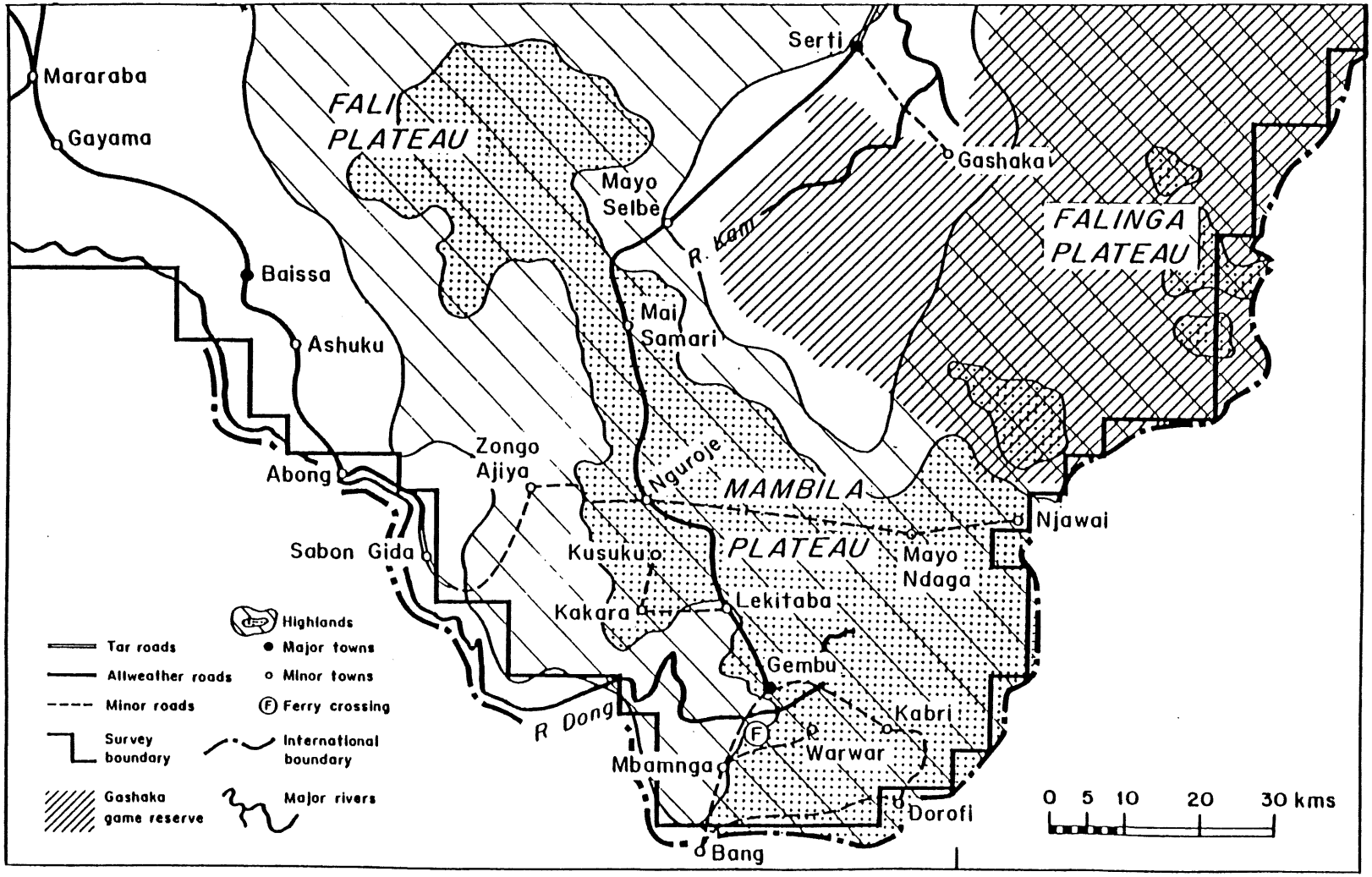
4.4.1 The Cattle Systems

4.4.1.1 System II: The Mambila Plateau

The extent of the Mambila cattle-system is shown on Overlay C and includes both the Plateau itself, two areas of lowlands to the north and west, as well as a less well-defined region of adjacent Cameroun. The Abong and Mayo Selbe regions are 'overspill' zones, where excess animals from the larger herds are sent in the dry season. The part of Cameroun shown is sometimes used for the same purpose, although this has become more occasional in the last decade.

The principal ethnic groups on the Plateau are the Mambila, FulBe, Kwabira, Yamba, Wimbum and Nso peoples. Except for the Nso, who originally moved onto the Plateau for the cola trade, all the other groups farm and to a certain extent have invested in cattle, especially the Mambila and Kwabira. It is nevertheless true that the majority of the stock remains in the hands of the FulBe. The FulBe now on the Plateau arrived both from the east, migrating through the Adamawa highlands of north-central Cameroun, and from the west, via the Benue Lowlands (Blench,1983a). None of the earlier literature sources for the Mambila people (e.g. Meek, 1931b, Schneider, 1955 or Rehfisch, 1972) mention their ownership of cattle, although it is referred to by Crowder (1960). This was confirmed by the accounts of our informants, who said that Mambila first began to get cattle from the FulBe about twenty-five years ago. There may be a connection with the construction of the escarpment road, which began at the end of the colonial period, and presumably improved the inter-regional cash-flows in the area. The export of cola, a trade

Map 21 Southern Uplands Development Region



item that has been coming down from the grasslands to the lowland towns since the beginning of the colonial era, would have increased.

Mambila began to acquire cattle by working for FulBe, and being paid with a bull for every six months they worked. However, the expansion of the cash economy on the Plateau meant that there were also considerable profits to be had by simply selling the FulBe surplus grain for cash, and buying calves on the open market. As relations with the FulBe have been poor throughout most of this century (Blench,1983b), most Mambila, particularly in recent years, have preferred to buy cattle in direct cash sales. The other ethnic groups on the Plateau, the Yamba and the Wimbum, who have settled there for farming over the course of the century have also begun to invest in cattle recently.

4.4.1.2 System IV: The Fali Hills

The Fali hills are connected to the northwestern edge of the Mambila plateau by a stretch of rugged dissected highlands. These connecting highlands are not suitable for cattle on a permanent basis, although some of the trek routes running off the Mambila pass through them before reaching the Bali-Mararaba road. The Fali grasslands consist of gently sloping hills separated from one another by forested river-valleys likely to be infested with tsetse. The cattle-system shown in Overlay C also includes a small ring of the adjacent lowlands, as if water is short on the Fali due to an extended dry season, cattle-owners will take their animals to the forests at the foot of the hills for a short period.

The traditional inhabitants of the Fali were Ndoro and Samba Leeko who have been farming the valleys for some centuries. During the last half-century they have begun to move down to the surrounding lowlands, a process that is still continuing today. As in the other grasslands, the arable farmers' only livestock was the dwarf goat.

The converse process, the movement of FulBe up to the Fali, has been under way since the early 1950's. The first settlers were led by ArDo Karim, who still lives there. The FulBe who settled were all 'nomads' who crossed the Benue searching for new pastures, and most were of the **Daneeji** clan. The lack of any infrastructure and markets for dairy products led the FulBe to begin farming maize, and today this forms their staple. As with the Shebshi, herders with larger numbers of animals must come down and herd in the nearby forested lowlands in the dry season. Because of its isolation, Fali has not attracted enough FulBe to become overgrazed, and there is presently no shortage of land.

4.4.1.3 System V: The Falinga Plateau

The Falinga cattle-system consists of the grassy uplands of the Plateau in Nigeria extending into Cameroun. FulBe with herds on Falinga occasionally descend into Nigeria to make use of the grazing enclaves in the Gashaka Game Reserve, but most often they go towards Cameroun. There are seasonal hunting camps set up by arable farmers from the Benue lowlands, but very little permanent settlement. The Falinga Plateau is

unlikely to be developed from the Nigerian side, because of the disruption that would be caused to the already gazetted Game Reserve. Apart from a report made in the colonial period and the comments in the LRDC report (Bawden & Tuley, 1966) little work has ever been done there.

4.4.2 Livestock Breeds

4.4.2.1 Cattle

Unlike the Ganye area, many FulBe on the Mambila Plateau expressed the opinion that in the past there had been no major economic considerations to take into account when choosing one breed of cattle in preference to another. Three of the four breeds of zebu widely recognized in southwestern Adamawa, the **daneeji, bodeeji,** and **gudali** are all present, although the red **bodeeji** is in the majority, particularly in the central regions (**RIM**,1983a:16-18). This pattern derives from the historical sequence of FulBe movement onto the Plateau. The first waves of herdsmen came across from Camerounian Adamawa via Banyo (**RIM**,1983b) in the late nineteenth century. These FulBe bred the prestigious **bodeeji**, and they had immediate access to the river valleys, and wetter, more fertile lowlands. During the course of this century, other FulBe populated the drier upland areas on the northern and western edges of the Plateau. These FulBe reached the Plateau via the tsetse-infested Benue lowlands, coming originally from the Jos area. Many of them already herded **daneeji** and **gudali,** while those who had previously herded **bodeeji** substituted the 'white' breeds because of their reported greater trypanotolerance.

This historical pattern has been maintained because there were no pressing reasons for stock-rearers to change the breed their clan traditionally herded. Until recently, the favourable conditions of the high-altitude grasslands made this a matter of indifference. But the degradation of the pasture on Mambila has begun to noticeably affect the health of herds. Although the rinderpest epidemic in 1984 and cattle sales in anticipation of losses took some load off the pasture, the degradation is permanent and cattle-owners are actively seeking remedies to the situation, particularly by switching from red to white cattle. The process is under way at present on Mambila and this accounts for the large number of mixed herds that can now be seen on the Plateau, particularly south of the Donga, where the difficulty of crossing into Cameroun has put stock under extra stress. Unless the next two decades see a radical shift in the mode of production, FulBe will gradually switch from red **bodeeji** to white **gudali** and **daneeji** because of their reputation of greater hardiness under famine conditions.

Aerial survey results show that the Fali Plateau has exclusively white breeds, whereas the Falinga has a mixture of white and red (**RIM**, 1983a & 1984). The Fali Plateau was first exploited by migrants who had crossed the Benue with **daneeji** cattle in the 1950's. As there are no clans owning red cattle permanently resident in the Benue lowlands, none ever made their way to the Fali. The Falinga, on the other hand was settled by the nomad groups of Camerounian Adamawa, in particular the Rahaaji clan, who

are specialised in **bodeeji**, and favourable conditions there have allowed them to continue.

4.4.2.2 Other livestock

FulBe on the Mambila do not keep goats, and so the only goats seen are the black dwarf goats kept traditionally by the Mambila. These are becoming less common as the Mambila find it more profitable and cost-effective to keep cattle. Pigs are unknown, and sheep are not common, as they are only raised by FulBe in limited numbers. They are exclusively of the Balani type. Horses are raised in the region of Tamniya and Hainare along the Nigerian frontier with Cameroun, and are exported both to Enugu for consumption, and to Banyo for riding. The breeding of horses has declined considerably over the last century. This is attributed by local opinion to unchecked theft of animals, but the prevalence of motor transport and the difficulty of feeding horses with degraded grass-cover are more likely explanations.

4.4.3 Traditional Livestock Management

Although both beehive-shaped rugas and rectangular mud houses can be identified from the air, all the FulBe on the Plateau today are settled agro-pastoralists, who either send their herds on transhumance in the dry season or hire others for this task. Rehfisch (1972 but based on work in the early 1950's) refers to nomads several times, but he is probably referring to FulBe who did not farm.

The Plateau, as all our informants agreed, was once an almost ideal environment for herding cattle. However, pressure on the land has become so extreme that permanent settlement is the only method of retaining a claim to land that is not otherwise developed. In the eyes of both Mambila and FulBe, the whole Plateau is 'owned', that is, rights to either graze or farm have been assigned to families or individuals and these are inalienable within the traditional system of rights and obligations. In practice, of course, it is more feasible for a farmer who has actually hoed and planted land to assert his claim, than a herder who merely grazes his cattle there.

FulBe herds on the Plateau are large, commonly numbering from 500-1000 animals. These herds will be split into grazing units, known as **sawru** (pl.**saBBi**), of 60-120 animals, managed by the herdowner, one of his younger male relatives, or hired herdsmen. The structure of the herd reflects the relative wealth of the herd-owner. FulBe frequently asserted that a wealthy man could afford to keep extra castrated bulls and barren females, rather than sending them to market. This is not supported by the detailed examinations of herd structures.

In the dry season, the erosion of the Plateau and the replacement of preferred pasture grasses by poorer species has meant that cattle

numbers exceed the carrying capacity of the land [1] in the dry season if the onset of the rains is delayed as in 1982-3. In order to prevent malnutrition and starvation, cattle must be moved to places where there is pasture and water throughout the dry season. Cattle could either graze in river valleys in the uplands, or else go down to the forests at the foot of the escarpment. Valleys were favoured because if altitude was maintained, the threat from disease was lessened. However, the earlier settlers of the Plateau laid claim to the grazing areas along the Donga and in adjacent Cameroun, leaving those on the northern and western uplands to descend to the forest. Increasing pressure from both cattle and arable farmers has forced ever larger numbers to use the lowlands. FulBe began to exploit the lowlands around Abong first in 1977, and now this is an important location for dry season grazing. This provides a neat illustration of the rapidly changing dynamics of livestock production in the Toungo Block referred to in Section I.

However, the establishment of national boundaries after the Referendum of 1962 made migration into Cameroun more difficult. The Cameroun Republic is no longer willing to allow the movement of large herds across the border, although as a result of an agreement in 1983, 10,000 head were permitted to cross. The Mambila farmers who control the Donga river valley have never been happy about the transhumance of the upland herds in the dry season, and since 1979 they have used their power in the Local Government to prevent it. As a result, many FulBe were unable to send away more than a small proportion of their herds, and mortality due to malnutrition during the 1982-3 dry season was reported to be between five and ten percent. The early rains in the dry season of 1983-4, combined with sales induced by the threat of rinderpest, temporarily alleviated the problem, but there is no doubt that this overstocking constitutes the single most important problem of livestock production in the area.

The traditional FulBe characteristic of avoiding any physical connection with farming has broken down throughout the Plateau. Almost all FulBe compounds in the uplands have an adjacent plot of maize, cultivated either by the family or by hired labour. This reflects the absence, especially in the northern regions of the Plateau, of a sufficiently large surplus-producing agricultural population to provide a regular supply of cereal staples, and the uncertainty of relations with the Mambila.

FulBe farms on the Mambila Plateau are 'minimal' exercises, supporting only sufficient maize to supply the family unit with a cereal staple. Vegetables are still bought from the Mambila, as well as firewood which is scarce and expensive. The wealth of the FulBe and their unwillingness to become competitive farmers, has led to considerable profits for the Mambila; these have been invested both in tin roofs (cf. Figure 14, **RIM**,1983a) and in cattle bought at the market. FulBe do not at present

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[1] Using a standard figure such as K = 2 hectares/head.

produce any dry season fodder, nor is any available from the Mambila farmers. They usually proposed extensive spraying programmes in the lowlands as a solution rather than the growing of forage crops. In 1981, the Gembu Local Government imported feed in the dry season and this was extremely popular as it was made available to graziers at a subsidized price. Whether herders would be willing to pay the full market price of such fodder remains to be tested.

Like the Samba, the Mambila conceive of cattle and sheep as a store of wealth to be cashed in when they require money. Most Mambila cattle-herds are small (Table 12), not generally above forty animals, and often only 5-10. As it is inefficient for an individual to herd such a small number, groups of Mambila owners often club together to hire a herdsman, or alternatively, their own sons herd all the cattle in rotation. Mambila herds are taken only short distances in the dry season, to graze at a nearby stream, and are usually brought back to the compound at night.

Milk sales play no part in the household economy of the Mambila, and the dairy production of their herds is consumed directly by the family and kin, or else given to the herdsman as part-payment for his services. Because the Mambila use green manure, cattle-dung is not highly valued, and therefore not integrated into agricultural practice.

4.4.4 Land Tenure

The principles of land tenure among the Mambila people have been discussed by Rehfisch (1972:34 ff.). Land is vested in the clan and was traditionally claimed by any individual who cleared and cultivated it. The grassy uplands were considered to be communal 'hunting land' but all other land was individually owned. When land was ceded to FulBe graziers for their cattle, the principles of individual ownership were applied, although the FulBe did not initially clear the land for cultivation. Since on the Plateau, there are substantial variations in the fertility of the soil according to proximity to rivers, among Mambila, the most valuable land was passed from father to son and mother to daughter.

The expansion of the Mambila population has caused considerable pressure on land in this century, and the Mambila communities in Cameroun are said to have migrated there in search of farmland. In the mid-1940's Mambila elders attempted to prevent sales of land (Rehfisch,1974:42), but land is regularly bought and sold today. The cattle brought in by the FulBe during the course of this century originally were confined to the uplands, only moving to riverbanks in the dry season. However, more recently, FulBe and Mambila have begun to compete for similar land, as FulBe have begun to farm and Mambila to herd cattle.

Certificates of Occupancy issued by the Local Government have been sought after by FulBe for some years, but recently a number of the larger stock-owners have been attempting to obtain the State-issued certificates. The conventional sign of a claim to land is the erection of a stake and barbed-wire fence around the entire plot. This trend has

been strongly resisted by the Mambila who view it as a means of preventing their children from gaining access to arable land. Presently, all issuing of C of O's has ceased until some overall strategy with respect to land tenure is declared at a state level.

Land tenure is not a problem on the Fali and Falinga plateaux which have low population densities, and have moreover experienced a net outmigration of arable farmers in recent years. As a result, FulBe pastoralists who have made their way into these grasslands since 1950 have found land freely available.

4.4.5 The Livestock Trade

4.4.5.1 Trade Routes

Cattle-markets, or **tike**, are widely distributed throughout the Plateau, the most important being Mayo Ndaga, Zongo Ajiya, Gembu and Nguroje. They are controlled by the veterinary service, and in theory each animal passing through them must receive its 'tike' or certificate of health. The cattle are bought by traders or their agents and then trekked to the bottom of the escarpment, where they may either be put in trucks or trekked by foot to the large buying markets (Map 5). There are two principal routes down the escarpment: to the north, connecting with the Mayo SelBe-Serti road, and to the west, either following the new escarpment road down to Baissa, or via the dissected land northwest of the Plateau reaching the lowlands on the Mararaba-Bali road (cf. Map 6). The Plateau presents considerable problems for the effective marketing of cattle, since in order for a trader to make a profit, he has to herd animals down the escarpment, cross the lowlands, and reach Katsina Ala, Ogoja, Abakaliki or another cattle-buying centre, while keeping his stock fat and free from disease.

However, from the Plateau, reaching a trucking point in the wet season was often a week's journey and given that to reach the markets would then only be another two weeks, traders often decided to maximise their profits and trek the cattle the whole way. The construction of an all-weather escarpment road that would permit large cattle-trailers to reach the Plateau, would undoubtedly revolutionise the economics of the external livestock-trade there.

Traders fall into two categories, those who herd the cattle themselves, and those who provide the capital, but hire others to do the work. The principal livestock entrepreneurs are Hausa, FulBe, Mambila and Shwa Arabs. Under normal circumstances, traders on the Plateau who intend to trek their cattle to the East have to put up about 15,000 Naira to collect a herd of sixty cattle, an average herd for trekking. It may take anything from two to four weeks to build up a herd according to the time of year.

In 1983 the rinderpest epidemic altered traders' usual strategies, because the veterinary service had closed the official livestock markets on the Plateau, in the hope of restricting the spread of the

disease. This forced the traders to move clandestinely across the countryside, buying cattle directly from their owners in private deals, as in Ganye. The herds seem to have been moved at night, in order to avoid too much public notice. After December 1983, when the rinderpest epidemic gathered force, enormous herds were gathered by traders from anxious stockowners trying to ensure against loss, and trekked down via Zongo Ajiya to Baissa. This may well have contributed to the considerable reduction in cattle numbers recorded by the aerial survey in the dry season (Table 4). An unfortunate side-effect of this may well be to spread rinderpest; but, given the logistical problems of effective vigilance over such a broad region, it is difficult to see how such an activity could be entirely prevented.

4.4.5.2 Stock prices

Between the wet and dry season surveys, the impact of the rinderpest epidemic was to force the price of cattle so high that trade had almost ceased. During August 1983, the rinderpest in the lowlands had forced up prices on the Plateau:- a large bull was selling for 600 Naira, as opposed to 300 Naira the previous year. Between December and March there was a glut of animals on the market because of panic selling and prices went very low. By May 1984 they had recovered and rose back to the levels of the previous August. This was because wealthy FulBe with considerable cash from anticipatory sales had begun to buy back stock to rebuild their herds. A good indication of this new demand was the relative price of calves. The cost of calves is normally only half that of a full-grown bull and in some cases, less. However, in most towns in the Mambila Plateau in May 1984, a yearling was often the same price, or only a hundred Naira less than a full-grown bull. Lactating females, in keeping with this trend were so rarely sold that prices could not be quoted.

TABLE 10. STOCK PRICES; SOUTHERN UPLANDS DEVELOPMENT REGION

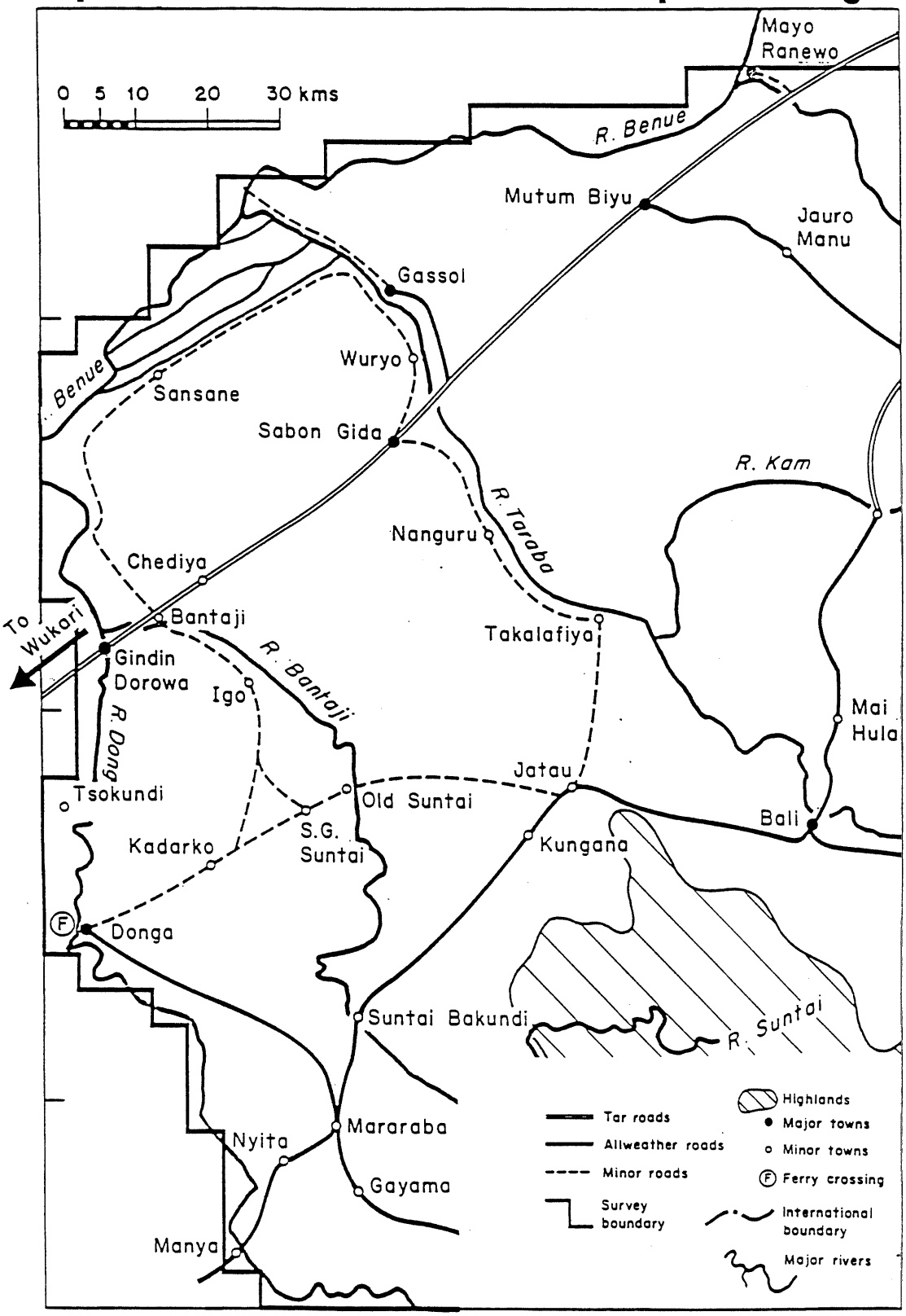
May, 1984

REGION	BULL	BAFE	CALF	MAGO	FEGO	MASH	FESH	MAHO	FEHO
MAMBILA									
Average	822	331	331	57	37	85	41.5	300	207
Maximum	1000	700	400	80	60	200	60	400	400
Minimum	600	160	220	30	16	40	30	200	100
TOWNS									
Dorofi	1000	400	350	-	-	200	60	-	-
Gayam	600	300	200	30	40	60	30	-	-
Hainare	1000	700	360	80	50	60	30	-	-
Jangon Mata	-	-	-	80	60	60	45	-	-
Kabri	900	160	300	-	-	90	60	200	120
Mai Dule	800	300	400	-	-	60	40	300	100
Tamniya	600	240	220	50	20	40	30	-	-
Titong	1000	500	400	-	-	120	40	400	400
Warwar	800	160	400	50	16	90	40	-	-
Yerimaru	700	220	350	50	35	70	40	-	-

KEY

BAFE= Barren Female **MAGO**= Male Goat **FEGO**= Female Goat
MASH=Male Sheep **FESH**= Female Sheep
MAHO= Male Horse **FEHO**= Female Horse

Map 22 Benue Lowlands Development Region



4.5 The Benue Lowlands

4.5.1 The Cattle Systems

4.5.1.1 General

The Benue lowlands form a less clearly definable geographical unit than either the Ganye district or the Mambila Plateau, and they are ecologically more diverse, including swampy lowlands, dry guinea savannah and heavily forested areas. Cultivation density is generally low throughout the lowlands (Map 9), although it increases in the southwest, towards Wukari and the Jukun and Tiv areas. Map 9 also shows a clustering of cultivation along the edges of the recently constructed tar road from Wukari to Jalingo. This suggests the speed at which such roads act to open up new agricultural land.

Aerial survey results (Tables 11 & 12) do not show a marked change between wet and dry season cattle distributions in 1983-4. This conflicts with the widely-held view that pastoralists only enter the tsetse-infested lowlands of the SHZ in the dry season and return to the arid zone in the wet season. Many of the pastoralists who come to the Toungo Block in the dry season return to their homes in the wet season, either to plant crops or because they have left part of their family behind. However, today those homes are located within the Toungo Block, and the seasonal migrations cover relatively short distances. The degree of difference between the two seasons may have been further obscured by an additional feature; in the 1983 wet season there were additional FulBe na'i herds that would normally have crossed the Benue in the direction of Wase, but remained isolated in the bush for fear of rinderpest.

4.5.1.2 System VI: The Wase-Jalingo System

Of all the cattle-systems in the Benue lowlands, the Wase-Jalingo system is both the largest and the densest in cattle population. As the northernmost system in the Toungo Block it represents the lowest tsetse challenge to the cattle and was thus the first to be exploited extensively by FulBe pastoralists. It also shows the greatest increase in cattle populations between wet and dry seasons; from 79,600 to 185,800. The FulBe who presently herd here are from two sources; Wase, on the southeastern escarpment of the Jos Plateau, and from the region between Jalingo and Yola. Their movement into the area is plotted on Map 6 (also, Blench, 1983a), and it is clear that they were able to move freely across the Benue because of the old-established colonies of FulBe wuro in towns such as Mutum Biyu and Gassol.

The northern boundary of the Wase-Jalingo system is defined by the southern limit of the region where the red **bodeeji** cattle can be safely herded. The eastern edge has been largely defined by the thick forest that is found on the other side of the Jalingo-Jatau road. The southern boundaries are more fluid, since graziers occasionally make forays south of the Taraba river when pasture is scarce.

4.5.1.3 System VII: Suntai

FulBe in the Suntai system base their pattern of exploitation around the Suntai river. All of them farm in the wet season, the majority around Bantaji and move their cattle only short distances for grazing. They appear to have originally crossed the river as nomad groups and to have taken to farming only in the last ten years as a response to the low price of dairy products. Those FulBe herding on the Benue flood-plain itself have links across the river to FulBe in Plateau state, and some of them said that it was only the outbreak of rinderpest that had prompted their decision to stay permanently on the east bank of the Benue.

Average herd size in the Suntai system is large for the SHZ, ca. 200 animals, and this can be attributed to low pressure on land and a low incidence of tsetse. Comparative work on sedentarized FulBe in other parts of the Middle Belt (Blench, 1984a) showed that average herd sizes were much smaller than this, ca. 50 animals. This is partly due to the much higher population pressure in Southern Zaria, for example. It is argued (op. cit.) that the eastern Benue flood-plains represent a catchment area for larger herds because of the low settlement densities.

4.5.1.4 Systems VIII & XII; Kam-Serti System

In the Benue lowlands it is the Kam-Serti system that has most recently evolved. It is premised on the ribbon development that has occurred along the road between Jalingo and the Mambila escarpment. Its northern boundary is defined by the southern limit of the FulBe Wiiti, a long established sedentarised group, with settlements down as far as Garba Chede and along the Mutum Biyu road. The FulBe in the Kam-Serti system are a mixed assemblage of recently arrived migrants unable to secure grazing land in more favourable areas, particularly WoDaaBe and Bokolooji but also some others as well.

Most of the FulBe within this system have farms along the road between Garba Chede and Mayo Kam, and they return to these to farm in the wet season and then move towards Serti and Mayo Selbe in the dry season. The Mayo Kam itself is not considered appropriate for dry season grazing, because its steep banks prevented cattle from getting down to drink and moreover, the thick forest along them harbours tsetse.

4.5.1.5 System IX; The Takum System

The greater part of the Takum system is outside the survey zone, but the high stocking rate of the grids surveyed argues its importance in overall regional livestock planning. Its population consists of a relatively small number of FulBe from certain clans, who migrated across the Benue into the area of Arufu some fifteen years ago. Until 1980, there used to be a considerable trade-route across the middle of the region, because of the bridge across the Donga at Manya. This was attractive to commercial yam-farmers, and as a result the FulBe population was low. However, good relations with the Kuteb, and the decline of the yam trade have assisted the FulBe to increase their population.

4.5.1.6 System X; The Wukari System

Only a small fragment of the Wukari cattle-system is inside the Toungo Block, but the region around Wukari has a dense cattle population and a relatively high human population. Wukari is moreover, the zonal veterinary centre covering most of the southern Benue lowlands and a major centre for the cattle trade to the East.

There is an ancient stratum of FulBe wuro around Wukari, as well FulBe na'i who have settled in the region over the last thirty years. Most of the FulBe na'i farm to some extent, and they only move their cattle short distances in the dry season, from the farms, where they are corraled, to the banks of the Donga, Benue or sometimes the Katsina Ala.

4.5.1.7 System XI; The Shendam System

Although strictly outside the limits of the Toungo Block, the Shendam system borders it closely, paralleling the Wase-Jalingo system, further south. FulBe move between the west bank of the Benue opposite Ibi as far as Shendam and southern Plateau state. A region of sparsely inhabited land on the west bank of the Benue separates the two systems. The only variation in the pattern is the presence of numbers of non-FulBe pastoralists. In Sarkin Kudu, for example, the Montol and the Goemai also herd zebu cattle. Their herds are much smaller, perhaps 10 animals on average, so they do not go on transhumance. The FulBe, however, spend their wet season around Shendam, where they have their farms, and come down to the Benue during the dry season.

4.5.2 Livestock Breeds

4.5.2.1 Cattle

Aerial survey data (Maps VI-IX) showed that the white breeds, **gudali, bokolooji** and **daneeji,** predominate throughout the lowlands in both season. The only exception to this was in the Takalafiya region west of Bakundi, where small pockets of **bodeeji** red cattle were seen in the wet season. These were due to incursions of WoDaaBe from the arid zone who have begun to exploit the lowlands in the last few years and who remained in the lowlands in the 1983 wet season, despite the risk from trypanosomiasis, because of the threat of rinderpest.

According to our informants, many of the FulBe **leYYi** that crossed the Benue from Wase and the Jos Plateau already possessed **daneeji** and **gudali,** and those with **bodeeji** cattle switched to herding 'white ' breeds, in view of their alleged trypanotolerance.

A few **muturu** cattle kept by the Tiv are black west African shorthorns. They are not traditional in the lowlands, but have been brought in along with the migration of the arable farmers during the last thirty years. The Mumuye cattle, found south of Zing, are presumably a cross between **gudali** and a type of savannah shorthorn. They have extensively interbred with zebu over the last twenty years, but as their existence has gone unreported, no statements about their disease resistance can be made

with confidence.

4.5.2.2 Other livestock

Apart from the Uda sheep on the northern frontier of the lowlands, all the sheep are Balani. The majority of sheep are in the hands of the FulBe, with only small numbers in the hands of arable farmers. The poisonous **sambeeru** bush, prevalent in parts of the south, is a major deterrent to sheep, and many FulBe who pass to the south when the crop residues are finished leave their sheep behind with their relatives further north.

4.5.1 Traditional Livestock Management

In the lowlands, only FulBe raise zebu cattle. FulBe movement into this area is recent (**RIM**, 1983b), presumably due to its former high level of tsetse infestation. The ecological diversity of the lowlands has led to a corresponding diversity of productive strategies among the FulBe who now live there. Although certain towns on the Benue flood-plains such as Gassol, Wuryo, Sansane and Mutum Biyu, are relatively ancient foundations, their original settlement was not by cattle-owning FulBe. The stimulus to expand deeper into a region traditionally avoided because of the high tsetse challenge has come from drought and disease, and occasionally land pressure. Frequently, crises precipitate the exploration of these areas, and the pastoralists then find that the tsetse are less of a threat than they formerly believed. In part this is because of their failure to correctly identify tsetse (see Map 19).

4.5.4 Land Tenure

The relatively low human population of this Development Region has meant that until recently pressure on land has been slight. This has acted as a spur to Tiv yam farmers who have begun to settle along the arterial roads. Land tenure has traditionally been vested in the local rulers. A prospective farmer, migrating into the region, would request permission from the chief, who would assign a part of the bush not claimed by the resident farmers, and the migrant would assert title to that bush by clearing it.

The transhumant FulBe who have been coming into this area since 1950 (Blench,1983a:18) usually claimed grazing areas for their cattle by agreement with their ArDo and other herdsmen. They cleared obstructive trees, occasionally dug wells, and put up their traditional 'beehive' dwelling, the **ruga**. This has the effect of making such an area attractive to an incoming farmer, since the cattle have often manured it for a number of years in succession. However, recently, FulBe returning to their grazing area have found their **ruga** burnt, the land dug up for yams, and the well surrounded by a fence to make access for their cattle impossible. Many of the FulBe interviewed claimed to have tried to seek redress in the local courts, but without success.

4.5.5 The Livestock Trade

4.5.5.1 Trade networks

The absolute volume of cattle sold from herds in the Benue lowlands appears to be much less than from the Ganye and Mambila districts. This is because the majority of the cattle are herded by the seasonally migrating FulBe na'i, who are, by their own account, much less willing to sell animals than sedentary FulBe, partly because they have a lesser requirement for cash.

Even quite large settlements such as Bantaji and Gassol have only token cattle markets, while Mararaba and Bali are without them. However, the whole of the Benue lowlands acts as a 'funnel' for stock moving from all parts of Gongola State to Enugu and the other markets of Igboland. At the time of the wet season ground-survey, a number of traders from the Ganye district, put out of work by the closure of the markets due to rinderpest, had moved down to the Mararaba-Takum area, where there were large herds of cattle unaffected by rinderpest belonging to nomadic FulBe. The traders were moving from camp to camp in the bush, buying single animals. When they had collected between fifty and seventy cattle, they would trek these as far as Abakaliki to sell.

4.5.5.2 Stock prices

The recent completion of the Wukari-Jalingo road has not yet been mirrored by the establishment of a series of unofficial livestock markets (Map 5). The lack of regular markets and the upheaval created by rinderpest made it difficult to establish a 'normal' price for stock. Table 11 shows the livestock prices recorded;

TABLE 11.

LIVESTOCK PRICES IN THE BENUE LOWLANDS

April-June, 1984

REGION	BULL	BAFE	CALF	MAGO	FEGO	MASH	FESH	PIG
LOWLANDS								
Average	519	138	329	54	47	77	47	68
Maximum	700	300	500	120	100	200	140	90
Minimum	300	30	40	16	12	12	14	45
TOWNS								
Amar	700	300	500	40	32	40	30	-
Bali	-	-	-	-	-	-	-	90
Daka	600	40	500	100	55	120	140	-
Dampar	600	130	400	40	60	80	38	-
Didango	400	200	300	40	60	120	40	-
Donga	500	60	80	-	-	30	20	-
Garba Chede	600	130	500	80	68	60	32	-
Gungunbode	-	-	-	-	-	-	-	45
Gwiwan Kogi	300	30	200	26	20	50	30	-
Ibi	400	100	400	-	-	12	20	-
Kila Ganadere	-	-	-	60	40	90	70	-
Kungana	-	-	-	30	40	90	85	-
Malin Yero	400	120	225	16	45	60	30	-
Mayo Ranewo	400	80	40	30	20	50	30	-
Mayo Kam	600	200	400	-	-	-	-	-
Nanguru	500	180	325	40	60	120	65	-
Sansane	500	40	400	-	-	60	36	-
Sarkin Kudu	600	200	400	120	100	200	80	-
Sheka	600	200	150	30	12	40	14	-
Tsokundi	600	200	450	100	40	80	45	-

BAFE= Barren Female **MAGO**= Male Goat **FEGO**= Female Goat
MASH= Male Sheep **FESH**= Female Sheep

4.6 Animal Production: Quantitative Data

4.6.1 Samples and Data Collection Techniques

As part of the collection of data on rinderpest, the stated sizes of herd owned were systematically recorded. This figures are intended to represent the total numbers of cattle owned by individuals, and are therefore different both from Grazing Units, and from the herds enumerated in the animal production study, as they include animals on loan to other herders. As there is no independent means of checking stockowners' assertions, these figures should be treated with caution. However, they provide some substantiation for the assumption that herds in the Toungo Block are larger than elsewhere in the Sub-humid Zone. Table 12 shows the average sizes of herds owned and Figure VIII represents these as a histogram.

TABLE 12

STATED HERD SIZE

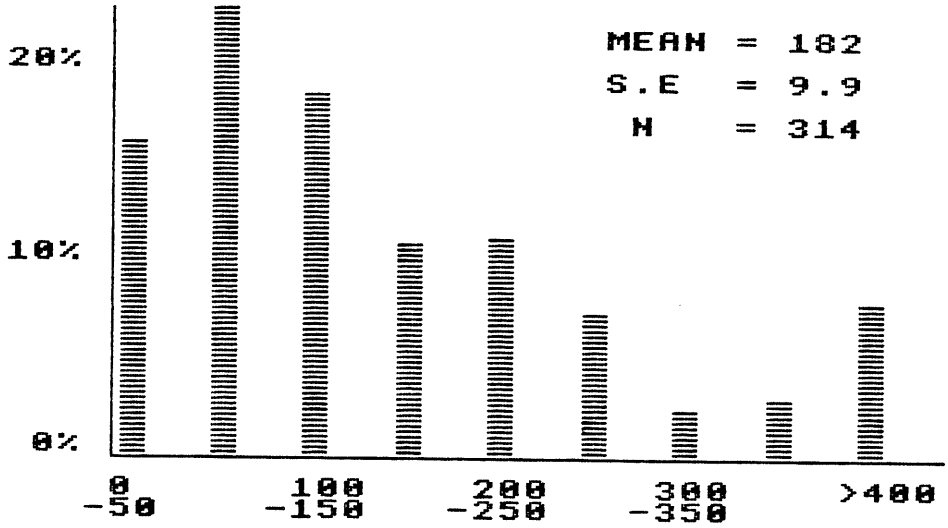
	GROUP						REGION		
	FW*	FN	MB	HA	AK	JK	LOW	MB	TOTAL
Herds Sampled	108	238	14	4	2	2	262	101	368
No. Cattle	23924	53775	379	161	56	40			78335
Mean Herd	221.5	226	27	40	28	20	182.4	248	212.9
SE	34.9	-	3	-	-	-	9.9	46.6	11.2

* Acronyms are expanded in the list on Page 14.

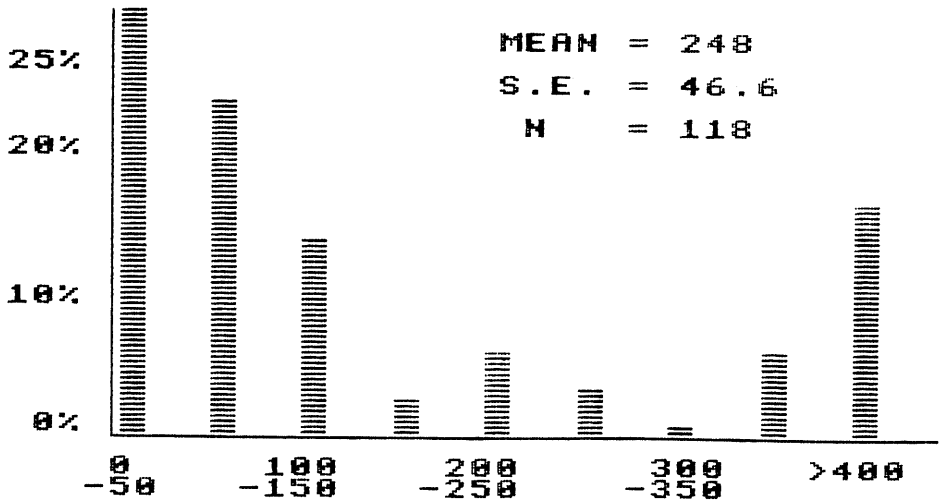
The detailed examination of animal production characteristics was undertaken in the Ganye Region and on the Mambila Plateau. The techniques used are described in Appendix I. Four general topics were studied with the co-operation of the herd-owners; herd recruitment; herd losses; age structures of cows and their calves; and the seasonal patterns of birth. The sample studied included cattle-herds belonging to four distinct socio-economic groups; the Samba and settled FulBe agropastoralists of the Ganye region; FulBe na'i encountered in the Ganye lowlands; FulBe and Kwabira pastoralists on the Mambila Plateau; and Mambila farmers owning cattle, also on the Plateau. Comparable studies have been carried out in Niger (Swift, 1984), on the Jos Plateau (Pullan, 1979) and in Southern Zaria (Otchere et al. 1982 & Otchere, 1984). The data from the Toungo Block can thus be systematically compared to results from elsewhere.

FIGURE VIII. HERD SIZE FREQUENCY.

A. BENUE LOWLANDS



B. MAMBILA PLATEAU



Two methods were used to establish the data on herd composition in this section. These were;

a) Direct observation of herds for data on herd structures and mortality rates.

b) Calving histories of selected cows. These histories were used to determine reproduction parameters, age structure of offspring and percentages of calf sales.

4.6.2 Herd Composition

Table 13 shows the overall distributions of males and females in different age-classes within the herds examined. Swift (1984: 104) by comparing herd structures reported in different ecological zones is able to demonstrate that there is a relationship between the quality of the environment and the percentage of males in a given herd. Thus the herd structures, on the Mambila Plateau especially, correspond most closely to those in the Inland Delta in Mali (Coulomb, 1972), in particular the high proportion of males, 37.5% in Mali and 42.0% on the Mambila Plateau. The low percentage of castrated bulls compares with Southern Zaria (Otchere et al. 1982) - castrates have no particular market advantage and are said to grow less quickly than breeding bulls.

The high percentage of males is also related to the overall size of the herds. In Southern Zaria (Otchere, 1984), where herds are much smaller (average herd size 45.9 animals), the overall percentage of males is less than half that in the Toungo Block.

Elsewhere in the pastoral zone, herders with a surplus of male animals that are 'useless' or unsaleable, for example the Malian Twareg, tended to slaughter excess males at birth. However, there is no evidence that the FulBe in the Toungo Block have ever practiced this. This underlines another crucial feature of livestock production in the Toungo Block -the marginal costs of additonal stock are much lower than in the arid zone. For example,in the northern Sahel, watering stock from point sources is a major additional labour cost. In addition, where stock must be fed on browse cut by the herders - and where resources are dispersed, keeping track of animals is more difficult, and requires extra resources.

Thus the marginal costs of additional stock in the arid zone are much higher than in the Toungo Block. Therefore, it needs only a slight impetus to retain males in the herd when they are not to be used for breeding. FulBe provide two explanations for maximising their herd size; either they hope to provide each of their sons with a fully viable herd, or they keep the excess stock as insurance against epizootics or other catastrophes. This latter strategy was vindicated during the rinderpest epidemic, for herders who sold their excess males and barren females before the rinderpest reached their area had funds to rebuy stock, whether their herd was affected or not.

TABLE 13. MEAN PERCENTAGE CATTLE HERD STRUCTURE PARAMETERS.

Age (yrs)	Sex	Ganye Lowlands	Mambila PLateau	"Zonal"
0-1	M	8.3	13.8	10.6
	F	8.9	14.2	11.4
1-2	M	5.4	7.9	6.7
	F	6.8	8.3	7.6
2-3	M	6.0	1.5	3.8
	F	5.5	2.5	4.1
3+ unclassified	M	6.0	4.7	5.4
Breeding Bulls		4.7	11.5	8.1
Castrates		2.8	3.3	3.1
Total Males 0-3		13.5	19.5	16.6
unclassified F		25.4	16.9	21.2
Pregnant Cows		18.7	15.8	17.3
Barren Cows		1.4	0.2	0.8
Total Females 0-3		45.5	32.9	39.3
% Females all ages		67.3	58.0	62.4
% Males all ages		32.7	42.0	37.6

4.6.3 Herd Recruitment through Reproduction

4.6.3.1 Age Structures of Cows in Calving History Study

The detailed age structure of the cows in the calving histories study examined is shown on Figure IX. Age-classes 3-4 and 4-5 are probably under-represented because of a bias against choosing animals that were apparently heifers. Thus only those age-classes 5-16 can be considered to be representative of actual herd structure. This indicates a sharp drop in proportion between the ages of 8-10, perhaps reflecting the drought in the Sahel in the early 1970's. The advantage of this technique is that it gives greater accuracy in determining animal ages.

The ages of all the offspring born by these cows (932) were recorded, whether they were still present or not. It should be noted, however, that this type of analysis tends to under-represent older age-classes, as offspring are only recorded if their mothers are still in the herd. Figure XV shows the age structure of the 532 offspring still present in the herd. The greater offtake of males is clearly evident.

The figures for offspring in the first age-class (0-11 months) are clearly anomalous. This certainly reflects the high mortality of cows during the rinderpest epidemic of 1983-4. It may also be due to the seasonality of births (see previous Section). Because births show a peak in March, and the study was carried out in March-April, offspring born 12 months earlier may well have been categorised in the 1-2 years age-class.

4.6.3.2 Fertility of Cows in Sample

Of the 565 cows recorded, 92 (16%) were classified as heifers because they had had no calves, and a further 15 (3%) were of unknown age. The remaining 458 (81%) thus constituted the sample. Figure XI shows the range of ages at first calving, with an average of 57 months, within a range of 42-102 months. No significant difference between Mambila and Ganye was found. Figures for the pastoral zone of Niger and the Delta region of Mali are 66 and 48 months respectively (Swift, 1984:116) and these compare with the figure of 60 months obtained for S. Zaria (Otchere, 1984:5).

Females over three years old were assumed to be potentially able to reproduce, and 550 animals fell into this category. Calving percentage is then calculated by dividing the actual number of calves produced by the total number of reproductive cow years. This came out at 52% for Ganye and 50% for Mambila, a difference that is not statistically significant. This compares with a figure of 48.2% for Southern Zaria (Otchere, 1984).

However, in the Ganye region, calving percentages do exhibit a contrast between the figures for FulBe na'i (46%) and those for the agropastoralists (54%). This is likely to reflect the higher stress that nomad animals are subjected to in the course of long treks and variable qualities of pasture.

The calculation of calving intervals was based on parities from 2 to 6. Figure XII illustrates the average intervals recorded between successive births. The average calving interval of the whole was 17 months. This agrees well with the figure for WoDaaBe herds in Niger (17.7 + 7.1) (Swift, 1984:112). With increasing parity calving interval decreased from 19 months between first and second to 14 months between fifth and sixth. This may show the greater fertility of individuals achieving higher parity status but could equally be attributed to the abundance of pasture and water-sources. These figures are substantially lower than for Southern Zaria, 25.2 months (Otchere, 1984:7) and from Jos, 27 months (Pullan, 1979). These greater intervals may be caused by lactation stress, as there is considerable pressure to extract the maximum amount of milk from lactating animals, due to its greater commercial value in the central regions of the Middle Belt.

A higher figure is derived from the calving percentage, 23 months, because cows that had had either a single calf or were barren would be of lower fertility. Maximum recorded parity was 9, but these figures were not included because of the limited sample size.

The presence of a large number of unproductive cows in a herd implies either that the herd-owner is not oriented towards profit, or else his management practices are ineffective. In order to assess this, cows over seven years old that were not pregnant and had not calved for more than thirty months were extracted from the data. Only 4.4% of the cows recorded fell into this category, a figure that compares with studies of FulBe herds elsewhere (Maliki, 1981 & Pullan, 1979). FulBe na'i herds contained a slightly higher percentage of infertile females, a consequence perhaps, of their lack of profit orientation, lower calving percentages and large herds.

4.6.4 Losses from Herds: through Calving Histories.

4.6.4.1 Sales

According to the herd-owners, the most frequently sold animals were young males, with the highest percentage among 2-3 year olds. The cows surveyed had produced 444 male offspring and 92 (21%) of these had been sold, in contrast with the female offspring, where 28 of 485 had been sold (6%). Figure XIII illustrates the percentage sales for each age and sex class, corrected for the decreasing sample among smaller age groups. Maliki (1981:83) found that in Niger, the highest % sales (43% of 100 males sold) were in the 3-4 year old category. WoDaaBe in Niger like to keep some castrates for fattening, and the figures (33% of all males) (Swift, 1984:106) compare well with those in the Toungo Block (27% of all males).

Sales figures were considered to include animals that were given away or slaughtered for ceremonial purposes or for home consumption. Dying animals are also sold, and the price obtained for them is related to how sick the animal appears to be. 46% of all dying animals were sold for at least a small profit.

FIGURE IX AGE STRUCTURE OF COWS

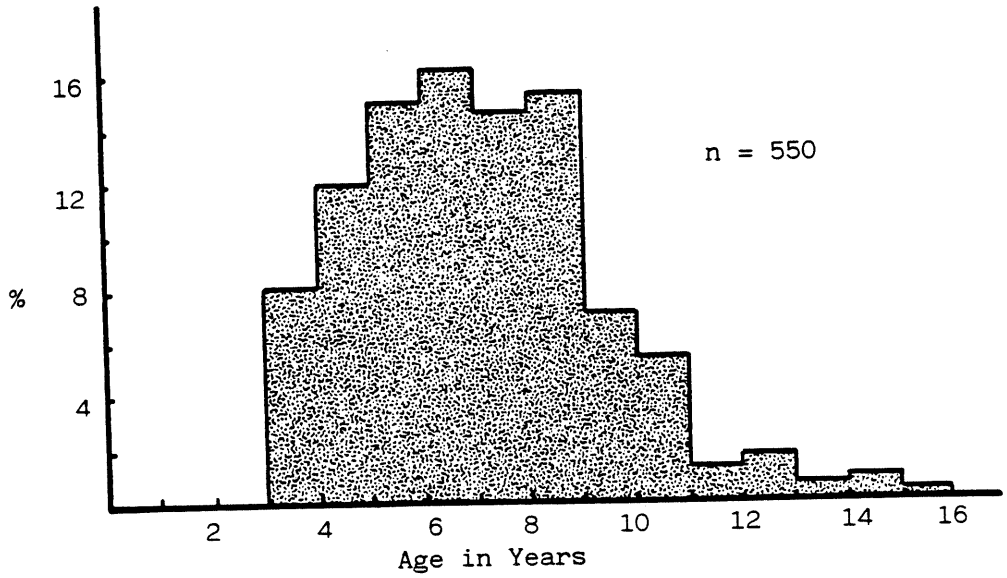


FIGURE X AGE STRUCTURE OF CALVES

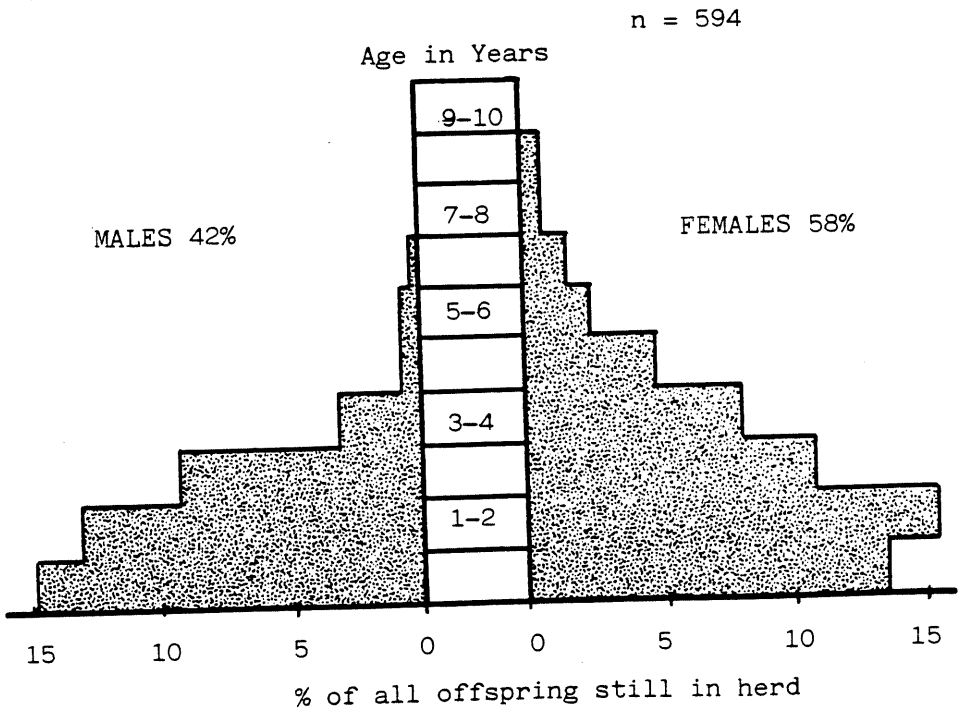
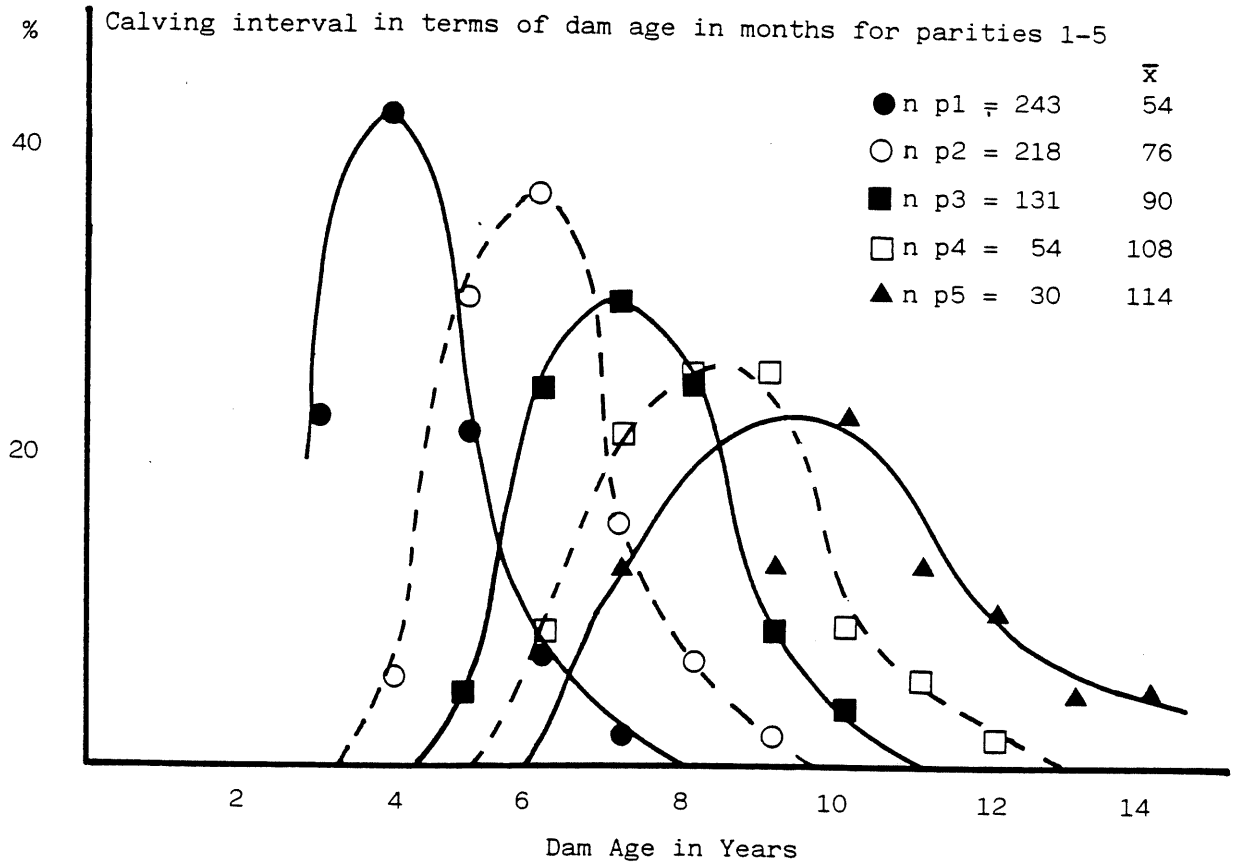


FIGURE XI AGE AT FIRST CALVING

FIGURE XII CALVING INTERVALS



4.6.4.2 Mortality

Mortality included both dead animals, and sick animals sold or slaughtered for insignificant financial gain. In all cases, the herd-owners were asked to state the cause of illness or death; reservations about the accuracy of diagnosis are dealt with in 5.1.3 and Appendix III. The figures obtained in the calving-history study always refer to deaths within specific herds, unlike those in Table 15, which sample overall mortality, including herds not affected by epizootics.

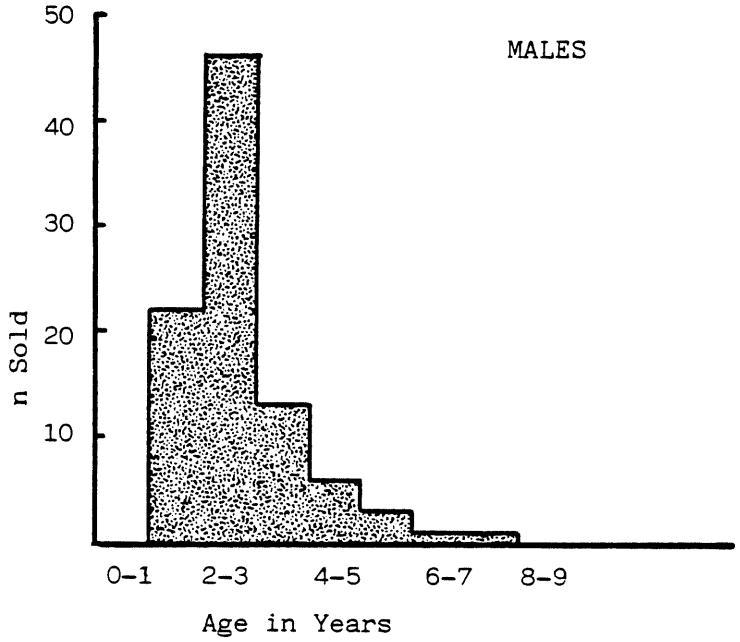
The mortality levels for each calf age group are indicated in Figure XIV. They show no significant difference between males and females. Mortality is greatest in the first year of life and then gradually declines. The overall mortality was 35.5% on a sample of 932 offspring with a mean age of 2.25 years. This gives an average annual mortality of 14%. These figures compare with mortalities of 34.4% (Coulomb, 1971) for Niger, and 36.7% for the WoDaaBe (Swift, 1984: 121). Calf mortality in the first year of life was 30.2% as compared with 22.4% in Southern Zaria and 36.7% in Niger. The figures for mortality from different ascribed causes are shown in Table 17.

4.6.5 Birth Seasonality

Variation in the time of year the sample of offspring were born is shown in Figure XV. The Ganye histogram shows a bimodal distribution; births in March correspond to conception in June, while the scatter of births from September to November are from conception in the early dry season. This pattern corresponds with the findings of Pullen (1979) for Jos and Otchere et al. (1982) for S. Zaria. The peak of conception in June corresponds to the first sprouting of the wet season grass, whereas the conception in the early dry season is related to the availability of the nutritious crop residues. WoDaaBe herds in Niger (Swift, 1984: 110) show a similar pronounced seasonality with a majority of births in July-August, corresponding to conception at the end of the wet season. Births on Mambila show a broadly similar pattern of bimodal seasonality with a pronounced major peak in May and a secondary peak in August.

Table 14 summarizes the most significant cattle production parameters recorded in the Toungo Block and compares them with similar from elsewhere in Nigeria and West Africa.

FIGURE XIII SALES OF OFFSPRING



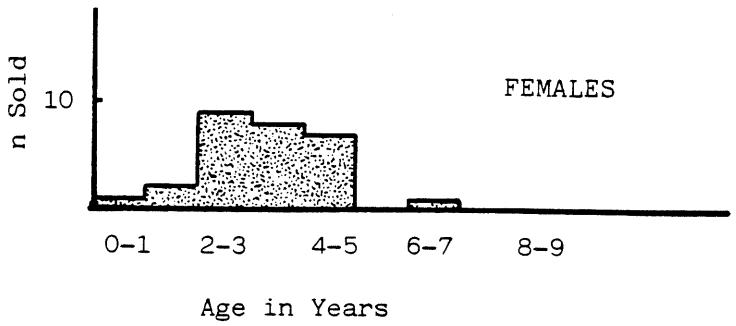
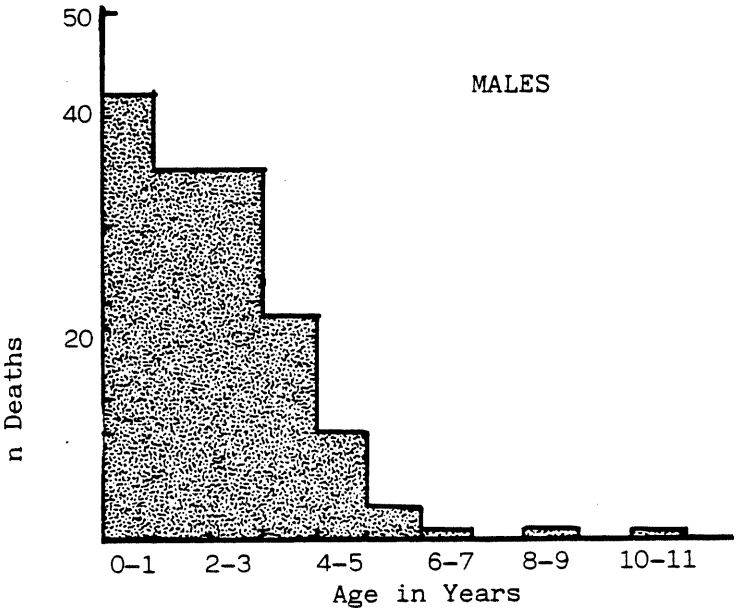


FIGURE XIV MORTALITY OF OFFSPRING



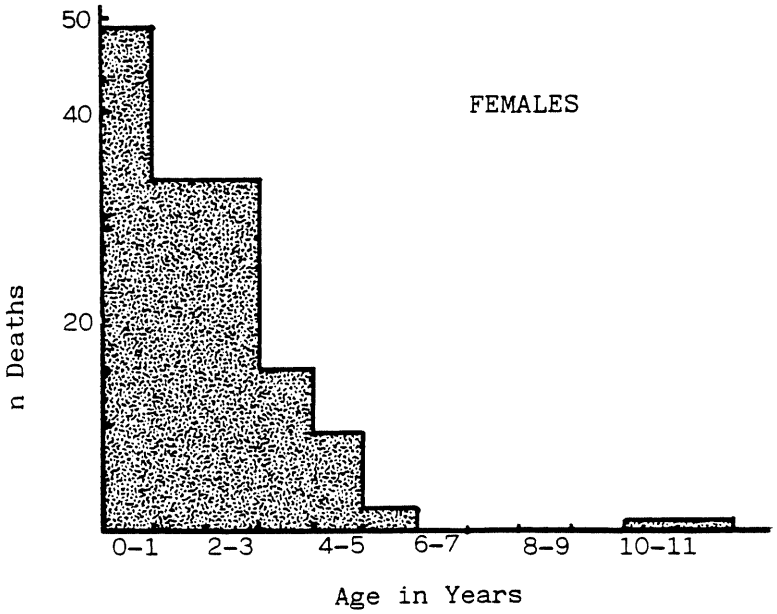
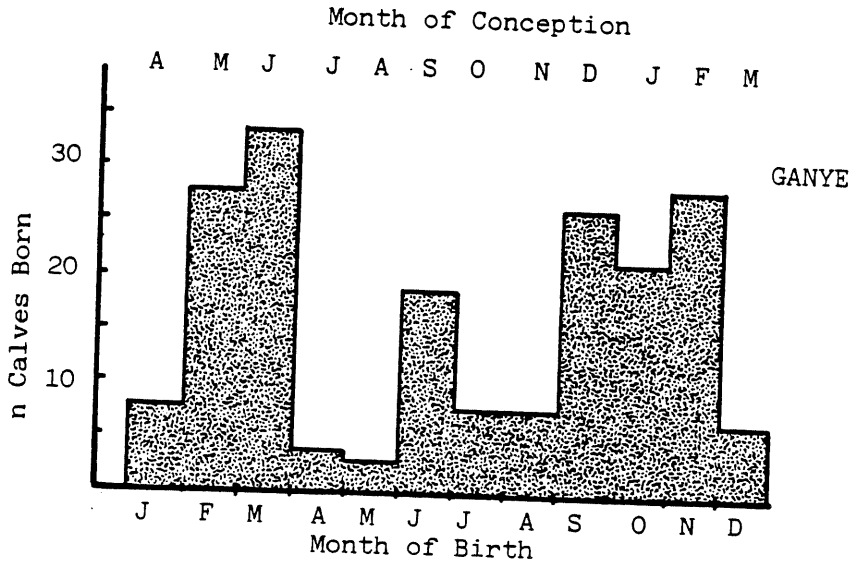


FIGURE XV SEASONALITY OF CALVING



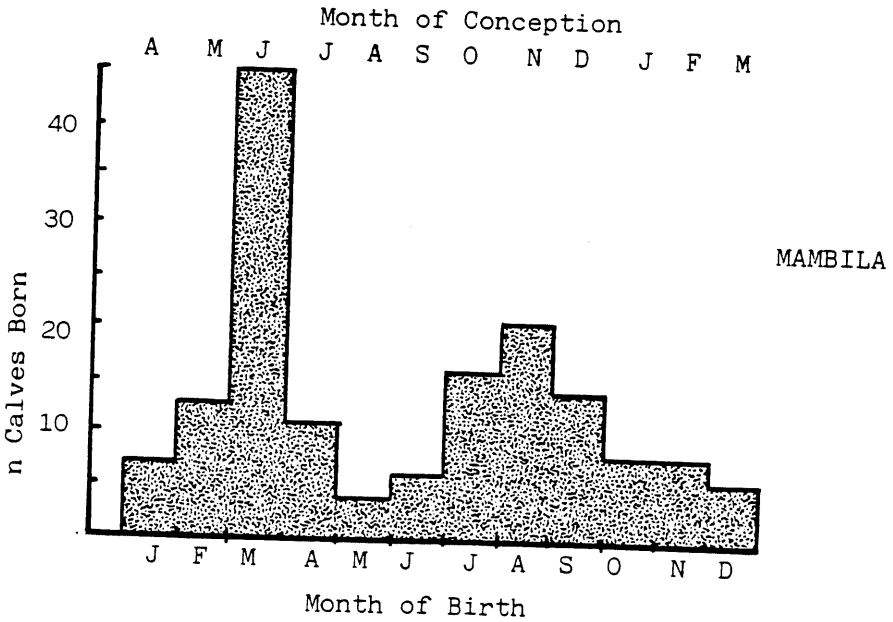


TABLE 14. A COMPARISON OF CATTLE PRODUCTION PARAMETERS IN DIFFERENT PARTS OF WEST AFRICA.

	Ganye	Mambila	S. Zaria	Niger	Mali
	Zonal				
Mean Herd Ownership	116	248	46	16	
Mean GU Size	30	34		41	
% Males	33	42	35	27	38
% Females	67	58	65	73	62
Calf Mortality (1st yr)	30.2		22.4	36.7	34.3
Sales	21% Males			33% Males	
Average Calving Interval (months)	17		25.2	17.7	19.6
Calving Percentage	54	50	48.2	60-70*	55-65*
Age at 1st Calving (months)	54	59	60	66	48

Sources other than this work: Otchere (1984), Swift (1984), Coulomb (1972).
* Represents "reproduction rate" rather than calving percentage.

SECTION V.

CONSTRAINTS ON LIVESTOCK PRODUCTION

Previous sections have discussed the background to the Toungo Block and its livestock production systems. Certain aspects, such as disease, land tenure, trade bottlenecks and communications, were identified as the principal constraints on increased livestock production, and these topics have therefore been reserved for this section. Graziers and farmers were asked to list all the constraints on livestock production they experienced, and their responses are discussed systematically in section 5.5.

5.1 Disease

5.1.1 Rinderpest

The rinderpest epidemic of 1983/4 had a profound effect on almost all aspects of cattle production in the survey area, and discussions with livestock producers were inevitably dominated by it. Both pastoralists and local government officials confirmed that the distribution of cattle in the Benue Lowlands found by the wet season aerial survey (Map 11) was abnormal, and they ascribed this to the effects of rinderpest.

The history of rinderpest in Nigeria to 1975 has been outlined by Felton & Ellis (1978). Although the campaigns of vaccination throughout West Africa in the 1960's had a considerable effect, the residual pockets of infection have remained sufficiently virulent to re-infect large areas.

The first suspected cases were reported from Ganye and the Benue lowlands during the December 1982-January 1983 period, but no large-scale vaccination programme was initiated until April-May 1983. In the early stages, veterinary officers indicated that difficulties were experienced both in the supply of vaccine itself, and in the infrastructural support necessary to administer it effectively. There was a resulting shortage of saline solution, fridges, syringes, ear-clippers and transport for veterinary staff. A similar situation was reported from Kano state (PAN, 1983). The first cases on Mambila were reported in August, 1983, but it took until December for the disease to take hold fully. Veterinary supplies were more readily available than in 1983, and local conditions for the storage of the vaccine had been improved. Although sporadic outbreaks were continuing during groundwork in May, 1984, the peak of the infection had passed. The re-appearance of rinderpest in the Ganye region and elsewhere in Gongola State at the end of 1984 indicates that the logistical problems of administering the vaccine remain to be solved.

To compound the problem, cattle-owners proved to be misinformed about the nature of rinderpest vaccination. For example, there was a general conviction that the more times an animal is injected, the more effective vaccination will be. As a result, considerable ingenuity was expended in deceiving veterinary assistants into injecting a herd several times,

thus reducing the actual number of cattle vaccinated. Another widespread misconception was that refrigeration is not important in the storage of the vaccine. Most veterinary assistants were aware of the need for cold storage, but were hindered by the lack of reliable equipment. Most FulBe, however, did not know this, and believed vaccines to be similar to more familiar medicines. Many enterprising FulBe, particularly in the Benue valley, obtained large quantities of vaccine for themselves, and injected their own herds, in an attempt to protect them. These were sometimes not rinderpest vaccine, and were generally of little or negative value because of their dubious provenance and inappropriate storage conditions.

Stockowners were equally ill-informed about the ways that rinderpest is spread. Once rinderpest had entered a herd, measures were rarely taken to prevent the cattle from coming into contact with one another, and the disease could thus spread through saliva, dung and urine. FulBe drive their herds into remote bush areas to avoid contact with other possibly infected herds, although when their own animals are infected they are less careful. Moreover, when cattle traders are passing from camp to camp, in an attempt to circumvent the closure of markets, the herders rarely take measures to prevent them. FulBe believe that the infection can be spread by transporting infected meat from dying animals, but they have taken no practical steps to prevent this from occurring. Butchers from certain outcaste groups follow the infected herds in the Benue valley, taking away dead and dying animals and processing the meat for sale to unwary customers, and FulBe seem unaware of the danger this poses.

Finally, there appears to be no consistent policy of either preventing herd movement after vaccination has taken place, or even of burning dead animals in herds where infection has definitely occurred. Veterinary assistants on Mambila began by burning infected carcases, but this practice was not common elsewhere. Those FulBe who live along the border with Cameroun reported that the slaughter and burning of infected animals is a government policy there, and as a consequence, herders had crossed the border into Nigeria to avoid this threat.

Mortality rates from rinderpest were collected in the wet season as estimates for the major interview sites, based on conversations with stock-rearers and veterinary officials (**RIM**, 1984a: Fig. 10). During the dry season, cattle-owners were asked to state the precise numbers of their herds before and after the epidemic. At each interview, the total number of herds affected was recorded, from a percentage of all the cattle-owners present. This allowed a measure of average herd size, and an assessment of the impact of of the epizootic in a given location. These figures are summarized in Table 15. The overall mortality recorded was 33.3% in 1983-4. Since a figure of this nature has no independent verification, it is correct to regard it with some scepticism. For example, herd-owners may count as 'dead' sick animals that were sold to traders, or indeed healthy animals. The lingering belief that

compensation will be forthcoming may have encouraged some herd-owners to inflate figures.

TABLE 15. MORTALITY ATTRIBUTED TO RINDERPEST AS A PERCENTAGE OF THE TOTAL POPULATION

	CATTLE-OWNERS						REGIONS		
	FW	**FN**	**MB**	**HA**	**AK**	**JK**	**LOW**	**MB**	**TOTAL**
No. Samples (Meetings)	13	23	2	1	1	1	27	14	41
% Affected	70.4	83.5	44	100	100	100	43.9	75.1	78.6
% Loss	35	62	54	-	57	58	62.5	25.5	53
% Total Loss	24.6	44.3	45	-	57	58	27.4	19.1	33.3

KEY

FW= FulBe Wuro **FN= FulBe na'i**
MB= Mambila (People and Place)
HA= Hausa **AK**= Ankwe
JK= Jukun **LOW**= Benue Lowlands

However, the independent survey of herd composition in Ganye and the Mambila Plateau recorded the percentages of total mortality attributed to rinderpest in individual herds (Table 17). This gave an overall figure of 46% for adult animals and 17% for calves. Table 18 shows the ascribed causes of death among 330 offspring in the calving history study -61% were attributed to rinderpest.

A paradoxical effect of the rinderpest was to stimulate offtake in the period immediately preceding its appearance. On the Mambila Plateau, where its advent was delayed in relation to the Lowlands, considerable numbers of animals were sold to provide funds for herd rebuilding should it be necessary. The survey of sales also questioned stockowners about their reasons for selling; - the results are shown in Table 16:

TABLE 16. STATED REASONS FOR SALES: MAMBILA PLATEAU.

Reason	Number of animals	% of Sales
'Cash Needs'	111	6
'Anticipating Rinderpest'	1069	61
'Sick'	584	33

5.1.2 Trypanosomiases

With the exception of rinderpest, the trypanosomiases associated with the tsetse-flies is the single most frequently reported veterinary problem throughout the Toungo Block. Herd composition studies (Table 13) indicated that 31% of adult animal and 11% of calf deaths in Ganye were attributed to trypanosomiases; a similar or higher incidence can be predicted for all lowland areas within the survey zone.

The calving history study (Sect.4.6.4.2) showed that there was a considerable difference between mortality from trypanosomiases among FulBe na'i as opposed to settled stock-owners. Among FulBe na'i in the Ganye region 70% of overall mortality was ascribed to **jola.** Part of the reason for this unusually high figure was that the nomads had spent part of the wet season in regions of known infestation due to the rinderpest epidemic. In a normal year, the prevalence of tsetse is the major factor that a herd-owner must weigh up against the attractions of otherwise desirable pastures and river-valleys. Map 19 shows the conjectural limits of Glossina morsitans, derived from recent research conducted by FDPCS and the wet-season distribution of tsetse alleged by the FulBe. One of the striking features of this map is that G. morsitans is not present in many areas where **bubi silon** (= tsetse fly)has been reported by pastoralists. The FDPCS survey was not exhaustive -but it does give independent support to the idea that FulBe are frequently mistaken about the identity of the tsetse fly and thus unnecessarily avoid regions where their cattle are not under threat. Stock-owners reported the spread of tsetse both on the high altitude grasslands of the southern Shebshi range, and in the lowlands east of the Shebshi around Toungo town. Some of the preliminary maps prepared by FDPCS, on the basis of their own more recent surveys, show increases in infestation, and changed distributions for the different species of Glossina. A priority in the planning of development projects would be more reliable information on the present degree of tsetse challenge.

A problem in discussing tsetse infestation with stock-owners is the terminological confusion that results from translating the English term 'trypanosomiases' by the Fulfulde **jola. Jola** applies to a wide variety of symptoms that herders associate with biting flies. The Fulfulde term **bubi silon** is usually taken to refer to Glossina spp. but it is more

commonly applied to other species of biting fly. Many symptoms of **jola** described by herders, such as wasting, may well be due to a variety of other parasitic and tick-borne diseases. As a result, FulBe symptomatic diagnosis may well over-estimate the reality.

The Fali and Kiri Plateaux should be above the altitude limit of the tsetse fly, and surveys in the 1950's and 1960's showed that these were free of fly (Bawden & Tuley,1966; Howell-Davies,1977). However, both pastoralists and farmers consistently reported an increase in biting flies, both on the grasslands and in the lowlands. There are several possible explanations for the expansion of the tsetse belts around Toungo town. The Gumpti Game Reserve and the Faro Game Reserve on the other side of the Cameroun border are associated with an expansion of wildlife, and a likely consequence of this is an increase in tsetse. However, neither of these reserves have been established long enough to account for the rising incidence of tsetse, as this reputedly dates back some fifteen years. Alternatively, the decline of the route joining Toungo to the Bali-Serti road has caused farmers to move away, with a resultant decline in hunting pressure, and an increase of wildlife hosts. Such a process is clearly circular -the worse the flies are, the greater the outmigration. In Kiri town, for example, it is believed that farmers are leaving due to the greater numbers of these biting flies.

The distinction between riverine and savannah species of biting fly is not usually made by informants, but may be of crucial importance in reconciling accounts of the expansion of infestation. It is argued in Working Paper VI (Bourn, 1983b), that some species of fly adapted to gallery forest can survive without wildlife vectors by staying at river-crossing points used sufficiently often by cattle to provide the flies with a regular blood-meal.

Another possible explanation is the increase in stock movement. The expansion of the meat trade in Nigeria means that the number of traders, passing from herd to herd buying individual animals to build up a herd large enough to trek to the markets of Igboland, have increased. These emphasize the significance of the off-Plateau movements where roads suitable for trucks are not available. If flies are able to travel with such herds and survive, they may well be passed to new hosts in resident herds, whether the wild animal vectors are present or not.

The movement of nomads in this area is also believed locally to account for re-infestation of sprayed areas. An area south of Ganye sprayed by FDPCS in 1981 remained free of fly for only four months. Local stockowners said that shortly after it was sprayed, large numbers of nomadic FulBe brought in their herds and this accounted for the rapid re-infestation. However, an alternative explanation might be the recovery of residual tsetse populations surviving spraying.

TABLE 17. PERCENTAGE OF TOTAL MORTALITY RECORDED CAUSED BY VARIOUS DISEASES. (from investigations of herd structure)

Disease	Age	Ganye Lowlands	Mambila Plateau	"Zonal"
Rinderpest	Adult	38	60	46
	Young	18	16	17
Trypanosomiases	Adult	31	0	20
	Young	11	0	7
Blackquarter	Adult	+	3	1
	Young	0	2	1
Fluke	Adult	0	0	0
	Young	0	7	3
Starvation	Adult	0	7	3
	Young	0	4	1
Accident	Adult	+	+	+
	Young	+	+	+
Other	Ad + Yng	+	+	+
Total	Adult	70	71	70
	Young	30	29	30

+ Indicates a mortality of less than 1%.

5.1.3 Other Diseases

A valuable survey of the cattle diseases recognised by FulBe in Niger, and their names in Fulfulde, is provided by Maliki (1981). In the Toungo Block, the principal diseases named by veterinary officials, apart from the complex of symptoms associated with trypanosomiases are CBPP (Contagious Bovine Pleuro-Pneumonia), Liver-fluke, Haemorrhagic septicaemia, Foot and Mouth disease, Heartwater, Redwater, and Blackquarter. Detailed mortality studies (Tables 17 and 18) indicated that only Blackquarter and Liver-fluke were stated by herdowners to have had a serious impact on stock numbers. However, the high levels of mortality from rinderpest have been affected the process of diagnosis and some diseases that would have been attributed to other causes at another time are now indiscriminately classified as rinderpest.

TABLE 18 OVERALL OFFSPRING MORTALITY

CAUSE	% MORTALITY
Rinderpest	61
Trypanosomiases	12
Blackquarter	7
Liverfluke	3
Perinatal Death	3
Effects of Drought	3
Accidents	2
Worms	1
Diarrhoea	<1
Streptothricosis	<1
Dystocia	<1
Death post-vaccination	<1
Cause Unknown	6

The cattle ailments recognised by the FulBe do not precisely correspond to these, but local names can often be a valuable guide for rapid diagnosis. A survey of Fulfulde terms and the spectrum of their

application is provided in Appendix III. Stock-rearers interviewed emphasized, however, that these were hardly more than a nuisance compared with rinderpest, although there have been serious epidemics of CBPP in the past (cf.Hurault, 1964).

The supply of drugs to treat these diseases appears to be very sparse. Stock-rearers asserted that even worming medicines were not readily available. Only in the Ganye Development Region was it stated that the the veterinary service could provide certain medicines. FulBe often buy medicines in the market and are well used to treating their own cattle. However, supplies of illicit veterinary drugs appear to have largely ceased, except along the Wukari-Jalingo road, where the drugs are reportedly coming in from Makurdi. FulBe have a considerable repertoire of traditional remedies for common stock diseases, although their effectiveness has never been properly investigated. In recent years, however, they have become increasingly dependent upon the relatively cheap, effective Western drugs. Such dependence requires a regular supply of such drugs and shortages are greatly resented by stock-rearers who have come to rely upon such government support. FulBe persistently requested the government to make drugs available 'over-the-counter' at standard prices, even if these represented the full cost of the drug.

5.2 Environmental

5.2.1 Water

Unlike most of the other cattle-producing regions of West Africa, pastoralists do not experience significant problems through lack of water. The dry season aerial survey mapped rivers and standing water (Map 8), and demonstrated that, combined with the Benue and its tributaries, water is freely available throughout the Toungo Block. Only along the northern border of the Toungo Block, in Jada, Kojoli and Monkin, did pastoralists regularly request dams or other devices to store water.

In regions where the stocking rate is very high the pressure on pasture is such, that if the rains are late, the new grass is delayed and the nutritional consequences for the cattle can be serious. Although the Mambila Plateau has the highest rainfall in the survey area, pastoralists suffered in the dry season of 1983 because the rains were six weeks late, and many of the cattle were unable to reach either the foot of the escarpment or cross into Cameroun, both traditional grazing points in this period. As a result, there were a number of requests for dams, or infrastructure to help build them.

In the past, dams have been put in with little consultation of the pastoralists who are intended to use them, and without requiring any personal investment from them, either in construction or maintenance. Furthermore, they have not been asked to co-operate in regulating access to them. Pastoralists conceived of dams as state affairs, and were not therefore receptive to the suggestion that they mobilise their own labour to construct earth dams. Unless the manner in which sites are

chosen, and the process of selecting communities they are intended to serve is radically restructured, dams are unlikely to be successful in the development of pastoral communities, without extensive and prolonged support from the State.

Although water may be widely available, access to water may be constricted for a number of reasons. For example, the Mayo Kam, despite its northerly location is little used by pastoralists in either wet or dry season (Maps 11,12). The main reason, according to the FulBe, is the steep banks, and the adjacent forest harbouring tsetse. FulBe in Garba Chede argued that if sloping paths giving free access to the river were created, and the forest cleared on either side, then many more would use the Mayo Kam for dry season pasture.

Access to water may also be in dispute because traditional drinking points have been cultivated. From the point of view of arable farmers, such places are excellent for cultivation because of the annual manuring that takes place. Furthermore, the FulBe who use it leave at certain times of the year, allowing the hoeing to take place without dispute. Violent quarrels have broken out in the region between Sabon Gida and Wukari, over disputed watering points. Pastoralists regularly suggested the government find a means of enforcing the prohibition of cultivation in such places.

Some effects of the widespread drought in the Sahel during the 1983/4 dry season were apparent during the ground survey. Since previous experiences of drought in West Africa have been systematically investigated (Gallais, 1977), it is worth considering the significance of drought for livestock production systems in the Toungo Block.

The immediate effect of drought in the Sahel is to encourage nomadic herders to come further south in search of regular supplies of water and pasture, regardless of the risk of disease. This will increase the stocking rate throughout the Toungo Block, but especially in the Benue lowlands where overall cultivation densities are low and there is sufficient space to contain the large herds of the nomads. Just as rinderpest impels pastoralists to explore unfamiliar territory and may lead to its colonisation, movement from the arid zone in the wake of drought may have a similar effect.

5.2.2 Access to Pasture

5.2.2.1 Overgrazing

Comments about overstocking on the Mambila Plateau have been current in the literature (Bawden & Tuley, 1966:111 ff.) since the first recommendations for improving livestock management there. Stock-owners on the Plateau do recognize that the excessive numbers of cattle are largely responsible for the widespread erosion (Map V) and grass species replacement. The question of overstocking was discussed with herders throughout the Plateau, and while they agreed that destocking was desirable in principle, nowhere did anyone express willingness to begin the practice. Herders suggested that the government should continue to

make dry season feed available at subsidized prices as in 1981. This would however not solve the problem, and could in fact lead to further degradation as well as additional difficulties created by reliance on such supplies.

The prevalence of erosion can be related to the lack of demarcated individual land rights assigned to graziers. Because grazing land is vested in the community, an individual does not feel responsible for the condition of any particular stretch of land. If his cattle eliminate the grass cover, then the obvious response is to move them to an adjoining stretch.

From the point of view of the grazier, there is a certain ambiguity about the retention of rights in a specific area of land. Although many FulBe expressed the desire for a Certificate of Occupancy, their herding strategies are usually premised on 'their' grazing land having flexible boundaries. In general, herders had not considered the consequences of their neighbours also obtaining such certificates. If land were enclosed throughout the Plateau the free movement of their stock would be restricted. As a result, if the cattle were subjected to stress, whether from drought or disease, the issuing of Certificates of Occupancy would limit herd-owners' options to move their cattle to more suitable pasture.

5.2.2.2 Co-operation and Conflict between Farmers and Graziers

Within the regions of the Toungo Block stock-raisers and farmers have a wide variety of interdependent relations. Farmers allow cattle to graze on crop residues in order to benefit from their manure. Meat and dairy products are exchanged for cereals, either indirectly through sale in the market or by direct trade. In the case of the Samba and Mambila, younger men work as herdsmen for the FulBe in order to obtain stock.

Relationships of this type are by no means uniformly good and Working Paper IX (Blench,1983b) considers in more detail the factors that account for this. Broadly, conflict between farmers and graziers can be attributed to three principal causes;

a) Competition for limited land resources.

b) Traditional dominance relations between the stock-raisers and the farmers.

c) Incompatible farming systems; the Tiv, for example, rarely farm cereals, while the Mambila combine a green manure with the interplanting of maize and tubers. As a result, neither group are willing to allow cattle to graze on their fields after the harvest.

Strategies to encourage mixed farming as a part of livestock development must therefore take these three major factors into consideration. At present, farmers do not plant forage crops specifically for livestock, but the making of dry-season fodder from cereal residues is established among the Samba and Mumuye. In view of the increased difficulties

experienced by transhumant stock-rearers in recent years, there is reason to believe that farmers would be receptive to the introduction of forage crops, and that these would find a ready market among graziers. Moreover, it would create a further basis for co-operation between the two groups and encourage the spread of mixed farming techniques.

5.3 Economic Constraints

5.3.1 Credit and Loans

5.3.1.1 Loans in traditional society

Before discussing the willingness of herders and farmers to participate in national loans schemes, it is useful first to know how credit and loans schemes operate within their traditional society. Credit schemes are much more elaborate among farmers, and they were also much more acute in understanding and asking questions about the conditions of government loans. This is likely to be a partial guide to the speed of uptake of credit schemes introduced by external agencies.

A fundamental rule binding together most of the societies surveyed in the Toungo Block, is the paramount importance of kin relations. Kin are most likely to assist an individual in economic difficulties and are least likely to demand exact or prompt repayment of such assistance. Both graziers and farmers had evolved systems of mutual assistance appropriate to their specific situations.

One of the features of FulBe society not mirrored in other agricultural societies is the possibility of catastrophic losses due to epizootics. This has been a historic liability of herders, and their social structure has partly evolved mechanisms to compensate for it. One of these is extensive 'exchange' loans, where owners of herds loan selected animals to other FulBe living elsewhere. The reasons are twofold; to have the cattle managed by experienced herders, and to have them as reserves in the case of epizootics.

In other circumstances, if a nomadic FulBe loses his entire herd through disease or mismanagement, then his relatives will normally loan him animals from their own herds. He is permitted then to raise the offspring of these animals as the nucleus of his new herd, and eventually the animals he has 'borrowed' or equivalents are returned to the owners without interest.

Both Tiv and Mumuye farmers have credit and loans associations. Among the Mumuye, this consists of a group of farmers, who each contribute a fixed amount every month, and the entire sum is then taken by one member after another in rotation. These 'rotating credit' associations are common in Africa, particularly where cash has not long been in use, and they have been studied by Ardener (1964) and Cohen (1965). Their function is not so much to supply credit, since a contributor can never take out more than he contributes over a year, but to allow the build-up of cash for individuals who would otherwise be obligated to distribute it to their kin.

Tiv credit associations resemble banks more closely, in that members can request to borrow whatever sum is appropriate for their capital venture. Such 'banks' are run by church members, and often church functionaries act as administrators. Interest rates are extremely high, between 5-10% per month, but both inflation and default rates constitute considerable risks for such schemes. This suggests that the lower interest rates that credit agencies can offer would therefore be well received among the Tiv. However, since livestock is not percieved by the Tiv as the most immediately profitable capital venture, the expenditure of loans would have to be closely supervised.

5.3.1.2 External credit schemes

The NLPU livestock-fattening scheme was in many cases the only official loan scheme that stock-rearers had experienced, so it is difficult to assess how effective other loan and credit schemes would be, especially in areas where the fattening scheme did not operate. Stock-rearers in the Toungo Block were without exception in favour of loans and credit, although they were rarely familiar with the exact conditions of the fattening scheme. When stock-rearers were asked about the type of credit they would like to see available for themselves, their response was almost invariably framed in terms of herd rebuilding following rinderpest losses; loans were requested for a period of between two and five years, so that they could buy calves in the market and fatten them up for sale.

Another topic that drew considerable comment from both arable farmers and pastoralists was the methods of allocating loans. Given that there are only a limited number of loans because they draw on revolving funds, it is inevitable that those farmers or pastoralists that do not recieve them may resent their allocation to their neighbours. However, it was regularly asserted that when the allocation of loans was not handled directly by NLPU staff, they went to the livestock-owners least in need of them, those with viable herds. In that this type of resource is likely to become scarcer in the coming years, the demand that greater care be exercised in ensuring that the loans go to those most in need of them should be carefully noted.

Cattle prices on the national market in Nigeria have undergone considerable fluctuations in recent years, and the consequences of this do not seem to have been fully absorbed by the herdsmen. Their expectations concerning the repayment of longer-term loans tended to assume a stability of market conditions that may no longer exist. If herdsmen buy animals when the price is high, after a drought or a rinderpest epidemic, they may find that the price for the animals they must sell later in order to repay their loan is well below the price they originally paid. In view of recent market trends this possibility cannot be ignored.

Stock-owners hardly ever raised the possibility of loans for the construction of dams, feeder roads or other types of infrastructure.

This may have been due to the effect of the rinderpest and the stock losses it has engendered, but it was evident that such items were seen as the responsibility of government. In view of this, it should be a priority to involve stock-raisers both financially and organizationally in planning and execution of infrastructure development. This is partly to ensure that any proposed construction would meet their needs, and partly because if they make no personal investment in the realization of a given project, they are unwilling to foster communal efforts towards its continuing success.

An example of this situation is the salt and potash licks on the Mambila Plateau. There are no natural licks on the Plateau, and in the nineteenth century, the natron trade from Lake Chad through Adamawa was one of the mainstays of commerce in the region. During the colonial period the Government began to supply salt and potash to the Mambila, and herders began to expect this. The supply system has now been interrupted. Under normal circumstances, herders would be expected to very soon have the capability to organise their own supply; now, however they are simply waiting renovated support, rather than mobilizing their own resources and initiatives.

5.4 Media and Communications

One of the most frequent complaints voiced by stockowners was that they were unaware of government schemes that already existed, or that they did not know how to take advantage of schemes they heard about on the radio or by word of mouth. This section considers the means available to a development agency to make known its proposals to stockowners and the potential constraints on the dissemination of new ideas.

5.4.1 Language

The most important language in southern Gongola state is Fulfulde, since it is spoken both by the FulBe, who constitute the majority of cattle owners, and is also a widespread lingua franca among Mambila and Samba. Although spoken by the herders in the Benue lowlands, it is not used by other people there. Fulfulde is not a unitary language, but is divided into a large number of dialects. The speech of the herders is different from the Hausa-influenced Fulfulde spoken in Yola and other towns. This urban Fulfulde is associated with external authority by the nomadic groups, and information disseminated in this dialect risks being dismissed because of its associations. Any form of media in Fulfulde should ideally be prepared in both urban and nomadic dialects.

The second most important language is Hausa. It has only recently begun to compete with Fulfulde as a lingua franca in Southern Adamawa, perhaps because of the influence of the radio, and the improved communications networks leading to an influx of Hausa traders. At present, Hausa is understood by government officials and traders, as well as many semi-settled FulBe. However, it is not spoken by many nomadic herdsmen, nor is it used much on the Mambila Plateau. Although it is used as a lingua franca in the Benue lowlands, neither the Jukun nor the Tiv people are

particularly receptive to media material in Hausa.

English is confined to government officials, throughout most of the survey area, and although valuable as a national medium of communication, is not understood by the majority of those a development project would be planned to reach. It remains to be seen whether Universal Primary Education will create a new generation of schoolchildren literate in English.

Literacy programmes have begun in Jibu, Mumuye, Mambila, Jukun, and Tiv, but only among the Tiv is the written language a substantial medium of communication. Radio broadcasts in this area are confined to English, Hausa, Fulfulde, Tiv and Jukun.

5.4.2 Media

It is frequently argued that the most direct impact is made by visual media, either films or television. There are, however, logistical difficulties in reaching a large number of potential recipients of development in this way. Moreover, a problem with films is that they cannot be referred back to, in situations of doubt or confusion. Written material would seem to be an alternative to this, and there is no doubt that simply presented material in English, Hausa and Fulfulde would certainly be used by a minority of livestock-raisers. However, written material does not always carry the same cultural values it does for farmers and herders as for harassed development officials. Pamphlets may well be carried about and shown to large numbers of interested people, but not actually read and absorbed.

Media that actually depend on speech seem to be the most significant option, because they resemble most closely traditional modes of transmission of information; i.e. word-of-mouth. Two methods are obvious, the radio and teaching cassettes. During the course of the survey, sufficient anecdotal material was collected to suggest that people are very attentive to the radio whenever anything of importance to them is broadcast. Radio-cassette tape-recorders are widespread, and distributing duplicated cassettes would be relatively easy.

5.4.3 Traditional systems of authority

When considering how to persuade people to adopt innovations, sufficient consideration is seldom given to authority structures within the society. In hierarchical societies, innovation seldom succeeds unless it has the implicit or explicit approval of the rulers. In acephalous societies, controlled by associations, such as the Samba, the approval of those in charge of the societies is crucial to acceptance. In societies where even associations have limited power, such as the Tiv, innovation will be adopted in terms of an individual's immediate economic advantage.

The FulBe na'i elect an ArDo to represent their interests and act as a mediator with Local Government as well as to arbitrate in disputes with farmers. Since the ArDo's original task was to represent the interests of

his clan, he used to move with the herds. However, the settlement of many FulBe na'i, and the relationships nomadic groups have formed with farmers has resulted in many ArDos becoming sedentary, even while their herds continue to move. Some of these ArDos have lost the confidence of their clans, and at meetings where the ArDo was not present, herders took the opportunity to complain about his corrupt behaviour. The ArDos are potentially the most important channel whereby the great majority of herdsmen can be reached, informed and influenced. However, it is essential that it is independently established that they have the support they claim over local pastoralists.

Among the Samba, there are chiefs whose position is important, but the economic sinews of the society are the associations, such as the Women's Fellowship and the Chamba Cultural Development Association. These groups mobilise collective labour for agriculture and work on the roads, and funds that are to be are channeled to this area could be disbursed directly to such groups.

5.5 Pastoralists' Requests for Inputs

Throughout the survey area, stock-rearers were asked what inputs and assistance they would like to see in their region. Table 19 shows the number of overall respondents and the Development regions where they were interviewed. Tables 20-25 at the end of this section tabulate their responses in various ways (Appendix 1.3.2 explains in detail the numerical methods used to rank their preferences).

TABLE 19. CATTLE-OWNERS REQUESTING DEVELOPMENT INPUTS

SAMPLE SIZE BY DEVELOPMENT REGION

REGION	LOWLANDS	GANYE	MAMBILA	TOTAL
No. Meetings	37	13	19	69
Mean No. Present	23.7	36.6	20	25.9
Total nos.	1521	476	672	2669

Cattle-owners were asked initially to list the constraints they experienced with livestock production. Their responses are shown in Tables 20, 21 & 23, and are ranked according to the importance assigned to the constraint. Table 22 indicates the numbers of problems raised in the course of public interviews, sorted by type of livestock producer, and nature of interview site. This table is intended to show;

a) Urban cattle-producers are more aware of the potential benefits to be gained from the intervention of a livestock agency.

b) Settled FulBe are most likely to be aware of the benefits of agency intervention, other settled livestock producers less so, whilst the pastoral nomads are least aware of the possibilities of

livestock development.

It is evident from Tables 20, 21 and 23, but should be emphasized again, that responses were dominated by anxiety over the recent rinderpest epidemic, and the possibility of a further outbreak. In many places herdsmen asserted that, apart from the epidemic, they were content with the present situation. In a normal year herdsmen do experience problems, and these had to be elicited by more persistent questioning.

After listing their problems, pastoralists were asked to propose development inputs to remedy them. Table 24 lists these proposed inputs or interventions as they were expressed by the pastoralists.

Table 25 is intended to present a brief survey of the opinions of arable farmers of the perceived benefits or otherwise of the presence of FulBe pastoralists. Since interventions that require the purchase or allocation of land, or are intended to assist the settlement of pastoralists should be catried out with the co-operation of the local agriculturalists, this shows the potential reception of such ideas in various parts of the Toungo Block.

A number of short sections below deal with the less major constraints on cattle production raised occasionally by pastoralists.

a) Theft.

Cattle theft is only a problem on the Mambila Plateau. It is an obvious danger wherever stocking densities are high and an international frontier is nearby. According to stock-owners, some of the stolen animals are trekked across the border into Cameroun and there sold to traders, while others are butchered and sold in the markets on the Plateau. Interviews revealed that there was a strong correlation on the Plateau between southern location and a higher incidence of theft. This was attributed by local opinion to the greater intermingling of FulBe and Mambila populations, as the Donga river valley was approached. Theft was attributed to inter-ethnic animosity rather than commercial motives, although some FulBe were honest enough to admit that FulBe who had lost their herds themselves were major culprits.

The opinion of the police, who dealt with the majority of cases of reported theft, was that the large thefts were the work of experienced FulBe, who had the herding skills to move large bodies of animals without attracting attention, while single beast thefts might be attributable to Mambila. In some areas such as Mbamnga, a theft is reported to the local ArDo at least once a week. Several stock-raisers reported a regular loss of their animals. The recovery rate for such thefts is low, because once an animal has been slaughtered, proof of ownership is difficult.

At present there is no system of ear-tagging to mark individual ownership, although some **lenyol** cut the ears of cattle to indicate that

their owner was a member of that clan. A system of branding, such as is used by Twareg and FulBe in Niger, was suggested to herdsmen at a series of public meetings. After the ramifications of such a system were explained, most of the herders were in favour of such a scheme. Branding could be administered locally at minimal cost, and regional cattle-brands could be publicly advertised through posters. A version of a tagging system is used in the Ganye area at Sallah time, when the number of sheep in the town increases. Some owners stain the sheep's wool in bright colours, in order to signify their ownership.

b) Grazing Reserves.

Grazing reserves have been established in name throughout much of southern Gongola State. Despite the demarcation of these areas, few herd-owners seemed to understand clearly the conception or potential advantages of such reserves. None of the stock-owners interviewed asked spontaneously about their establishment. This is not because graziers are not pressed for land; both on Mambila and in the Benue valley, there is a strong desire for an inalienable territory. But unless grazing reserves are established with considerable infrastructure, such as year-round water, disease control systems and supplementary feed supplies, herdsmen will not treat them as an exclusive area, but only as convenient refuges for certain times of the year.

Opinion was divided on whether agriculture should be allowed in grazing reserves. In those areas where most FulBe were transhumant and farmed as part of their household economy, agriculture was approved, while among FulBe na'i without farms, such as those interviewed in Mararaba and Bibinu, it was thought that it should be prohibited.

A method for the allocation of collective responsibility on reserved land has not yet been systematically worked out. Dams put in by the government are not generally maintained by the local community, even when it is in their interest to do so. This is because they perceive such maintenance as a government responsibility. If an outside agency were to put in dams and ramps in a Reserve without demanding financial involvement from the FulBe, then it seems likely that they would suffer similar neglect.

Another difficulty raised by herdsmen was the control of access. A Grazing Reserve with a restricted infrastructure is only valuable to local stock-owners if only a limited number use it during a given period. For example, the spraying of an area against tsetse fly rapidly becomes widely known to the nomadic community, and soon attracts excessive numbers of cattle. Similarly, the presence of a dam with uncontrolled access could lead to rapid pasture degradation and erosion. A necessary preliminary to the establishment of a Grazing Reserve would have to be the clear assignation of rights to a restricted number of individuals, and the promotion of practical measures to ensure the protection of those rights.

It should be mentioned that where the local farming population was aware of the significance and purpose of grazing reserves, it was almost united in opposition to them, as it poses a threat to their expansion on to new land. The establishment of reserves should thus be planned in consultation with local agricultural populations otherwise they will meet with local opposition. Many sites, such as the 'Suntai triangle', presently used by the FulBe are not favoured by farmers and would therefore be suitable as gazetted refuges.

c) Certificates of Occupancy

In Gongola State, two types of Certificate of Occupancy (C of O) are available. One type, issued by Local Government, is of uncertain legal validity. Such certificates were traditionally issued by means of a long and elaborate process of consultation with elders and local officials, and resulted in the right to fence off a piece of land that could later be sold. More recently, Local Governments are reported to be issuing these certificates without going through the process of consultation; in the process, they sometimes abrogate their own previously-issued certificates. On Mambila, where pressure on land is high, such certificates have recently been issued for traditionally 'owned' land. Needless to say, the graziers who had previous rights on such land are extremely bitter.

The second type of C of O is that issued by the State Government, after the passage of an act in the State House of Assembly. This is a long and complex process and was regarded by most stock-rearers as a luxury that only the rich could afford. Only a few stock-owners have such C of O's and they were indeed notably wealthy.

If the process for obtaining a C of O at either State or Local Government level could be made simpler, cheaper and more equitable then this would improve the situation for transhumant pastoralists throughout the Toungo Block. The recent practice of abrogating such locally-issued C of O's has acted to undermine confidence in the system, and some means should be found to reassure pastoralists who undertake to obtain them of their long-term validity.

This suggests that a livestock agency could perform a useful role in establishing guidelines and a formal procedure for the obtaining of C of Os. In regions where GRazing Reserves are not establishment of pastoral enclaves in a region that will increasingly be dominated by arable farming.

In the meantime, however, in view of the framing of Nigerian law, a practical step would be to encourage herders to lay claims to their grazing land by the planting of economic trees. This would give them a case against anyone who occupied their land while they were away on transhumance. It might also encourage them to establish more permanent residences. If this were combined with self-help schemes to put in dams and feeder roads, the goal of settling nomads might thereby be partly

achieved.

d) Salt and Potash

In parts of the Toungo Block where salt was not available naturally, potash and salt used to be imported by caravans from the sources in Bornu. Mambila is the largest area that is lacking in salt. In colonial times the authorities began to provide **kombowal**, troughs containing salt for the use of herd-owners. This continued until recently, but has now ceased. Herd-owners complained about this, as they perceive it is the responsibility of government to provide such materials. Therefore, a livestock agency or private institution should consider making salt and potash available all-year-round on the Mambila Plateau, in view of its limited accessibility, and reported demand.

e) Dry-Season Fodder

The provision of fodder in the dry season has two functions; to prevent major weight loss and consequent animal deaths, and to avoid the necessity for transhumance. ILCA studies have moreover shown (Bayer, in press) that if given to pregnant and suckling calves it can improve calf survival. Although Hausa farmers elsewhere in Nigeria regularly prepare fodder for sheep and goats from crop residues, apart from the Samba, stock-rearers in the Toungo Block rejected it as an alien concept. FulBe associate the provision of such fodder with the low status of agricultural labour. To prepare sufficient fodder for the large herds that presently migrate would be a lengthy task, without any guarantee that the resultant decreased stock losses would compensate for the labour. Only when the risks are high, as they are on Mambila, where pressure on grazing resources is intense, would herd-owners consider this possibility.

At present there has been little research and no successful development of dry-season forage crops such as Stylosanthes on the Plateau. In view of the difficult situation for graziers, an innovation of this type would probably meet with a more enthusiastic reception from them although arable farmers might initially oppose it.

TABLE 20. PROBLEMS OF CATTLE-PRODUCTION EXPERIENCED BY STOCK-OWNERS

UNWEIGHTED RESULTS

TOPIC	LOWLANDS	GANYE	MAMBILA	TOTAL
1. Rinderpest	414(1)	121(1)	208(1)	1343(1)
2. Tsetse	350(2)	97(2)	71(9)	518(3)
3. Other Disease	297(3)	77(3)	170(2)	544(2)
4. Land Tenure	180(5)	5(10)	116(3)	301(4)
5. Farmer/Grazier	213(5)	27(6)	98(4)	238(5)
6. Water Access	41(6)	-	29(9)	70(9)
7. Pasture Degradation	-	-	53(8)	53(12)
8. Theft	-	5(11)	82(5)	87(8)
9. Bush Fires	33(9)	27(9)	8(12)	68(10)
10. Access Roads	12(10)	6(9)	5(13)	23(13)
11. Credit	20(8)	63(4)	19(10)	102(6)
12. Salt	-	-	10(11)	10(14)
13. Water Shortage	15(9)	44(5)	-	59(11)
14. Dry Season Fodder	-	23(8)	76(6)	99(7)

TABLE 21. RANKED PROBLEMS OF CATTLE-PRODUCTION EXPERIENCED BY STOCK-OWNERS

WEIGHTED RESULTS

TOPIC	LOWLANDS	GANYE	MAMBILA	TOTAL
1. Rinderpest	14949(1)	4466(1)	7159(1)	26574(1)
2. Tsetse	13078(2)	3993(2)	1300(8)	18371(3)
3. Other Disease	11377(3)	3079(3)	6008(2)	20464(2)
4. Land Tenure	6163(5)	175(11)	4355(3)	10693(5)
5. Farmer/Grazier	8974(4)	1200(7)	2487(6)	12661(4)
6. Water Access	1861(6)	-	828(9)	2689(10)
7. Pasture Degradation	-	-	3136(4)	3136(8)
8. Theft	-	400(9)	2811(5)	3211(7)
9. Bush Fires	1507(7)	881(8)	245(12)	2633(11)
10. Access Roads	6(10)	300(10)	75(13)	381(13)
11. Credit	356(8)	2156(4)	450(10)	2962(9)
12. Salt	-	-	330(11)	330(14)
13. Water Shortage	8(9)	1460(5)	-	1468(12)
14. Dry Season Fodder	-	1210(6)	2004(7)	3214(6)

TABLE 22. NUMBERS OF PROBLEMS RAISED BY CATTLE-OWNERS

SORTED BY LOCATION AND PRODUCER TYPE

Average Number of Problems Raised

Towns	Rural Interview Sites	
7.4	4.8	
FulBe na'i	FulBe Wuro	Other
4.46	6.27	5.55

TABLE 23. LIVESTOCK DEVELOPMENT PROBLEMS SORTED BY TYPE OF PRODUCER

UNWEIGHTED RESULTS

TOPIC	FN	AP(=FW)	MF	TOTAL
1.Rinderpest	457(1)	307(1)	99(1)	1
2.Tsetse	390(2)	197(3)	40(5)	3
3.Disease (other)	359(3)	223(2)	80(2)	2
4.Land Tenure	133(5)	108(5)	46(4)	5
5.Farmer/Grazier	219(4)	123(4)	50(3)	4
6.Water Access	36(7)	45(9)	27(6)	7
7.Pasture Degradation	-	40(11)	6(11)	12
8. Theft	19(10)	69(7)	17(8)	6
9. Bush Fires	42(6)	44(10)	10(9)	10
10. Access Roads	6(12)	11(12)	8(10)	13
11. Credit	29(8)	52(8)	25(7)	9
12. Salt	-	6(13)	5(12)	14
13. Water Shortage	22(9)	44(10)	-	11
14. Dry Season	7(11)	82(6)	25(7)	7

NOTES ON DEVELOPMENT INPUTS PROPOSED BY PASTORALISTS

When pastoralists had responded to questions on their development problems, they were asked what solutions could remedy the situation. These solutions are recorded in Table 24 as proposed, and the discussion following examines their practicality. The solutions cluster around seven topics, and these are explained below briefly:

Veterinary

1. **Drugs.** The government should make effective veterinary medicines of all kinds freely available.

2. **Veterinary Practice.** The government should license private veterinary practice and the private sale of pharmaceuticals through registered outlets.

3. **Tsetse Spraying.** The FDPCS should survey (and spray) extensively throughout the Toungo Block.

Land

4. **Land Tenure.** A commission or consultative body should be set up to regularise land tenure and give inalienable title to both pastoralists and farmers.

5. **Grazing Refuges.** The grazing reserves that have been promised, set up by local government or actually gazetted should be permanently established and a means of enforcing the boundaries should be found. Grazing refuges open to all cattle-owners, and not available to farmers, but without infrastructure should be set up.

6. **Arbitration.** A mechanism to regularise relations between farmers and graziers should be set up and some form of consistent arbitration should be found. Setting fire to the bush should be controlled through the courts.

Water

7. **Dams.** The government should put in dams to store water in the dry season.

8. **Water Access.** Access to selected drinking-points for cattle should be enforced by government, and farmers should be prevented from encroaching.

Credit

9. **Herd Rebuilding.** Government should make credit available for herd rebuilding after rinderpest, and loans should be directed towards buying calves and raising them to mature weights.

10. **Insurance.** Livestock credit agencies should provide some form of insurance against the death of stock bought with loans.

11. **Equal Credit.** Credit should be administered directly from the agency to the livestock-owner and not through the intermediate step of local government. Credit should preferentially go to owners of smaller herds.

Diet

12. **Dry-Season Fodder.** Government should deal with pasture degradation scientifically and/or make dry-season fodder available at preferential rates.

13. **Salt.** Government should make salt or potash available at subsidised rates.

Theft

14. **Theft.** Livestock-thieves should be vigorously pursued and punished. The Nigerian government should make an agreement with the Cameroun government to send back thieves who drive stolen animals across the border.

Access

15. **Access Roads.** Access roads should be built to open up remote areas, to ease the cattle trade and services that foster it, such as the veterinary service.

TABLE 24. INPUTS PROPOSED BY PASTORALISTS

INPUT	LOWLANDS	GANYE	MAMBILA	TOTAL
1. Drugs	13512(1)	4936(1)	6369(1)	24817(1)
2. Private Veterinary Service	4630(5)	-	1811(7)	6411(6)
3. Tsetse Spraying	11252(2)	3518(2)	3288(3)	18058(2)
4. Land Tenure	3803(6)	-	2973(4)	6776(5)
5. Grazing Refuges	6547(3)	2750(3)	-	9297(4)
6. Arbitration	6349(4)	385(8)	2888(5)	9622(3)
7. Dams	1197(7)	2539(4)	1610(8)	5346(7)
8. Water Access	841(8)	249(10)	-	1090(12)
9. Herd Rebuilding	675(9)	1964(5)	420(11)	2959(9)
10. Insurance	-	192(11)	-	192(15)
11. Equal Credit	60(10)	674(6)	814(9)	1548(11)
12. Dry Season Fodder	-	560(7)	3325(2)	3885(8)
13. Salt	-	-	585(10)	585(13)
14. Theft	-	125(12)	2163(6)	2288(10)
15. Access Roads	-	250(9)	-	250(14)

TABLE 25.

ATTITUDES OF ARABLE FARMERS TO PASTORALISTS

Location	Sample Size	Attitude	Benefits				
			Milk	Meat	Manure	Cereals Market	Stock Improvement
1. Bakin Dutse	15	+	3	2	1		
2. Daka	8	+	4	3	2	1	5
3. Diyangwo	6	+	2		1		
4. Garbabi	10	+	3	2		1	
5. Garin Baki	5	-					1
6. Gidan Garba	5	-					
7. Gungunbode	10	+	3	2		1	
8. Jamtari	7	+	3	2		1	
9. Karamti	10	+	4	3	1	2	
10.Kila G. Dere	8	+	2	3		4	1
11.Kungana	17	-					
12.Mala	7	+	3	2	1		
13.Serti	11	+	3	2	1		
14.Suntai	12	-					
15.Tissa	7	+	3	2	1		

+ or - Represents positive or negative attitudes.

Benefits of association or presence of pastoralists are ranked numerically from 5-1.

SECTION VI

POTENTIAL DEVELOPMENT OPTIONS FOR SOUTHERN GONGOLA STATE

6.1 Introduction.

Given the stated aim of the Federal Government to increase the availability of locally produced meat on the national market, there are essentially two means by which this may be achieved: increase the amount of usable grazing land and so increase the livestock population from which animals can be culled; influence husbandry and production systems so as to raise levels of offtake from the existing herd and rangeland. [1] It is towards both these aims that the following options are directed:- through the conservation and extension of existing pasture; through the reduction of conflicts of interest between the pastoral and other sectors of the economy, thereby indirectly improving the efficiency of cattle production; and through more direct incentives to change herd structures and thereby encourage greater offtake.

The development options considered are divided into two broad categories - existing and novel. Existing options are derived either from those currently in use within the region, or from discussions with NLPU staff of draft proposals for the Second Livestock Development Plan (NLPU, 1984). The novel options suggested stem from interviews with livestock owners who were asked to rank the major problems affecting animal production within the survey zone (Tables 20-24). This allows the pastoralists themselves to make a substantial contribution to the identification of development priorities. These novel options therefore represent additional development strategies which address the perceived constraints on livestock production within southern Gongola State.

In view of the financial constraints livestock development can be expected to operate under, economic analyses of these development options are treated in two ways; in terms of a pilot project to test and evaluate the novel options proposed; and assuming that finance will only be available to extend certain NLPU models into new regions.

The reactions of pastoralists to existing and proposed options also provides a basis to assess the extent to which stockowners might be prepared to involve themselves in SLDP models, as well as to provide recommendations for their application to the specific situation of southern Gongola State.

In addition, proposals are put forward for co-operation and infrastructural support for Federal and State departments concerned with livestock, in order to facilitate the execution of livestock

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[1] It is assumed that other possibilities, such as importing more meat from outside or preferentially encouraging poultry may be discounted as realistic or desirable alternatives.

development proposals.

It must be stressed that the development strategies considered in this section are tailored specifically for southern Gongola State and may not be relevant to other parts of Nigeria. This is because several aspects of pastoral production within the survey zone are unusual, if not unique to it:- the comparatively low density of arable farming populations that permits a high density of nomadic pastoralists with a large average herd size: a free availability of water and dry season pasture not characteristic of much of the conventionally identified pastoral zone; lastly, a numerous cattle population in a region with a reportedly high level of tsetse challenge.

It must also be emphasised that these options are put forward to address the perceived and inferred constraints acting on livestock production within the survey zone. They represent an ideal solution, unmodified by economic practicality. Section VII presents models that it would be possible to implement on a trial basis assuming more modest levels of finance.

This section describes a range of relevant development options and provides quantified assessments for the regions within the survey zone where each option is most appropriate. Many of the parameters, measured during the aerial survey, or abstracted from published maps, are directly relevant to the development options identified on the ground. As values for these parameters are available for all the sampling grids, sets of selection criteria were defined for the development options discussed and these then applied to each individual grid. Those squares which satisfied all the criteria were taken to be priority or 'core' areas and should be regarded as nuclei for the siting and establishment of specific development options, and where appropriate their location on an accompanying map.

Not all the options considered below could be sited in this way, as some depend more on social or economic factors than environmental, demographic or geographical ones. It was therefore not possible to quantify selection criteria for each grid in such a way as to create meaningful distributions. One such example is credit schemes, as the availability of appropriate recipients of loans and funds is constrained by social and economic factors that cannot be measured satisfactorily from the air.

The qualifying criteria for each development strategy treated in this way are shown in Table 26. The numerical values are discussed in the relevant context below. The survey grids which qualified as suitable according to criteria derived from aerial survey are then evaluated in the light of additional information gleaned from the literature and from groundwork.

The implications of the ground survey results have been summarised in terms of the regional relevance of each possible strategy (Table 27).

The relevance of each option for both the Development Regions and the Cattle Systems can be assessed from the pastoralists' expressed needs, modified by information from other sources such as environmental data and interviews with government officials. The values assigned in Table 27 are ranked on a scale from zero to three: the higher the score, the higher the relevance. It will be immediately apparent that access affects the relevance of many development options: markets, banking, loans and reserves are seen as virtually irrelevant to Systems III, IV and V (the high-altitude grasslands excluding Mambila) simply because their isolation and low populations could never make these cost-effective to administer. By contrast, central Systems such as VI and VII - Wase-Jalingo and Suntai - have high relevance scores for the majority of options.

To illustrate this type of modification, Table 27 should be compared to Tables 20-23 showing livestock development problems experienced by pastoralists. For example, Tables 20 and 21 indicate that theft is a major for stock-owners in some regions. However, because livestock agencies have few effective means of combatting this problem, Table 27 does not reflect this aspect of the pastoralists' concerns. As a contrastive example, stockowners did not request the Small Ruminant Seasonal Loans; this option has been put forward on the basis of the information they provided on fluctuations in stock prices.

In many parts of the pastoral zone of West Africa cattle-owners' capital base is so precarious (Swift, 1984:352 ff.) that to demand substantial financial participation in infrastructure development would be self-defeating. This is not generally the case in the Toungo Block, and although pastoralists would clearly prefer the government to bear the entire cost of development inputs, they raised no objection to commitments of several thousand Naira, if a local project were demonstrably to their advantage. Indeed the large cash sums some were able to raise in order to obtain illicit rinderpest vaccines demonstrates their considerable disposable income.

6.2 Existing Options.

6.2.1 Grazing Reserves

6.2.1.1 Model Grazing Reserves

Two types of grazing reserve are considered: Model Grazing Reserves (Type I) and Grazing Refuges (Type II).

The revised model for grazing reserves, as described in the available proposals (SLDP, Annex 12 p.7), envisages 6-10 settled pastoralist family groups with access to a central water point - either a dam or a borehole. Additional water may be piped from the source to fenced areas suitable for fodder banks. The total leaseholding allocated would be 150-200 hectares including 4 hectares of fodder banks cleared and kept irrigated by the pastoralist. Improved conception rates and decreased calf mortality would permit a higher offtake from herds and allow for the repayment of the loan used to cover the initial costs of establishment.

The fodder banks are used to keep the lactating females adequately fed during the dry season, while additional nearby pasture is used for the other stock. The total herd is envisaged as at least 35 A.U. , with the 'dry' herd sent on transhumance as necessary. At present, six grazing reserves of this type are planned for the Northern States. Two grazing reserves based on this model are also envisaged for the sub-humid zone, but their exact location remains to be decided.

The grid selection criteria for Model Grazing Reserves (Table 26) reflect the need for a relatively low initial cattle density, in order to avoid potential competition between pastoralists and farmers and to reduce the risk of overburdening the resources provided. However, the presence of some cattle and a few pastoralists, particularly those who already raise crops, would suggest that the area was both suited to cultivation and also favoured, to some extent, by the stockowners. A prerequisite of the scheme is that competition from arable farmers for land should be slight and hence potential sites should support little cultivation. However, there should be a significant amount of grassland within the grid, so as to reduce the amount of bush clearance necessary to grow crops. Access to roads should be reasonable in view of the scale of initial inputs and the need for monitoring and assessment, as well as accessibility to markets. With respect to topography and vegetation, the prospective sites for grazing reserves of this type should obviously be suited to cattle, with relatively low vegetation density and little rugged land. Moreover, it should not form part of any previously reserved zones.

Only two grids conform to these fairly strict conditions, largely because very few pastoralists were found during the dry season near roads and in areas with a significant proportion of grassland. If the need for open grassland is removed and the qualifying cattle density widened to 10 - 30/per square kilometre, then eight grids (i.e. a total of 200 square kilometers) are defined as suitable for this type of grazing reserve (Overlay D). Five are in the Benue Lowlands: along the River Donga near Bantaji, Tsokundi and to the south west of Donga; and near the River Taraba to the south of Takalafiya. The remaining three are on the Mambila plateau, clustered to the north west of Nguroje, which though otherwise suitable, would be problematic on sociological grounds - a grazing reserve of any sort on the Plateau would tend to exacerbate farmer/grazier conflict (cf.Section 4.4.4).

The structure of the Model Grazing Reserve is particularly suited to more arid regions where availability of dry season pasture and water constitute major constraints on livestock production. In view of the situation within the Toungo Block, it is likely that the extensive inputs involved in these schemes could be considerably reduced without markedly reducing the effectiveness of the grazing reserve concept within southern Gongola.

6.2.1.2 Type II -Grazing Refuges

A Reserve, initially without these facilities, which gave pastoralists secure land tenure on their dry season grazing areas, would be very well received by the cattle owners (Table 24). Such established refugia would both act to preserve existing grazing land from any future expansion of cultivation and would also attract FulBe, especially if they coincided with those preferred by the FulBe themselves (See Overlay D). In view of the comparatively low initial inputs necessary for such Type II Grazing Refuges - primarily, gazetting and boundary delineation - the areas of grazing land involved could be relatively large. The initial negotiations with pastoralists and arable farmers could be put in the hands of the proposed Landuse Planning Section (NLPU, 1984).

In the longer term, once established and occupied, such Grazing Refuges could be enhanced by, for example, building dams to improve access to water (see below) or by spraying against tsetse if required. **Such infrastructural improvements should, however, only be embarked upon following significant economic commitment by the users of the Refuge.** The eventual goal would be to encourage pastoralists, who initially only made use of the Refuge seasonally, to settle there throughout the year.

When pastoralists were asked to state the conditions that would encourage year-round settlement, their principal request was effective tsetse spraying, followed by secure land tenure and access to markets (Section 5.5). Therefore, if such grazing reserves were established and occupied then regular tsetse surveys should be carried out and control operations mounted as required. If tsetse monitoring units were attached to or responsible for specific Grazing Refuges, progress could then be systematically evaluated. One of the tested methods for decreasing the incidence of tsetse infestation is planned bush clearance. This is something pastoralists have stated they are not willing to perform manually on a large scale. If heavy plant were available to clear bush, then pastoralists intending to obtain land tenure in a reserve could be required to make a contribution towards the costs, either through a loan from the livestock agency or from the sale of stock.

The criteria applicable to the initial siting of such Grazing Refuges can be less strict than those for the Model Grazing Reserves described above (Table 26). Any localities already used by pastoralists or their cattle with a low level of competition for land resources (particularly arable cultivation or conservation) are most likely to be acceptable to cattle owners. Environmental features such as thick vegetation cover, steep slopes or severe erosion would lead to the elimination of a number of sites.

Despite the comparative laxity of these criteria, only eleven grids qualify as suitable. This rises to a total of 21 (525 per square kilometre) if the pastoralist density criterion is enlarged to >1/per square kilometre and rises further to 55 grids (1375 per square kilometre or 3.1% of the total survey zone) if the necessity for

resident pastoralists is removed altogether. This last level of selection identifies three clusters of squares:- a dense group of nine to the north of Nguroje, along the edge of the Mambila plateau, which should be immediately disqualified on the grounds of the existing potential for conflict between arable farmer and pastoralist (see Section 4.4.4); a second dense group of 29 grids along the Benue River and north of the tar road between Bantaji and Mutum Biyu; and, in the middle of the Benue Lowland Region, a more diffuse group of 11 grids (275 per square kilometre) in the area between Takalafiya, Nanguru and Mayo Kam. There are also outlying grids defined as suitable for Grazing Refuges near Suntai, on the River Bantaji and to the east of Toungo, in the Ganye Region.

In addition to these regions there are a number of 'de facto' Grazing Reserves, i.e. regions where there are few arable farmers and good pasture. Most important of these is the large area between the Fan Manga and the Donga on the Benue flood-plain. Because of the seasonal flooding, this region has lush pasture, but is not used for year-round settlement by arable groups.

The locations of grazing reserves requested by the pastoralists themselves were in the Lowland Region along a wide band either side of the new Wukari-Jalingo road and in the lowlands of the Ganye Region (Overlay D). These correspond fairly closely, if not precisely, to two of the areas defined by the grid selection process. Obviously, grids selected by this means must then be screened by further discussion with the pastoralists. FulBe criteria for selection or rejection of pasture may not precisely reflect a balance of ecological parameters and is certainly not always sensitive to the existing uses to which the land is put. The factors that underly this rejection can only be elicited with further localised groundwork.

Potential Grazing Refuges should also have an acceptably low tsetse challenge in the dry season, so that pastoralists would be encouraged to stay initially for at least part of the year. With increasing density of settlement the incidence of trypanosomiasis is likely to decline as a result of habitat modification and reduced tsetse populations (Putt et al. 1980 & Bourn, 1983). Thus the costs of moving the cattle for the entire wet season will gradually increase. If this is combined with the potential for investment in infrastructural improvements the result will be a considerable incentive towards year-round settlement and improved husbandry techniques. If, however, Grazing Refuges are defined as exclusively dry season grazing, then the significance of trypanomiasis as a possible siting criterion is reduced considerably.

An important additional consideration must be taken into account when siting possible grazing reserves of all types. A number of areas have already been officially allocated for this purpose, although none of those within the boundary of the Toungo Block have been officially gazetted. Overlay D shows their locations and these should be compared with the suggestions made by pastoralists for sites within the Toungo

TABLE 26. GRID SELECTION CRITERIA* FOR SITING THE OPTIONS.

VARIABLES	DEVELOPMENT OPTION				
	Grazing Reserve		Land	Crop	Range
	Model(I)	Refuge(II)	Tenure	Residues	Mgmt
Aerial survey data:					
Dry Cattle/sq km	15-30	30+	50+	40+	40+
Dry Past dwel/km	2-4	3+			
Arable dwell/km		0-1	0-12	4-10	0-12
% Cultivation	1-15	0-5	0-40	0-40	0-20
% Forest	0-10	0-10	0-20	0-20	0-20
% Woodland	0-50	0-50	0-70	0-60	0-30
% Grassland	30+				10+
Sheet Erosion Score	0-2	0-1		2-5	2-5
Gully Erosion Score	0-2	0-1			2-5
From Maps					
Game Reserve	N	N	N	N	N
Forest Reserve	N	N	N	N	N
Dissected land	N	N	N	N	N
Dist Roads (km)	0-15				0-15
Dist Towns (km)	1+	1+	1+	1+	1+

* Blanks indicate that the variables were not used in the selection process.

Core grids isolated but not discussed in the text.

Crop Residues. The values used for this option excluded all grids within the survey zone. By removing both the need for a resident arable farmer population 28 grids were selected, all on the Mambila plateau.

Land Tenure. 93 core grids were identified by the criteria shown in the relevant column above, divisible into three general groups: throughout the Benue Lowland Region, particularly around Gassol, Mutum Biyu and Takalafiya; in the northern part of the Mambila plateau; and to the east of Toungo in the Ganye Lowlands. These areas coincide with those where pastoralists were found to be particularly concerned with the issue of land rights.

TABLE 27. RELEVANCE SCORES* OF POSSIBLE DEVELOPMENT OPTIONS BY CATTLE SYSTEM.

CATTLE SYSTEM**	I	III	II	IV	V	VIII XII	VI	VII	IX	X	XI
Devel Region***	GL	GL	SU	SU	SU	BL/SU	BL	BL	BL	BL	OS
Grazing reserve	2	0	0	0	0	1	3	3	1	3	1
Crop Residue	3	2	3	0	0	2	1	1	1	1	1
Range Mgmt	0	0	3	0	0	0	0	0	0	2	0
Mixed Farmer	0	0	0	0	0	0	0	0	0	0	0
Credit											
Sheep	3	3	3	0	0	2	2	1	1	2	2
Goats	1	0	0	0	0	2	2	3	3	2	1
S R S L@	0	0	0	0	0	3	2	2	2	2	1
Pig	0	0	0	0	0	0	2	3	3	3	3
Muturu	0	0	0	0	0	2	2	3	3	3	3
Zebu	3	3	3	0	0	2	2	2	1	2	2
Land Tenure	1	0	3	0	0	1	2	2	2	2	1
Tsetse Control	2	2	0	?	?	1	3	3	1	3	1
Bush Clearance	1	0	0	0	0	3	2	2	1	1	2
Info/Advice	3	2	3	1	1	2	3	3	3	3	3
Vet assistance	3	3	3	3	2	3	3	3	3	3	3
Banking	1	0	3	0	0	3	3	3	2	2	2
Markets	1	0	1	0	0	2	3	3	3	3	3
Roads	2	NA	3	NA	NA	2	2	2	1	1	2
Truck Loans	3	0	2	0	0	2	2	2	2	2	2
Water Access	1	0	2	0	0	2	3	3	2	3	2
Animal traction	3	0	1	0	0	2	2	2	2	2	2
Fencing	0	0	3	0	0	0	1	2	0	2	0

* Relevance score are ranked, 3 indicating highest relevance. NA implies not applicable.

** Cattle systems as defined in text. I = Ganye, II = Mambila, III = Shebshi, IV = Fali, V = Falinga, VI = Wase-Jalingo, VII = Suntai, VIII/XII= Kam/Serti, IX = Takum, X = Wukari, XI = Shendam. See also Overlay C.

*** Development Regions as defined in text. GL = Ganye Lowlands, SU = Southern Uplands, BL = Benue Lowlands, OS = Outside survey zone.

@ S R S L = Small Ruminant Seasonal Loan.

Block. Obviously, many pastoralists who herd in cattle systems that are only partly within the survey area suggested locations outside the Block proper, although within southern Gongola state.

There are some additional development possibilities which could be incorporated into any type of Grazing Reserve that are relevant only to restricted locales in the survey zone. The two most important are to promote the preparation of dry season fodder from crop residues and to encourage range management.

Fodder made from crop residues and cut grass is already made by some of the arable farming peoples in the northeastern corner of the Toungo Block (Section 4.3.3.1). There is a demand for such fodder in the northern Benue Lowlands south of Jalingo, especially from settled or transhumant pastoralists. The techniques developed by the Samba could well be adapted and extended to ecologically similar zones elsewhere in the Block - both inside and outside established grazing refuges.

Two arguments could be used to encourage pastoralists to adopt some form of pasture management - that improved nutrition reduces cattle mortality and that the weight and dairy production of well-fed cattle will increase. The only part of the Toungo Block where these arguments might have some force is on the Mambila Plateau, where pasture is undoubtedly in short supply (Section 5.2.2.1), of poor quality and heavily eroded, and where significant numbers of cattle are reported to die of malnutrition and diseases aggravated by starvation (Tables 17 & 18). In the lowlands, grazing land is more freely available (see Section III) and the labour costs of providing and pastoralists claimed that maintaining specific areas of improved pasture for the large herds would exceed those of simply moving the cattle to new pasture.

On the Mambila Plateau, herds are also comparatively large (Section IV) and the preferred solution of the pastoralists is to spray the adjacent lowlands so that cattle could be taken there safely. The majority of large herds descend the escarpment in the dry season despite the present risk of trypanosomiasis. The case for improving pasture quality on the Plateau is therefore strong. However, in view of the shortage of land and competition from the expanding population of arable farmers, enclosing the plots necessary for Stylosanthes or other fodder plants would excite considerable opposition from the farming population. To succeed, therefore, rangeland improvement would have to go hand in hand with a considerable degree of skilled arbitration.

The grid selection criteria used to locate areas in which range management is likely to be a priority were relatively strict (Table 26). The primary qualifiers are likely to be significant sheet erosion and high cattle density, leading to rapid range degradation. In addition, high arable farmer populations or intense cultivation could prejudice the success of any range improvement schemes through competition for land. Three further factors are included - the availability of some grassland; ecological suitability for cattle (low vegetation density,

little topographic dissection, non-reserved status); and moderately easy access to permit the degree of management needed to run such schemes. These criteria select 16 grids, all on the Mambila Plateau, and fairly close to Gembu (Overlay E).

6.2.2 Smallholder Credit

Present smallholder credit schemes promote the fattening of cattle and sheep. Rinderpest has made the survival of fattened cattle a matter of doubt and potential loanees expressed anxiety over the possible death of stock purchased with these loans. An insurance scheme integrated with the loan would do much to alleviate this problem. However, given the low credit levels involved, monitoring such a scheme to reduce fraud might be prohibitively costly and could only work if loanees would be prepared to obtain vaccination certificates and death certificates from veterinary officers.

The considerable social, economic and ecological variation in the Toungo Block suggests that no single type of credit scheme can be expected to work everywhere. A set of six options has been devised, based partly on the existing NLPU fattening schemes that have been tested elsewhere and partly on the potential of specific conditions obtaining within the survey zone. These are:

a) **Sheep.** Loans are presently based on the variation in prices between Sallah and other times of the year (Sections 2.6.4 and 4.3.5.2). Such loans are obviously most appropriate where the Muslim element in the population is the greatest. This would include all towns and trade centres, the Mambila Plateau, the whole of the Ganye DR and the northern and central regions of the Benue Lowlands.

b) **Goat.** A fattening loan similar to the sheep loan could be established in the south of the Toungo Block to take advantage of the rise in prices of goats at Christmas time (Sections 2.6.4 and 4.5.5.2). These loans would be successful wherever there is a substantial Christian population and a high goat population. This would include the southern part of Ganye and those parts of the Benue lowlands with Tiv and Mumuye populations (Map 3).

c) **Small Ruminant Seasonal Loan (SRSL).** Wherever the FulBe are only present for certain months of the year, there is a considerable fluctuation in the price of small livestock according to the amount of beef that is available for slaughtering (Section 2.6.2.4). A loan structured to allow an arable farmer to buy ruminants when they are cheapest and resell fattened animals in six months could be devised to take advantage of this situation. Such loans would be most appropriate in places where the tsetse challenge is presently too high to permit all-year round settlement, for example the entire lowlands between Mayo Kam, Mararaba and Serti.

d) **Pig.** The locations of pig-breeding in the Toungo Block are very

specific (see Map 4 and Section 2.5.5) and prices are not usually subject to the same sorts of seasonal fluctuation as other ruminants. Loans to arable farmers should therefore be directed at assisting them to begin pig-breeding with improved breeds, fencing materials and possible supplementary feeds. The Islamic prohibition on pigs will prevent the operation of such schemes in many places. However, as the Tiv, Mumuye and Jukun populations (Map 3) who live in the Benue Lowlands already breed pigs, credit should be directed towards expansion and improved techniques of management.

e) Trypanotolerant Cattle. The numbers of Muturu cattle in the Toungo Block are at present very low compared with humped cattle. However, the proportion increases among the Tiv living to the southwest of the Block and among the Mumuye living near Zing and Jalingo. Markets in these regions could be focused on as potential sources of supply to loanees wanting to buy Muturu. Before setting up a scheme, the implementing agency would have to establish that a regular supply of animals would be available. Muturu should be the preferred breed for loans to arable farmers in the south of the Block because their trypanotolerance would allow them to be kept safely all year round in one place.

Alternatively, the Eastern Ndama breeder proposed as Model 10 of the LPU Second Phase preparation (NLPU, 1984), initially designed for the Southern States could be adapted for the lowland regions of the Toungo Block. Such an extension would depend upon the trial exposure of Ndama cattle to the local trypanosomiasis strains prevalent in the southern parts of the Toungo Block.

f) Zebu Cattle. Loans for Zebu are the established NLPU smallholder fattening scheme and are being operated in several regions of Southern Gongola. Interviews with both pastoralists and arable farmers throughout the Toungo Block confirmed that these loans are in considerable demand. They can be expanded therefore to the limits of the infrastructure available to administer them.

No attempt has been made to site these various credit options using aerial survey data, as the majority can usually be operated independently of livestock density. In the remote areas, or where there is a low stocking rate, the costs of administering the scheme may outweigh the potential benefits. It is, however, possible to identify some areas where goats and sheep were found at relatively high densities (see Table 8 and Maps 13-15), which are likely to be particularly receptive to credit schemes designed to promote their production. These are, for goats, the Ganye and Wukari (near Bantaji) Cattle systems and the southern Mambila Plateau, around Mbamnga; and for sheep, the Wase-Jalingo and Wukari Cattle System, near Sabon Gida and Bantaji, and the northern part of the Mambila Plateau near Nguroje.

The estimated relevance of these credit options to the specific Development Regions and Cattle Systems are set out in Table 27. As a

general rule, credit schemes involving goats, pigs and Muturu cattle are deemed to be most important in the Benue Lowlands DR, while those involving sheep and Zebu cattle are most appropriate to the upland systems of Mambila and Shebshi and in the lowland areas surrounding Ganye.

The schemes outlined above for the fattening and resale of small ruminants are designed to encourage arable farmers to put increased quantities of stock on the market. Another layer of this strategy should be advice on veterinary problems, with improved supplies of drugs made the priority. Although a low level of credit and a relatively high level of technical supervision would be acquired in the initial stages, the long term consequence would be the evolution of more effective small ruminant stock-rearing practices. The supplementary feed and the more effective use of fodder derived from crop residues could be introduced once farmers had acquired a more solid capital base. This could be linked with effective extensions of the banking and marketing systems (see Section 6.3.5.1).

6.2.3 Mixed Farmer

This model involves loans to mixed farmers with substantial arable production and a initial herd of 10-12 cattle. The construction of fodder banks etc., in this context, would increase milk production and permit a higher annual offtake. The scheme is intended primarily for arable farmers who have only recently begun, or wish to begin cattle-rearing.

While the mean number of animals claimed by herdowners within the survey zone was found to be in the region of two hundred, this conceals a very wide range (Figure VII). Preliminary analyses suggest that 5.6% of the cattle owners interviewed claimed to own fewer than 20 cattle and would thus qualify to participate in the mixed farmer scheme as currently envisaged.

Unless they are purely interested in fattening animals for resale, stockowners throughout the Toungo Block aim to build a viable herd of 60+ animals (Section 2.4.3.1). A herd of this size is considered to be self-sustaining while allowing for the sale of enough animals to provide for family grain requirements. The gradual decline of the traditional economy based on sales of milk, due to its fall in price relative to grain (Section IV), has meant that this goal is more in prominence today than formerly. The low price of dairy products in the Toungo Block relative to elsehwere in the Nigerian Belt is a reflection of their restricted market. To increase supplies of milk to the market would be unlikely to increase profits to the producer. Higher milk production would marginally reduce the amount that FulBe men now have to subsidise their wives' household expenses - but as the scheme is aimed generally at arable farmers this is unlikely to prove a significant attraction.

In addition to this, both among mixed farmers and FulBe profits from

increased milk production do not accrue to men. Among pastoralists, women are invariably assigned all income from surplus dairy produce (Section 2.4.3.1.1), so that a scheme which depended on acceptance by men would be difficult to establish. Among cattle-owning farmers, milk is not sold but merely drunk in the compound. A scheme that was intended to increase income through greater milk-production would not therefore benefit the cattle-owners themselves and there is no reason why they should adopt it. In view of this, loans to smallholder mixed farmers in the Toungo Block designed to promote milk production would therefore have to be premised on a careful choice of potential recipients. In the long term, however, as local markets expand with an increasing and changing human population dairy production and marketing may become a more attractive propostion.

This type of credit scheme would be appropriate for the dissemination of information about improved marketing practices. If the potential loanees were by origin arable farmers in the process of changing over to mixed farming then information on correct feeding, offtake and period of sales will be more easily disseminated than among FulBe.

As a result of the very specific nature of the potential loanees, the relevance of this scheme to various regions of the Toungo Block and its possible siting using aerial survey data have not been considered.

6.2.4 Land Tenure

To date, NLPU has only been involved with assistance in securing Certificates of Occupancy for potential ranchers and larger stockholders in Gongola State. In view of the constantly re-iterated demand for secure land tenure in many parts of the survey area, (Tables 20-23) some assistance to smaller-scale pastoralists should be considered. This should take two forms: assistance to pastoralists in making use of pre-existing mechanisms to grazing land; and in relation to the establishment of Grazing Refuges (cf. 6.2.1.2).

This type of assistance could be offered through the medium of the new Landuse Planning Section envisaged by the SLDP. Liason with Local and State Government officials and assistance to pastoralists in establishing their claims could be carried out by extension workers attached to this section.

In conjunction with this, the evolution of some scheme for controlled bush clearance is desirable, in order to reduce tsetse challenge in sites occupied by pastoralists. The success of a scheme of this sort would be dependent, to some extent, on the degree of commitment (particularly financial) undertaken by the stockowners. Considerable bush clearance is proceeding rapidly throughout the Benue lowlands as a result of immigrating arable farmers (Section 2.2.1.1 and Map III), though their settlements are unplanned and often create unnecessary conflict with established pastoralists. The stockowners could therefore be materially assisted by the establishment of an arbitration service

and advice on securing claims on an area of land by, for example, the planting of economically important trees.

The stockowners in several areas ranked land tenure as of particular relevance (Tables 20-24), particularly in the lowland regions to the north west of the survey zone. Only on the Mambila Plateau was this topic considered to be of primary importance after disease.

6.2.5 Tsetse Control

Although not an NLPU programme, the extension of settled pastoralism into the sub-humid zone is partly dependent upon a close integration of the operations of FDPCS and livestock agencies. All types of planning for livestock development in southern Gongola State are vitiated by a dearth of comprehensive and up-to-date information on tsetse distributions. The provision of additional infrastructure to assist FDPCS staff in providing a baseline survey would be an important element in the allocation of areas appropriate for Grazing Reserves, for example.

The success of tsetse spraying in the Toungo Block, as elsewhere, has been hindered by the, as yet, unsolved problems of controlling reinfestation from outside the sprayed areas. If grazing reserves are established and pastoralists have a personal investment in them, then clearance and maintenance will be encouraged and there is more chance that the problem of extraneous herds exacerbating tsetse reinfestation will be reduced.

Because of the uncertain nature of information on tsetse distribution it has not been possible to adapt the methodology used above to identify areas for priority tsetse control. Nevertheless, certain recommendations; primarily, high priority should be given to establishing the limits of G. morsitans distribution. If, as indicated on Map 19, the only remaining belt is contiguous with that in Cameroun and the Gashaka Game Reserve, then it would seem most logical to initiate control operations from both the north and the west of the belt. Settlement would then be encouraged around the periphery of the reserve in order to prevent future expansion of the belt.

Elsewhere, tsetse survey work should be carried out wherever cattle development projects, especially the establishment of Grazing Reserves are planned or in progress. Where necessary, localised tsetse control operations should be initiated where required. Wherever practical, integration of various tsetse control measures should be considered and applied, including biological, chemical, environmental and physical methods.

In regions experiencing light infestations of riverine species of tsetse serious consideration should be given to the use of biconical traps and insecticide-impregnated screens, as well as the possibility of providing pastoralists with such devices and instruction in their use.

They could then be placed at strategic locations such as river-crossings, where they would provide a means of local tsetse control, and population monitoring.

Tsetse control operations should also be considered for the major trek and trade routes particularly those descending from the Mambila Plateau. Initially, however, such routes would have to be adequately surveyed to identify the most suitable method to be employed.

6.3 Novel Options

6.3.1 Rationale and Applicability

Cattle-owners do not always have very practical notions about the powers of a livestock agency; some of their complaints, such as grass-burning and theft inevitably fall outside the provenance of NLPU. The options presented below, therefore, extract the more practical development strategies from a broad range of requests. A distinction is drawn between those options that are feasible within the present structure of NLPU livestock programmes, and others that would be valuable but may not be immediately practical. These options are not considered in relation to their economic feasibility at this stage, but it is assumed that they may form the basis of a pilot project to evaluate long-term livestock development strategies.

Several other factors must be taken into account when evaluating the following options. The ground surveys indicated that for a livestock development project to be administered successfully throughout Southern Gongola State it should include important commercial centres such as Takum and Wukari. Although not in the survey zone proper, these towns form the nuclei of cattle systems that do extend inside the Toungo Block (Overlay C) and, moreover, are entrepots for the livestock trade throughout its southern half (Map 5).

Until recently, much of the development assistance provided to livestock owners has been either free or highly subsidised (NLPU, Second Phase Preparation Report). A way to reduce the considerable drain of funds this represents is to take advantage of the willingness generally expressed by the stockholders interviewed to pay full market prices for the services they requested.

It will be apparent that many of the suggestions set out below require relatively low amounts of credit and higher levels of technical supervision. This derives from the overall findings of the survey that the quantity and quality of animals brought to market are far below the present potential of the area (Section 2.4.3.1).

6.3.2 Information and Advisory Services

Due to the constraints of time, manpower and resources, NLPU has not yet been able to cover a number of parts of Southern Gongola State, though an office recently opened at Jalingo will reach the stockowners of the Benue Lowland Region. As a result, many of the resident pastoralists are currently unaware of the potential help available to them through either the NLPU, or other State services (Section 5.3.1.2).

Ignorance about the causes and consequences of rinderpest, for example, caused many cattle herders to seek, and incidentally pay high prices for, worthless vaccinations from black market sources. This situation was compounded by ignorance of the uses and lifetime of Western drugs. Also the widespread failure to understand the processes for obtaining a Certificate of Occupancy has meant that many herders have been unable to obtain secure land rights. The potential value of accurate information and advisory services are thus clear, especially in those regions which support major concentrations of cattle. A further possibility is to include, within an information scheme, some form of arbitration service aimed at reducing conflicts of interest arising from land tenure allocation (see Section 6.2.4). The relevance scores assigned to this option for all areas within the survey zone are therefore high (Table 27).

An information service, if successful, could eventually be extended to cover not only the dissemination of information concerning these more general aspects of livestock production, but also the collection and transfer of data concerning the more localised issues. For example, knowledge of economic and marketing trends in other areas, of the availability of good grazing and potential areas of overstocking and of itineraries of visiting personnel such as veterinary officials, would be of considerable value to many stockowners.

Such information could be imparted to the pastoralist through various media. Those in less rural areas could be reached directly through well publicised offices. Those in more remote regions could be reached by taking advantage of the ubiquitous radio-cassettes, using regular transmission of radio programmes in Fulfulde and possibly Samba and Mambila. Teaching cassettes on topics of specific interest to herders might also be provided. Both radio and cassettes could also be eventually employed to influence the pastoralists to adopt more productive types of husbandry techniques.

6.3.3 Strengthening the Veterinary Service

Officials of the veterinary service regularly stated that problems of communication and a lack of transport, fridges and proprietary drugs prevented them from offering an adequate service to livestock owners (Section 5.1). As a result of the high losses from rinderpest and trypanosomiasis sustained by many herd owners (Tables 17-18), the need for effective veterinary services was invariably ranked first in the list of perceived constraints on livestock development (Tables 20-24).

NLPU could assist in the provision of both infrastructure to improve drug storage and the keeping of regional innoculation records and of additional labour to help with veterinary programmes. The direct sale of proprietary medicines to herders might act to prevent bottlenecks in supply from causing unnecessary stock losses. A dependable regional infrastructure could also be of considerable value to other Federal, State of Local Government departments concerned with promoting livestock production.

Aerial survey data shows that 65-80 % of all cattle within the Toungo Block were within 20 kilometres of a major road (Section 3.2.7). In view of this, a mobile veterinary service, travelling regularly on well publicised routes with veterinary staff who would stop on request to give treatment or advice as required would probably be most appropriate to the changing situation in the Toungo Block. There is no doubt that it would be well received by the stockowners and its impact could be monitored by the proposed Information and Advisory Services. Alternatively, it might be possible to assist and encourage the establishment of private veterinary services.

6.3.4 Other Options

The following possible options are those which are of less widespread applicability than those previously described and are either relevant to specific areas of the survey zone or are unlikely to be feasible unless viewed in the long term. It must, however, be strongly emphasised that they nevertheless reflect the perceived constraints of significant sections of the pastoral community interviewed during the ground survey.

6.3.4.1 Access to Water Sources

It has been pointed out that the Toungo Block is not generally short of water, either in terms of rivers or standing water (Map 8 and Section 3.1.1.2). However, access to water is often a major source of conflict between stockowners and arable farmers (Section 5.2.1). A common situation is that an arable farmer will begin to cultivate the place where cattle go down to a river to drink as the accumulated layers of manure make it attractive because of the subsequent fertility of the soil. Cattle-owners throughout the Benue Lowlands suggested the establishment of fenced access points so that farmers were prevented from cultivating around water sources used by pastoralists by physical barriers as well as legal sanctions. Herders frequently expressed a willingness to co-operate with such a scheme and even to put some investment in such access points, if the heavy plant were available to clear the land and concrete parts of them. Pastoralists might then be more open to accepting some responsibility for their maintenance and for restricting use by outside herds. The exact sites of protected drinking points can only be determined by discussion with pastoralists - but generally they are sited in the western part of the Benue Lowlands, where the expansion of arable farmers along the new tar road has given them increased access to the valleys of the Taraba, Suntai and Donga

rivers.

An innovative strategy that would both reduce costs to a minimum and have benefits in several directions would be to adapt live fencing (Section 6.3.4.3) to protect access to drinking-points. Access to rivers would then be guaranteed by avenues of useful trees planted across land otherwise allocated for agriculture. The trees would prevent soil erosion on the farms, provide tree-crops, and eliminate a major source of friction between farmers and graziers. Such as scheme would require a co-operative agreement with the local Forestry Department for the supply of appropriate seedlings.

6.3.4.2 Animal Traction

There is no inherent ecological reason why ploughs should not be successful in most parts of the Toungo Block. However, it is most useful where the bulk of cultigen staples are cereals. The Tiv people, who depend almost exclusively on tubers, expressed no interest in animal traction. The risk of tsetse challenge in the more southerly parts poses a potential threat to trained draught animals. However, under low challenge conditions, well fed zebu are capable of both surviving and working.

An extension service, providing loans for ploughs and assisting with the training of bullocks operated until the early 1970's in the Ganye region. However, it has fallen into abeyance and consequently there are now less ploughs used in the survey area than twenty years ago. To revive their use would have the additional bonus of increasing the perceived benefits of mixed farming. Ploughs could be introduced wherever the principal staples are cereals, where the tsetse challenge is sufficiently low to permit the keeping of animals all year round and where the land is not heavily dissected. If zebu cattle are to be trained as draught animals, this will apply to the northern parts of Ganye and the Wase-Jalingo Cattle Systems.

If the Eastern Ndama breeder scheme were extended into the wooded regions of the Benue Lowlands (cf. Section 6.2.2) then the simultaneous introduction of ploughs would be possible. The suitability of either Dwarf Shorthorns or Ndama for ploughing in such regions would have to be subject to field trials.

The high proportion of males in herds on the Plateau (Table 13) suggests that there is 'available animal labour' for ploughing, if herdowners were willing to experiment. Although ploughs are not appropriate for the steep valleys farmed by the Mambila - the flatter uplands farmed by FulBe and Yamba would probably be more suitable.

6.3.4.3 Fencing

The provision of fencing is an important demand, especially on Mambila where land tenure and grazing rights are major issues, but also elsewhere where stockowners are interested in securing permanent rights to a piece of land. The increasing price of stake and wire fencing means that this option is not practical for most pastoralists, without extensive subsidies. In the elevated grasslands of the Republic of Guinea live fencing also includes fruit trees and green manure plants, creating a multi-functional system for sedentarised pastoralists (Hurault, 1964). Experiments based on such precedents could determine the most appropriate type of fences to recommend and then to provide to pastoralists in the Toungo Block. It should also be borne in mind that fencing was in great demand from individual livestock owners, but this was tempered somewhat when it was pointed out that widespread fencing would severely limit the freedom of cattle movements in densely stocked area. Adequate provision for stock routes through and around fenced areas should therefore be made in conjunction with a fencing programme.

6.3.5 Longer-Term Development Options

There are certain development options that grow out of the expressed needs of pastoralists and that should be considered in the context of a large-scale LDP. Although they reflect the constraints on cattle production and marketing by the pastoralists their execution may well be delayed until further development of the region has been achieved.

6.3.5.1 Markets and Banking Services

Tike, officially regulated cattle markets, and banks for the depositing of cash from livestock sales are sparse in the Toungo Block compared to other parts of the Nigerian Middle Belt (Map 5). This is a reflection of the low population density of the region, and the widespread belief that parts of it are only visited seasonally by cattle. The lack of regulated markets was remarked upon both by government officials and by the pastoralists themselves. In general, the whole of the Benue Lowlands is poor in official cattle markets despite high densities of stock in certain areas.

Markets, if well monitored, act to ensure better prices for cattle and also allow for the closer supervision of the health, and category, of the animals sold there. The capital cost of setting up a tike, or market, is small - an office needs to be built and a small retainer paid to the Sarkin Tike, or controller of the market. The public sale of animals has a beneficial effect on the quality of animals brought to market. Sellers exert pressure on each other not to bring diseased animals, whilst malnourished animals are easily contrasted by buyers with those in good condition.

FulBe and other stockowners tend to have large cash holdings after cattle sales. They frequently complained that the traditional system of

obligations to kin prevented them from retaining these holdings. If some means of depositing money were created for pastoralists, then an additional consequence might be to encourage them to diversify their spending rather than put all their wealth into livestock. This would not only stimulate other sectors of the economy, but also encourage the pastoralists to become more settled. A livestock agency cannot offer independent banking services but could come to an agreement with a commercial bank to support the extension of its services in an appropriate manner. The nature of the bank's function would then depend on the agreement between the agency and the bank. In view of the mobility of the herds a correspondingly mobile, Landrover or Toyota-based, deposit service might be envisaged.

6.3.5.2 Road Construction and Trucking

The movement of cattle from the Toungo Block to the major urban cattle markets is subject to a number of bottle-necks that increase the price of meat to the eventual consumer. Roads to the major producing areas are frequently cut in the wet season, when sales are highest, and thus cattle have to be trekked long distances to loading points, losing most of the weight gains consequent upon the improved grass. The construction of a number of all-weather earth roads into areas of major cattle density would be likely to reduce such losses and thus increase the amount of meat on the open market.

Section 2.3 and Maps 1 and 2 describe existing communication networks. Federal and State contracts have been given out for a number of important roads such as the Mambila escarpment, the Mayo Selbe-Bali road and the Garba Chede-Mutum Biyu road. To encourage construction of feeder roads, a livestock agency with heavy plant available could work in co-operation with local communities to link cattle-producing regions to access routes. This could be achieved both through construction of feeder roads and through essential maintenance of existing roads and bridges. Examples of important bush roads are the Sabon Gida-Jatau road, the road joining Bantaji, Suntai and Donga and the Sabon Gida-Wuryo-Sansane road. Opening up these towns to cattle-trailers would cut down the trekking of stock and ensure that it reaches the market in prime condition. The recent collapse of the bridge at Manya forces cattle traders coming from Mambila to make considerable detours to the detriment of the stock they are marketing.

Another likely reason for inflated prices to the consumer is the number of intermediaries through which the cattle are passed on their way to the major market at Enugu. Most of the large cattle-trailers are owned by out-of-state entrepreneurs, so profits from the trade are rarely invested in local enterprise. Loans to purchase trucks, either to individuals or co-operatives would ensure ensure that more of the benefits of primary production remain within the State. A potential candidate for such loans would be the groups of families settled on the Model Grazing Reserves (Section 6.2.1.1). It should be remembered, however, that it is not usually pastoralists themselves who request such

loans but established cattle-traders, often those who are compelled to trek cattle for lack of a truck. If a loan were made, it would have to be clearly established that the managerial skills necessary to make the trucking profitable were available. Prices to the primary producer, the FulBe pastoralist, would not be affected and therefore would not have the effect of decreasing levels of offtake.

6.3.5.3 Herders Co-operatives

In many parts of the arid zone pastoralists have been organized into co-operative groups to allow them to control and allocate scarce resources more effectively. The success of such schemes depends on the delicate balance between irreversible degradation of the environment and the maintenance of a viable herd that such pastoralists must maintain. In other words, co-operation is necessary to survive.

This is not the situation in southern Gongola State despite the impact of recent epizootics. Pastoralists there are generally in a fortunate situation, with easily available water and pasture and, as yet, no overall land shortage (Figure I and Table 8). This is reflected in their relatively large herds (Section IV, Figure VIII and Table 12). Since co-operation is not a necessary means to survival in the Toungo Block, the stockowners expressed little interest in forming co-operative groups. They would be willing to put cash into specific local projects such as roads or water access but at least for the present, they were not prepared to extend this principle to broader economic integration.

6.4 Regional Identification of Development Options

Clearly, livestock development priorities and options vary from region to region in the Toungo Block. A series of Livestock Development Foci (LDF) have been identified and an assessment of local priorities compiled for each one.

6.4.1 Locations

The number of LDFs in the Toungo Block depends on the range of services to be provided, and the level of funding available. In view of this, three possible levels of implementation are considered below:

LEVEL ONE

One LDF to be chosen as a pilot project for implementation of both existing and novel development options outlined in this section. If this were chosen, then the NLPU office at Jalingo would be a logical site for such a station, as it is close to the State capital and is on a well maintained tarmac road. Access to both central administration and to the large populations of cattle to the southwest is thus made comparatively easy. Alternatively, despite its remoteness, Gembu on the Mambila Plateau could be considered because of the very large resident cattle population, the high levels of tension between farmer and cattle-owners and the existing NLPU office. However, the representativeness of such a location for

a pilot project is opwn to question.

LEVEL TWO

Three LDFs to be chosen: one at each focal point of the Development Regions identified in the preceding sections of this report. In this case, the obvious sites would be Gembu, Bantaji and Ganye, as they are central to the major cattle concentrations in each Development Region, and are accessible throughout the year.

LEVEL THREE

Sufficient LDFs to reach a significant proportion (perhaps two-thirds) of the cattle population in both wet and dry seasons. Assuming that 30 kilometres is the maximum distance stockowners would be willing to travel to obtain livestock services, examination of the cattle distributions in wet and dry seasons in relation to the major all weather roads suggest that Bali, Mararaba and Sabon Gida for the Benue Lowland Region, Nguroje and Mbamnga for the Mambila Plateau and Ganye for the Ganye Region would be most practical.

6.4.2 Availability to Stockowners

Table 28 below shows estimates derived from the aerial survey results of the levels of livestock populations, pastoral and arable habitations, and selected land use parameters within a 30 kilometre radius of each of the locations of the LSCs proposed for each LDF. Several of the sites are within 30 kilometres of the survey boundary, and so figures for the entire radius are not available. In these cases, the density of each parameter outside the survey limits was assumed to be equal to that within them and the figures for the full circle calculated accordingly. The equivalent estimates for each level of LDF implementation are also presented in Table 29, where these are also expressed in relation to the overall population levels within the survey zone.

Jalingo is included in both Tables 28 and 29 even though most of the area within 30 kilometres of it was not surveyed. The figures quoted for the numbers of livestock within reach of it are an underestimate, particularly during the wet season, as large concentrations of cattle were observed to the north of the survey boundary. Also, it should be borne in mind that, as a trial station, its influence would be expected to reach much further than LDFs selected with specific reference to the Toungo Block. There is also a case for suggesting that a trial LSC should be sited in an area of relatively low livestock populations, in order to be able to fully evaluate the effectiveness of the options being tested. If they succeed in such regions, and attract significant interest among the livestock owners, then they are also likely to work in more highly populated regions.

Of the proposed Level Two sites - Bantaji, Ganye and Gembu - a service centre at Gembu would reach the greatest numbers of cattle and

TABLE 28. LIVESTOCK, DWELLINGS AND ENVIRONMENT WITHIN 30 KM OF PROPOSED LDFs.

LDF Location*		JAL	BANT	GEMB	GANY	BALI	SGID	MARA	NGUR	MBAM
Implem level		1	2	2	2,3	3	3	3	3	3
Devel Region**		-	BL	SU	GL	BL	BL	BL	SU	SU
LIVESTOCK										
Cattle No	W	1675	104100	261400	59900	24100	70700	55200	184500	226500
	D	15600	74400	145800	26900	15700	78100	26400	108400	138000
" /sq km	W	0.6	36.5	91.7	21.0	8.5	24.8	19.4	64.7	79.5
	D	5.6	26.1	51.2	9.5	5.5	27.4	9.3	38.0	48.4
" ha/hd	W	169.5	2.7	1.1	4.8	11.8	4.0	5.2	1.6	1.3
	D	17.9	3.8	2.0	10.6	18.1	3.4	10.8	2.6	2.1
Sheep No.	W	600	9800	9400	6500	800	11800	2700	8300	6400
	D	2700	10700	17000	6100	60	11200	1200	12300	13300
" /sq km	W	0.2	3.4	3.3	2.3	0.3	4.1	0.9	2.9	2.2
	D	0.9	3.7	6.0	2.2	0.2	4.0	0.4	4.3	4.8
Goat No.		33600	223600	90300	250500	51900	54400	86800	44300	123000
" /sq km		11.8	78.4	31.7	87.9	18.2	19.1	30.2	15.5	43.1
DWELLINGS										
Arable No.	@@	30800	105900	80700	105700	29100	31100	38400	84900	73200
" /sq km		10.8	37.2	28.3	37.1	10.2	10.9	13.5	29.8	25.7
Past. No.	W	1100	4900	6000	2100	1000	1400	2200	5400	5810
	D@	1000	3300	12300	3100	1200	2300	800	9200	10600
" /sq km	W	0.4	1.7	2.1	0.8	0.4	0.6	0.8	1.9	2.0
	D@	0.4	1.1	4.3	1.1	0.4	0.8	0.3	3.2	3.7
ENVIRONMENTAL										
mean % Cult.		14.0	6.6	11.3	10.2	2.4	6.0	3.7	9.8	12.6
% grids with Water (D)		44	42	88	48	35	27	43	94	90
Mean Erosion Score (max 10)		0.1	0.3	3.8	0.1	0	0	0	1.7	3.6

* Jal = Jalingo, Bant = Bantaji, Gemb = Gembu, Sgid = Sabon Gida, Mara = Mararaba, Ngur = Nguroje, Mbam = Mbamnga.

** Development Region as identified in text: BL = Benue Lowlands, GL = Ganye Lowlands, SU = Southern Uplands.

W = Wet Season D = Dry season

@@ Excluding Agropastoralists @ Includes Agropastoralists

TABLE 29. NUMBER OF LIVESTOCK AND DWELLINGS WITHIN 30 KM OF PROPOSED LDF BY IMPLEMENTATION LEVEL. (The % of the total Survey Zone population that each figure includes is in parentheses.)

Implementation Level*		ONE	TWO	THREE
LIVESTOCK				
Cattle No	Wet	1700 (0.07)	425400 (47.4)	559000 (62.5)
	Dry	15600 (0.8)	247200 (31.4)	366000 (48.5)
Sheep No.	Wet	600 (0.03)	25700 (34.3)	35000 (57.0)
	Dry	2700 (1.1)	33800 (38.1)	41800 (35.9)
Goat No.		33600 (1.2)	564400 (51.0)	593000 (61.2)
HUMAN DWELLINGS				
Arable No.		30800 (1.2)	292300 (42.4)	352800 (55.2)
Agropast. No.		700 (1.5)	11600 (70.1)	14400 (76.6)
Past. No.	Wet	1100 (1.3)	12900 (39.0)	16000 (53.1)
	Dry	400 (1.1)	9600 (36.3)	11000 (65.7)

* Level one = Jalingo; Level two = Bantaji, Gembu, and Ganye; Level three = Ganye, Mararaba, Sabon Gida, Bali, Nguroje and Mbamnga.

TABLE 30. RELEVANCE SCORES OF POSSIBLE DEVELOPMENT OPTIONS BY POTENTIAL LDF.

LDF Location*	JAL	BANT	GEMB	GANY	BALI	SGID	MARA	NGUR	MBAM
Implem level	1	2	2	2,3	3	3	3	3	3
Devel Region**	-	BL	SU	GL	BL	BL	BL	SU	SU
DEVEL OPTION:					SCORE***				
Grazing Reserves	3	2	0	2	1	2	3	0	0
Crop Residues	3	2	2	2	1	1	1	2	2
Range Management	1	1	2	1	0	1	0	2	2
Credit									
Sheep	3	2	2	3	1	2	1	2	2
Goats	1	3	1	3	2	3	3	1	1
S R S L""	0	0	0	0	2	2	2	0	0
Pig	3	2	0	0	2	2	2	0	0
Muturu	2	3	0	0	3	2	2	0	0
Zebu	3	1	3	3	0	2	0	3	2
Land Tenure	3	2	3	1	1	2	2	3	3
Tsetse Control	2	2	0	3	2	2	3	0	0
Bush Clearance	1	2	0	1	2	2	2	0	0
Info/Advice	3	3	3	3	3	3	3	3	3
Vetin. assist.	3	3	3	3	3	3	3	3	3
Banking	2	2	2	2	3	3	3	3	3
Markets	2	3	1	1	2	3	2	1	1
Roads	1	1	3	2	2	1	2	3	3
Truck Loan	1	1	1	1	1	1	1	1	1
Water Access	1	2	1	1	1	2	1	1	1
Animal traction	2	2	0	2	0	2	0	0	0
Fencing	1	1	2	1	1	1	1	3	3

* Jal = Jalingo, Bant = Bantaji, Gemb = Gembu, Gany = Ganye, Sgid = Sabon Gida, Mara = Mararaba, Ngur = Nguroje, Mbam = Mbamnga.

** Development Regions as defined in text: BL = Benue Lowlands, GL = Ganye Lowlands, SU = Southern Uplands.

*** Scores are ranked, 3 indicating highest relevance.

"" Small Ruminant Seasonal Loan

pastoralists. However, Bantaji and Ganye together are within 30 kilometres of some 165,000 cattle during the wet season and 100,000 during the dry season. The areas surrounding these two towns also support comparatively high densities of pastoralists and their sheep, as well as upwards of 450,000 goats.

These Level Two sites between them thus account for approximately 250,000 to 425,000 cattle and 26,000 to 34,000 pastoralists' sheep, depending on season, as well as 564,000 goats. In relation to the survey zone, these sites represent 15% of the total area, and hold 30-50% of the cattle, 35-40% of the sheep, half the goats as well as high proportions of all the categories of human dwellings except those assigned to nomadic pastoralists.

The proposed development foci envisaged for Level Three - Ganye; Nguroje and Mbamnga; Sabon Gida, Mararaba and Bali - comprise a third of the survey zone if an effective catchment radius of 30 kilometres is assumed. As expected, the greatest cattle numbers are again around the prospective sites on the Mambila plateau, though the lowland radii enclose a significant proportion of the cattle (Table 29). Comparatively dense goat populations surround the lowland locations but the highest mean stocking densities (43.1/per square kilometre) were recorded near Mbamnga in the southern Mambila plateau. Sheep densities were also highest on the Mambila, as were the densities of all categories of pastoralist dwellings.

Level Three (in comparison to Level Two) implementation increases the potential numbers of cattle reached by just over 30%, to 526,000 during the wet season and by 48% (to 366,000) during the dry season. These figures include 63% and 49% respectively, of the total wet and dry season cattle populations within the survey zone. Level Three implementation would incorporate approximately half the wet season sheep population and 61% of the goats within the surveyed area, which constitutes an increase from Level Two implementation of 29% of the sheep and 20% of the goats. Similar increments are shown by Table 29 for the range of human dwellings.

Table 30 summarizes the potential relevance and effectiveness of the existing and novel development options according to the selected LDFs and allows for the rapid assessment of the perceived relevance of individual development options. For example, under Veterinary Assistance, the ease of implementation is listed as 3, or maximum, for almost all locations. This is because livestock owners are demonstrably willing to travel considerable distances to obtain drugs. By contrast, improved crop residue utilisation is rated as considerably more difficult, because pastoralists admit themselves to only a limited interest in this option.

The information shown in these tables can be summarized to identify the priority development options for each level of LDF siting, as inferred by the perceived needs of the livestock owners themselves, by examining

TABLE 31. ACCUMULATED RELEVANCE SCORES FOR EACH DEVELOPMENT OPTION ACCORDING TO LDF IMPLEMENTATION LEVEL.

Implementation Level*	ONE	TWO	THREE			
Development Region	-	All	All	Benue Lowlands	Ganye Lowlands	Southern Uplands
No of LDF Sites	1	3	6	3	1	2
Max poss score/option	3	9	18	9	3	6
DEVELOPMENT OPTION:						
Grazing Reserves	3	4	8	6	2	0
Crop Residue	3	6	9	3	2	4
Range Management	1	4	6	1	1	4
Credit Schemes for:						
Sheep	3	7	11	4	3	2
Goats	1	7	13	8	3	2
S R S L**	0	0	6	6	0	0
Pigs	3	2	6	6	0	0
Muturu	2	3	7	7	0	0
Zebu	3	7	11	2	3	6
Land Tenure	3	6	12	5	1	6
Tsetse Control	2	5	10	7	3	0
Bush Clearance	1	3	7	6	1	0
Information/Advice	3	9	18	9	3	6
Veterinary asst.	3	9	18	9	3	6
Banking	2	6	17	9	2	6
Markets	2	5	9	7	1	2
Roads	1	6	13	5	2	6
Truck Loans	1	3	6	3	1	2
Water Access	1	4	7	4	1	2
Animal traction	2	4	4	2	2	0
Fencing	1	4	10	3	1	6

* Level one = Jalingo; Level two = Bantaji, Gembu and Ganye.
Level three = Ganye, Sabon Gida, Bali, Mararaba, Nguroje and Mbamnga.
** Small Ruminant Seasonal Loans

TABLE 32. LOCATIONS AND FACILITIES OF EXISTING AGRICULTURAL SERVICE CENTRES IN SOUTHERN GONGOLA STATE.

LOCATIONS	STORE	WORKSHOPS	OFFICE
A. Inside Toungo Block			
Baissa	+	+	-
Bali	+	+	+
Donga	+	+	+
Ganye	++	-	+
Garba Chede	+	+	+
Gembu	-	+	+
Serti	++	-	-
B. Outside Toungo Block			
Fufore	+	+	-
Jalingo	-	+	+
Lau	+	-	+
Mayo Belwa	+	-	-
Numan	+	-	-
Takum	+	+	+
Wukari	++	+	-
Yola	+	+	+
Zing	+	+	-

+ Facility with one building - No facility ++ Facility with two buildings

NB In addition there are Livestock Service Centres at Nguroje, Gembu and Jalingo.

the accumulated relevance scores for each level (Table 31).

If a single LDF were established at Jalingo, then nine out of the twenty three possible options discussed earlier in this section can be identified as having the highest priority. These are: information services; veterinary assistance; formation of grazing reserves and associated programmes for the promotion of secure land tenure and the production of dry season fodder; and the provision of credit to increase the production of sheep, pigs and zebu cattle.

With one LDF in each of the Development Regions (Level Two implementation), the accumulated relevance scores isolate only information transfer and veterinary assistance as top priority options, though credit for sheep, goats and zebu cattle are also high priority, followed by land tenure, banking assistance, improvement of access routes and finally the provision of dry season crop residues.

With the full number of proposed LDFs, the major priorities are again the provision of information and veterinary assistance but also include the extension of banking services. If these potential sites are examined in relation to the Development Region (Benue Lowlands, Ganye Lowlands and Southern Uplands), then several additional options should be viewed as Regional priorities:- tsetse surveillance and control, goat and Muturu loans and improved marketing facilities in the Benue Lowlands; tsetse survey clearance, goat and Zebu loans in the Ganye lowlands; and land tenure establishment, zebu loans, improved access and provision of fencing in the Southern Uplands.

6.5 Implementation of Development Options.

The preceding sections present a broad range of possible development options for improving livestock production within southern Gongola State, although some are relevant to particular regions only. The effective implementation of these options, whether in whole or in part, primarily depends upon the provision of a comprehensive infrastructure capable of supporting them.

Such infrastructure is also needed as a base for the implementation of new livestock development models, as well as a number of the proposed novel options which involve assistance to pre-existing government programmes. It became evident in the course of discussions with government officials during the ground survey that many NLPU development goals cannot be met without additional support to the infrastructure that presently exists.

The combination of aerial and ground survey data has identified a number of foci for livestock development. Ideally at each of these nodal points, a fully-equipped Livestock Service Centre (LSC) should be purpose-built to implement the development options listed above. However, in practice it may be more efficient to strengthen and provide support to local veterinary and livestock services, and to adapt existing facilities, especially those belonging to GIRDP or to the Federal Livestock

Department. This solution is analysed in terms of a modular form of relatively low cost Livestock Extension Centres (LECs), and a more experimental Pilot Extension Project (PEP), the economics of which are dealt with in Section VII.

6.5.1 Existing Facilities

Within southern Gongola State there are presently three types of available structure that could be adapted to the needs of stockowners. The most widespread are the offices, stores and workshops of GIRDP - the Gongola Integrated Rural Development Programme. Overlay E shows the locations of these centres and Table 32 lists the present facilities they contain. In addition, there are the Livestock Service Centres (LSCs) run by the Federal Livestock Department, within the Toungo Block at Nguroje and Gembu and directly north of it at Jalingo and Demsa. Overlay B shows the Veterinary Zones that lie within the Toungo Block, and most major settlements have offices of the Veterinary Service. Where such offices exist, they should certainly be used as bases for the extension of veterinary assistance to stockowners.

It is clear from a comparison of the distributions of existing facilities and cattle concentrations (Maps 11 & 12 and Table 32) that many existing offices are not optimally positioned to reach the major regions of high cattle density particularly in the Benue Lowlands. However, those that already exist at Bali and Ganye could be adapted and extended to provide a range of improved services after suitable negotiations with the appropriate Federal and State Ministries involved. In view of this, the development agency should adopt a mixed strategy:- assisting with inputs and construction for centres that are well-situated; and building new centres wherever the relative abundance of cattle suggests that this is necessary.

6.5.2 Summary of Priorities for Proposed Sites

The following paragraphs systematically extract the data from the preceding tables to provide a rapid overview of the priority development options at each of the proposed Livestock Development Foci. They amalgamate social relevance, stocking rates determined by the aerial survey, and siting criteria. The individual problems and advantages of these locations are also commented upon using the material from previous chapters. Information and advisory services are not dealt with separately in each section, as they are broadly relevant in all locations.

LEVEL ONE

A) Jalingo. Although Jalingo is north of the survey zone proper, its ready accessibility from Yola, Wukari and Bauchi and the existence of an NLPU office make it a valuable location. The most immediate cattle populations available to such an office would be in the northern parts of the Benue Lowlands, but officers could use their mobility to deal with livestock beyond a notional 30 kilometre radius.

LEVEL TWO

B) Bantaji. The priority loans in Bantaji should be made for cattle and sheep as these are both present in large numbers and Bantaji is on a main access route, allowing them to be easily marketed once they have been fattened. Pigs and goats are of secondary importance, but if the move of commercial yam farmers into this region continues they will rapidly become primary targets for livestock loans. The competition for land between farmers and pastoralists suggests this is a good location for establishing low-cost 'grazing refuges'. Bantaji is without an official **tike** despite the numbers of livestock in the immediate area, and the easy access to administrative centres would make it simple to set up and maintain an official market. There are no GIRDP or FLD buildings there at present, so an LSC would have to be purpose-built.

C) Gembu. Because of its NLPU office, Gembu might be considered as an alternative site for a PEP if Jalingo were not chosen. The priorities in Gembu are loans for cattle and the establishment of an arbitration procedure to manage the land tenure problems. Access thoughout the Mambila Plateau remains a problem, but the current work on the principal roads will ease this situation. However, assistance with the construction of feeder roads in remoter areas is important to the effective operation of all types of livestock development. Gembu has offices for GIRDP, UBRDA, FLD and the State Veterinary Service.

C) Ganye. Ganye is a small and territorially coherent region with a relatively good network of roads making access easy, except in the Shebshi grasslands. Sheep, goats and zebu are all high priority for loans - the smaller numbers of pastoral sheep are counterbalanced by large flocks kept by arable farmers, and a large Muslim population encourages fattening loans aimed at the Sallah market. The shortage of water and the use of crop residues as dry-season fodder in the northeast of the region, suggests that this would be a good place to experiment with range mangement and fodder banks. Tsetse control operations are currently undertaken from FDPCS offices in Ganye, but for them to succeed in the large area south of Toungo Block funds would have to be available for more extensive operations. Offices of GIRDP and the Veterinary Service as well as a local ruler with an especial interest in livestock development would create an appropriate climate for a centre of operations. Ganye is equally appropriate as an LDF at the third level of implementation.

LEVEL THREE

E) BALI. Bali is the nodal point for the region with the greatest potential for expansion of livestock. FulBe na'i are moving in large numbers into the surrounding savannah woodland, but the prevalence of tsetse makes impossible all year round settlement. The immigration of farmers make trypanotolerant cattle and small

livestock except sheep a high priority for loans, together with tsetse monitoring and control. Bali is an important intermediate point for trade cattle coming from the whole eastern part of the Toungo Block, though the collapse of the bridge at Manya has recently made it less accessible. This makes it a high priority site for a banking service geared to the needs of the livestock trade. GIRDP and the Veterinary Service already have established offices that might be adapted to the needs of an LSC.

F) Sabon Gida. This town was only established after completion of the Wukari-Jalingo road in 1979, and its rapid growth confirms its accessibility and its importance as a focus for trade in both livestock and agricultural produce. There has been no governmental infrastructure development at present, but the potential in terms of livestock is large enough to warrant the contruction of a new LSC. As at Bantaji, grazing refuges and markets should be formally established to assist the monitoring of both commerce and animal health. Loans for all types of livestock were requested since there is a substantial population of both arable farmers and pastoralists.

G) Mararaba. Mararaba is similar to Bali in being a potential focus for livestock expansion given tsetse control, and forming a control point for the cattle trade from the Plateau moving to the markets of Igboland. Banking, market establishment and improved communications are therefore priorities. Goats and trypanotolerant cattle should be the focus of loans, and animal traction if the cattle breeding succeeds. There is no pre-existing government infrastructure at Mararaba, but the CRCN agricultural development project has been assisting small livestock owners for some years and would provide useful background information.

H) Nguroje. The priorities at Nguroje are similar to those at Gembu; cattle loans, land tenure settlement and associated fencing, construction of access roads. FLD already has a livestock Service Centre that concentrates presently on tick control and breeding. The facilities of this centre could be extended to meet the needs of pastoralists identified by this study.

I) Mbamnga. Mbamnga is the least accessible site recommended as an LDF. However, it gives access to a cattle population the size of which is only exceeded by Gembu and therefore, providing services to those stockowners should be considered a priority. There are presently no government facilities, so an LSC would have to be pupose-built. Markets are easily accessible but banking is a problem as stockowners complain of the necesssity of large cash holdings. Loans would be aimed almost exclusively at cattle and intervention, as elsewhere on the Plateau would be aimed at land tenure and fencing.

Table 33 is intended to summarize a number of features important in planning the extension of services to pastoralists.

TABLE 33. SUMMARY OF CHARACTERISTICS OF PROPOSED LDFs.

	LIVESTOCK DEVELOPMENT FOCUS				LIVESTOCK DEVELOPMENT FOCUS			
	BANTAJI	GEMBU	GANYE	BALI	SABON GIDA	MARARABA	NGUROJE	MBAMNGA
Roads	Tar	Dirt 4WD	Tar	Dirt AW	Tar	Dirt AW	Dirt 4WD	Dirt AW
Soil Type	Ferruginous Tropical	Humic Ferrisol	Ferruginous Tropical	Ferruginous Tropical	Ferruginous Tropical	Ferruginous Tropical	Humic Ferrisol	Humic Ferrisol
Land Type	Flood Plain	Montane Grass	Savanna Wood	Low Forest	Flood Plain	Low Forest	Montane Grass	Montane Grass
Cattle Market	at Chediya	Tike	Tike	Tike	Unofficial	Unofficial	Tike	None
Bank	No	Yes	Yes	Closed	No	No	No	No
Vet. Centre	No	Yes	Yes	Yes	No	Mission	Yes	No
R.B.D.A.	No	Yes	No	No	Yes	No	Yes	Yes
G.I.R.D.P.	No	Yes (LSC)	Yes	Yes	No	No	Yes (+LSC)	No
N.L.P.U.	No	Office	Yes	No	No	Office	Yes	No
Human Habitation (per km ^{2})								
Arable	37.2	28.3	37.1	10.0	10.9	13.5	29.8	25.7
Agropastoral	0.1	3.1	1.0	0.0	0.0	0.01	2.1	2.6
Pastoral (max)	1.7 (W)	2.1 (W)	0.7 (W)	0.4 (D)	0.8 (D)	0.8 (W)	1.9 (W)	2.0 (W)
G. morsitans								
Percieved	Yes	No	Yes	Yes	Yes	Yes	No	No
F.D.P.C.S.	No	No	No	Yes	No	No	No	No
Milk:Grain Price	1:4	1:3	1:4	1:3	1:4	1:3	1:3	1:3
Price of Bull	550	750	750	600	550	500	950	800
Grazing Unit Size								
Wet	91	42	34	92	100	86	39	41
Dry	55	29	33	19	68	68	32	29
Staple Crops	Yams Maize Sorghum	Maize	Maize Sorghum	Yams	Yams Cassava Sorghum	Yams Maize	Maize	Maize
Grazing Reserves	Yes	No	Yes	No	No	No	Yes	No
Land Availability	Negotiable	Difficult	Negotiable	Free	Free	Free	Difficult	Difficult

Roads:- AW is allweather, 4WD is four wheel drive only. Soil and Land types derived from Bawden and Tuley (1966). R.B.D.A.:- Given as Yes if office within 30km. of LDF. G.I.R.D.P.:- Yes implies are such buildings at LDF (for further details see Table .) LSC refers to Livestock Service Centres set up by FLD. N.L.P.U.:- Represents the presence or absence of fattening loans. Habitation densities and Grazing Unit sizes are those within 30km. of LDF.

G. morsitans :- Percieved to be present by pastoralists, or found to be present by F.D.C.P.S. survey. Bull Prices:- Gives average prices of a bull aged 3 and over, recorded in April to June 1984. These are likely to have fallen. Milk:Grain Prices:- Represents the estimated number of mudus of grain that are equivalent to one calabash of milk in areas close to LDFs. Grazing Reserves:- Yes indicates the presence of proposed or allocated Grazing Reserves within 30km. of LDF. Land Availability:- Represents the availability to pastoralists of secure land rights.

TABLE 34. MACRO ECONOMIC KEY INDICATORS FOR LIVESTOCK IN SOUTHERN GONGOLA STATE.

Indicator	Wet Season@	Zonal@	Dry Season@
Total Land Area (sq. km.)		43,875	
Total Cattle Population	686,700		596,700
Value (million Naira)	349		303
Overall Cattle Density/sq.km.	15.7		13.6
Effective Cattle Density/sq.km. *	22.7		19.7
Herd** Structure			
% Males			37.6
% Females			62.4
% Calves 1 yr.			22.0
Total Number of Herds**	3690		3208
Mean Herd** Size		186	
Median Herd** Size (Mambila)		35	
Mean Herd** Size (Mambila)		248	
Median Herd** Size (Ganye)		75	
Mean Herd** Size (Ganye)			
Mean Annual Offtake (at 10%)	68,670		59,670
Live Weight (tonnes)	23,819		20,698
Liveweight Value (million Naira)	53		46
Carcass WEight at 50% (tonnes)	11,909		10,349
Annual Milk Production (tonnes)	41,500		36,000
Value of Milk Production (million Naira)	41.5		36
Sheep Population	57,200		66,500
Value of Sheep Population (million Naira)	22.9		26.8
Goat Population		846,000	
Value of Goat Population (million Naira)		25.4	

@ Seasonal population levels and densities from text. As estimates of values for annual parameters depends on which season's figures are used, both are given to indicate range. Some of the parameters do not vary with season.

* Taking into account the proportion of land suitable for cattle.

** Herd defined as number of cattle owned by an individual, as opposed to managed in a grazing unit.

SECTION VII

ECONOMIC ASSESSMENT OF SELECTED DEVELOPMENT OPTIONS

As levels of funding available for livestock development are not currently known, and many of the most desirable interventions do not lend themselves to conventional cost benefit analysis, this section can deal only with a selection of the development options described in Section VI. Initially it provides an overview of the livestock resources of the Toungo Block as a whole; and then goes on to consider the costing of the two possibilties outlined in Section VI; a pilot project to test, evaluate and monitor the novel or modified options; and a financial analysis over five years of three NLPU models relevant to the Toungo Block.

7.1 Macro-Economic Overview

Table 34 summarizes the key indicators used to establish the livestock resources of Gongola State.

Accurate figures for the livestock population of Nigeria are elusive. A study conducted for the Federal Ministry of Agriculture and the Green Revolution Committee ('The Green Revolution Livestock Production Plan for Nigeria' FMA, 1981) estimated that by 1985 the national livestock population would be 13.85 million cattle, 16.5 million sheep and 33.4 million goats. They derive from estimates by the Nigerian Meat and Livestock Authority of a cattle population of 8.5 million in 1973 (op. cit.). FLD estimated annual increases in population of 2% in the south and 3% in the north. Based on these rates of growth, FAO calculated a total 1980 population of 8.9 million, assuming a 7.75% rate of extraction.

In this Plan, the projected rate of growth after 1980 is 8.1%, assuming the improved management, health services and nutrition advocated in the document. This projection has proved optimistic for several reasons: the disastrous rinderpest epidemic of 1983-4; the inability of livestock agencies to maintain the appropriate level of technical intervention; and the hiatus in government development programmes in the wake of political changes in 1983-4.

A more conservative estimate for the national herd in 1985 can be derived from returning to the growth rates of 2-3%. Assuming 2.5% annual increase, and adopting the 1980 figure of 8.69 million head as a baseline (FMA, 1981: Table 3:3) the 1985 population would be 10.08 million. The survey area in southern Gongola State with an estimated cattle population of 596,700 in the dry season, and 686,700 in the wet season, would therefore contain 6-7% of the national herd with a value of 303-349 million Naira at 1984 prices. The value of annual offtake would be 46-53 million Naira, making the cattle subsector one of the major components in the regional economy.

Projections of demand in the livestock sub-sector hinge on the quality of national statistics referred to above. The Livestock Production Plan quotes income elasticities of demand of 1.2 for beef, 0.8 for goats, and estimates of 0.8 and 1.3 for sheep. Estimates of growth of 2% in real incomes have been made by the World Bank (in FMA, 1981) and were used by the Food Sector Strategies Mission of the Federal Government in 1980. The present trend towards urbanisation and the monetarisation of the economy is likely to reinforce demand elasticities. However, the high inflation in the period 1979-84, together with erratic trade and monetary policies may produce a contrary trend. Livestock products have a relatively high negative price elasticity of demand, and urban consumers continue to prefer imported 'convenience' foods. Liberal policies towards imported food, in combination with an overvalued exchange rate may have had a detrimental effect on domestic production.

The present administration has expressed its intention to maintain restrictions on food imports in order to stimulate domestic production and exchange rates are likely to be adjusted. An improvement in livestock prices within Nigeria increases the incentive to import more stock 'on the hoof' from neighbouring countries, thus maintaining pressure on the domestic markets. Prospects for improvements in the supply depend partly on such price incentives, and partly on the technical innovations available to development agencies. A review of the these appears in Chapter III of the Livestock Development Plan (op. cit.) and will not be repeated here, except to the extent that these innovations are promoted by NLPU or are favoured by the pastoralists in the Toungo Block.

After correcting for the effect of rinderpest sales, current offtake in southern Gongola State is about 10%. However, as indicated in Section 2.5.1 sales are related to domestic cash requirements rather than to an income objective. Thus, the improvement of technical parameters within the herds does not have as a necessary consequence increased offtake. However, current offtake, with the potential for a higher level of stocking make the livestock sub-sector in southern Gongola State a major resource for development.

7.2 Livestock Extension Centres

The intention of this section is to illustrate the potential for low-cost Livestock Extension Centres (LECs) that could act as focal points of contact between livestock owners and NLPU staff and operate some of the Second Phase Models.

The concept of a Livestock Extension Centre is similar to the present LSCs run by NLPU. However, an LSC of the current type is a relatively expensive investment, based usually on a grazing reserve as a focus for its activities. The LEC proposed in this report is a low-cost investment using existing government offices or rented accomodation at a range of locations intended to maximise contact with pastoralists.

7.2.1 Operating Module

Two alternative strategies for LECs of this type are discussed; a low density network of three at Ganye, Gembu and Bantaji; and for a higher density network of six centres at Ganye, Nguroje, Mbamnga, Mararaba, Sabon Gida and Bali. With six centres in operation 470,000 head of cattle (some 80% of the study area population) would lie within a 30 kilometers radius of the centres.

NLPU has developed a number of technical models to stimulate greater productivity amongst livestock-owners. Each centre would be multi-functional, responsible both for advice and for the technical supervision of pastoralists who are taking part in its programmes. The main activities at each LEC would be as follows;

a) Smallholder credit schemes.

b) Technical advice on Grazing Reserves.

c) Promotion and administration of fodder banks.

d) Technical supervision of participants in NLPU development Models.

The concept of a Livestock Extension Centre is similar to the present LSCs run by NLPU. However, an LSC of the current type is a relatively expensive investment, based usually on a grazing reserve as a focus for its activities. The LEC proposed in this report is a low-cost investment using existing government offices or rented accomodation a range of locations intended to maximise contact with pastoralists.

The key to planning LECs is an operating 'Module'. One Module would consist of a Veterinary or Livestock Assistant, two Inoculators and one labourer, plus equipment and supplies. They would be responsible for supervising a predetermined target number of technical models and giving general extension advice. Each LEC would have one or more of the modules according to the potential of the area and the resources available to NLPU. Each LEC with three or more of these Modules would be overseen by a Livestock Superintendent and office support.

By adopting this Module approach, a livestock planner can allocate development resources to regions with good potential basing projections on air/ground survey data. Table 35 shows the data sources and processes involved to support such planning;

Table 35: **PLANNING STAGES FOR LECs**

Activity	Data source
1. Select technical interventions	ILCA, NAPRI, NLPU, FDPCS
2. Assess demand for development inputs	Ground surveys
3. Set limiting parameters for interventions	Research Data
4. Select suitable core grids for such interventions	Air/Ground survey
5. Conduct sensitivity analysis on limiting parameters	"
6. Site focal points for proposed LECs	"
7. Model potential adoption of interventions at LECs	Follow up ground survey
8. Allocate numbers of modules per LEC based on costs and potential adoption.	Aerial/ground survey data
9. Plan resource requirements for the State or Region.	"

The costs and operating capacity of one module, based on discussions with senior officers from NLPU are shown in Appendix Tables 21A,B. Total costs over a five-year period would be N86,025 for a single module, N145,525 for a site with two modules (N72,762 per module) and 327,775 for a site with three modules (N109,528 per module).

7.2.2 Technical Interventions

The main thrust of the NLPU programme is a series of technical interventions designed to raise animal productivity and increase offtake of meat and milk by improved nutrition, supported by health measures and improved management. Some fourteen production models have been designed encouraging cattle rearing, work oxen, sheep fattening, sheep, goat and pig breeding, poultry production, and dairying. A number of these are of potential relevance to the study area, including those designed for small ruminants and pigs. In view of the technical experience NLPU has with these models they would form the basis of extension activity in the study area. They are described briefly here and in the supporting tables. Full details may be obtained from NLPU, and will appear in the Appraisal Report for the next investment phase of NLPU.

7.2.2.1 Settled Pastoralist

This model is intended for pastoralists who have adopted a settled base, or have expressed an intention to settle. A typical livestock owner would have between 50 and 60 cattle, including 25 mature females, and 8 or 9 sheep. He would probably cultivate up to 1.5 hectare of land, for a variety of subsistence food crops. In some parts of the country the sale of surplus milk by women is an important feature of household income, but as noted earlier this does not apply in the same way in the study area.

Greater productivity would come from improved dry season feeding with the use of supplementary feeds at first, plus the establishment of a fodder bank. An improved animal health package would also be introduced.

This model was originally designed for use on grazing reserves. However, the technical components are equally feasible elsewhere if the livestock owner is able to fence his fodder bank. In this way, the scheme becomes similar to the Mixed Farmer model, the main difference being the size of herd involved.

Production costs and benefits are shown in Appendix Table 22. Incremental net benefit rises from about N1,000 in year 2 to become stable at N2,200 per annum from years 8 to 20. The net present value of the investment at 15% is N3,918.

7.2.2.2 Mixed Farmer

This model is directed towards an 'improved' farmer residing in an ADP or RBDA area and adapting some form of improved cropping practices. Before development he would own some 15 head of cattle and up to 20 sheep or goats. This small herd is the major difference compared with the Settled Pastoralist model.

The model emphasises low investment and short term credit. This would be used to establish up to 6 hectare of improved pasture (fodder bank) and the purchase of two breeding cows. Annual smallholder fattening scheme loans would be used to purchase fattening steers or bulls.

Incremental benefits stabilise at about N1,550 per annum after 10 years. The Net Present Value at 15% is N1,123 (Appendix Table 23). The calculation shown here differs from the NLPU data in that it excludes benefits from an increase in crop production as it is felt that these would not be attributable to the livestock extension programme.

7.2.2.3 Smallholder Credit

Participants are provided with credit for the purchase of three or four head of cattle, the supply of supplementary feed and animal health treatment for a three or four month fattening period. This model has proved to be one of the more successful components of livestock development in Nigeria and is expected to be expanded during the next

project phase. In Appendix Table 24, a summary of the production budget indicates a conservative net benefit of N260 per loan cycle. In practice, actual costs are often lower than the budget and staff of NLPU report higher typical returns.

7.2.3 Economic Returns

On the basis of the cost structure shown in Appendix Table 21A,B, net present values have been calculated for the three capacity profiles and the three module cost alternatives. These are summarised in Table 36.

If the LEC undertook to work with the settled pastoralist model only, one module could undertake 75 in the five year period. Disregarding any overhead costs, the NPV for an LEC with one module would be N114,000 at 15%, for an LEC with two modules it would be N251,000 and with three modules N274,000. The mixed farming models are less profitable. At 15% all NPVs are negative. Internal rates of return are calculated at between 12.5% and 14%. The smallholder cattle fattening loans have a high rate of return with NPVs between N41,000 and N105,000.

TABLE 36 ILLUSTRATIVE SUMMARY OF FINANCIAL RETURNS PER LEC

in Naira

Alternative model strategies	1 Module per LEC	2 Modules per LEC	3 Modules per LEC
Total capital and operating cost over 5 years	86,025	145,525	327,775
Settled Pastoralists (NPV 15%) 75 in five years IRR%	113,930 20	251,362 20	274,190 18.5
Mixed Farming (NPV 15%) 75 in five years IRR%	-29,330 13.5	-35,138 14	-155,591 12.5
Cattle Fattening Loans (NPV 15%) 100 per year for eight IRR% years	40,871 >50	105,245 >50	55,015 >50

Notes: Returns for the settled pastoralists and mixed farming are projected over a 20 year life.
The cattle fattening loans are projected for eight years in total.
Costs are assumed to stay at full LEC levels for three years after the five year investment period in order to sustain the long term cattle investments. LEC costs are zero from year 9.
No FLD and NLPU overhead costs are included.

This LEC analysis excludes any project overhead costs and thus is purely illustrative. At any specific site the extension activities would consist of a mixture of the three models, plus advisory and animal health work not costed here. However, it is clear that the LEC concept

would be cost-effective if the models are attractive to livestock owners. A widespread system of low cost LECs would ensure a far-reaching network of focal points for contact with livestock farmers and would be cost-effective on the assumptions used here.

7.3 Pilot Extension Project (PEP)

In contrast with the NLPU models, the benefits of many of the recommendations in Section VI cannot be precisely quantified. It should be emphasized that many of the technical innovations upon which NLPU Second Phase Models depend are unfamiliar to pastoralists, with the exception of credit, which already operates within their own society. This should not be viewed as a negative appraisal of NLPU models, but rather that in the particular circumstances of southern Gongola State alternative strategies and novel forms of intervention need to be considered.

As a potential forerunner to an expanded livestock development programme, this section considers the basic costs and personnel required to operate an interim Pilot Extension Project (PEP). The pilot project would have responsibility for investigating the application of both the existing and novel options outlined in Section VI. It would be staffed by more senior and authoritative personnel than those envisaged for the LECs, thereby providing the supervisory capacity needed to ensure satisfactory instigation, co-ordination and monitoring of a wide range of development options. The key to the activities of the PEP would be a flexibility in the allocation of resources following on from detailed local investigations to determine the development priorities of livestock-owners.

Although the PEP, because of its wider brief is more expensive than an LEC, the cost is still only a small fraction of the potential livestock assets of southern Gongola State. Over five years, the costs of operating a PEP would only amount to 0.2% of the total offtake assumed over that period. Table 37 is intended to show the value of the cattle assets currently in the survey zone, and the value of the offtake.

7.3.1 Objectives and Function

Costings are given in Section 7.3.3 for a single high level Pilot Extension Project, based on the LDFs selected by the processes outlined in Section VI. Should the initial pilot be considered a success after the first five years, an extension of the proposals envisaged in Section VI could then be considered for other sites in the survey zone.

The proposals put forward in this report are intended to address pastoralists' percieved needs; liason with existing government services in the immediate area of the PEP would provide a more precise knowledge of the most appropriate solutions for a given local situation. Three senior officers, Veterinary, Information and a Livestock Superintendant are proposed as senior staff for a PEP. Their major areas of operation

project phase. In Appendix Table 24, a summary of the production budget indicates a conservative net benefit of N260 per loan cycle. In practice, actual costs are often lower than the budget and staff of NLPU report higher typical returns.

7.2.3 Economic Returns

On the basis of the cost structure shown in Appendix Table 21A,B, net present values have been calculated for the three capacity profiles and the three module cost alternatives. These are summarised in Table 36.

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in Naira

Alternative model strategies	1 Module per LEC	2 Modules per LEC	3 Modules per LEC
Total capital and operating cost over 5 years	86,025	145,525	327,775
Settled Pastoralists (NPV 15%) 75 in five years IRR%	113,930 20	251,362 20	274,190 18.5
Mixed Farming (NPV 15%) 75 in five years IRR%	-29,330 13.5	-35,138 14	-155,591 12.5
Cattle Fattening Loans (NPV 15%) 100 per year for eight years IRR%	40,871 >50	105,245 >50	55,015 >50

Notes: Returns for the settled pastoralists and mixed farming are projected over a 20 year life.
The cattle fattening loans are projected for eight years in total.
Costs are assumed to stay at full LEC levels for three years after the five year investment period in order to sustain the long term cattle investments. LEC costs are zero from year 9.
No FLD and NLPU overhead costs are included.

This LEC analysis excludes any project overhead costs and thus is purely illustrative. At any specific site the extension activities would consist of a mixture of the three models, plus advisory and animal health work not costed here. However, it is clear that the LEC concept

would be cost-effective if the models are attractive to livestock owners. A widespread system of low cost LECs would ensure a far-reaching network of focal points for contact with livestock farmers and would be cost-effective on the assumptions used here.

7.3 Pilot Extension Project (PEP)

In contrast with the NLPU models, the benefits of many of the recommendations in Section VI cannot be precisely quantified. It should be emphasized that many of the technical innovations upon which NLPU Second Phase Models depend are unfamiliar to pastoralists, with the exception of credit, which already operates within their own society. This should not be viewed as a negative appraisal of NLPU models, but rather that in the particular circumstances of southern Gongola State alternative strategies and novel forms of intervention need to be considered.

As a potential forerunner to an expanded livestock development programme, this section considers the basic costs and personnel required to operate an interim Pilot Extension Project (PEP). The pilot project would have responsibility for investigating the application of both the existing and novel options outlined in Section VI. It would be staffed by more senior and authoritative personnel than those envisaged for the LECs, thereby providing the supervisory capacity needed to ensure satisfactory instigation, co-ordination and monitoring of a wide range of development options. The key to the activities of the PEP would be a flexibility in the allocation of resources following on from detailed local investigations to determine the development priorities of livestock-owners.

Although the PEP, because of its wider brief is more expensive than an LEC, the cost is still only a small fraction of the potential livestock assets of southern Gongola State. Over five years, the costs of operating a PEP would only amount to 0.2% of the total offtake assumed over that period. Table 37 is intended to show the value of the cattle assets currently in the survey zone, and the value of the offtake.

7.3.1 Objectives and Function

Costings are given in Section 7.3.3 for a single high level Pilot Extension Project, based on the LDFs selected by the processes outlined in Section VI. Should the initial pilot be considered a success after the first five years, an extension of the proposals envisaged in Section VI could then be considered for other sites in the survey zone.

The proposals put forward in this report are intended to address pastoralists' percieved needs; liason with existing government services in the immediate area of the PEP would provide a more precise knowledge of the most appropriate solutions for a given local situation. Three senior officers, Veterinary, Information and a Livestock Superintendant are proposed as senior staff for a PEP. Their major areas of operation

would be the following;

a) Animal health

b) Information services and demonstrations of NLPU technical innovations

c) Credit supervision

d) Legal advisory service: Arbitration, obtaining C of Os.

e) Monitoring of changes in participants' herds - assessing impact of innovations

The Veterinary Officer would be in charge of animal health and the preparation of information relevant to it, and also for monitoring changes in herds following decreased mortality. The Information Officer would be responsible for the Legal and Advisory services, and for the dissemination, through appropriate media, of innovations and news relevant to livestock-owners and the demonstration of NLPU technical interventions. The Livestock Superintendant would oversee of the administration of credit and overall monitoring of changes in animal production.

All these officers would be expected to co-operate with other research and extension agencies, such as the ILCA Sub-humid Zone programme, and the FAO Grazing Reserve team.

7.3.2 Long-Term Benefits

In a sense, all the possible options lead to benefits that are interlinked. However, given that financial constraints permit only a limited number to be put in operation, the following chain of events is envisaged:

a) Lower mortality of calves and adult animals through better health instruction.

b) Greater security for stockowners and thus more settlement.

c) Evolution of higher degree of mixed farming and greater offtake.

d) More efficient and greater volume of agricultural production.

e) Investment of surplus cash into non-pastoral ventures

f) Overall development of southern Gongola State.

Similar processes have been observed in the ILCA study areas in Southern Zaria (Ann Bayer-Waters pers. comm.) where FulBe pastoralists have settled over the course of this century. A pilot project over five years would have some chance of assessing the validity of such a developmental model, brought about through agency intervention rather than by demographic changes.

TABLE 37. VALUATION OF REGIONAL CATTLE ASSETS.

		Number	Valuation (Million Naira). Cattle Herd	Offtake*
TOUNGO BLOCK AS A WHOLE	dry	596,700	303.0	46.0
	wet	686,700	349.0	53.0
DEVELOPMENT REGION				
Ganye Lowlands	dry	42,900	21.8	3.3
	wet	72,500	36.8	5.6
Southern Uplands	dry	184,300	93.6	14.2
	wet	325,200	165.3	25.1
Benue Lowlands	dry	338,700	172.0	26.1
	wet	239,000	121.5	18.4
WITHIN 30 KM OF SELECTED LIVESTOCK DEVELOPMENT FOCI				
Jalingo	dry	15,600	7.9	1.2
	wet	1,700	0.9	0.1
Bantaji	dry	74,400	37.8	5.7
	wet	104,100	52.9	8.0
Gembu	dry	145,800	74.0	11.2
	wet	261,400	132.7	20.2
Ganye	dry	26,900	13.7	2.1
	wet	59,900	30.4	4.6

* Assumed Rate of Offtake: 10%.

TABLE 38. CAPITAL AND OPERATING COSTS OF PILOT EXTENSION PROJECTS (NAIRA).

	Unit	Unit Cost	Year 1 No	Year 1 Cost	Year 2 No Cost	Year 3 No Cost	Year 4 No Cost	TOTAL
CAPITAL								
Establishment								
Store								
Veterinary equipment	Set	4800	1	4800	--	--	--	4800
Farm tools	Set	500	1	500	--	--	--	500
Refrigerator	Unit	550	1	550	--	--	--	550
							sub total	7850
4WD Pick-up	Unit	13000	3	39000	--	--	3 39000	78000
Office furniture & equipment	Set	10000	1	10000	--	--	--	10000
							sub total	88000
					TOTAL	Capital Costs for PEP		95850

OPERATING	Unit	Unit Cost	YEARS ONE TO FOUR No.	Cost	TOTAL
Information Officer	GL10	8500	1	8500	42500
Veterinary Officer	GL12	9500	1	9500	47500
Livestock Superintendent	GL07	4400	1	4400	22000
Clerk/Typist	GL04	2400	1	2400	12000
Drivers	GL03	2400	3	6600	33000
				sub total	157000
Office	p.a.	3000	-	3000	15000
Equipment & Store	p.a.	10%	-	800	4000
Office Equipment	p.a.	10%	-	1000	5000
4WD Pick-up	p.a.	5100	3	15300	76500
				sub total	100500
			TOTAL	Operating Costs for PEP	N 257500
		TOTAL	Capital and Operating Costs for PEP		N 353350

7.3.3 Costs

The exact cost of running such a pilot project will depend on its location; any of the nine LDFs identified would be suitable in terms of access to livestock; however, access difficulties and lack of existing facilities suggest either Jalingo or Bantaji are the most suitble sites given the presence or easy access to NLPU offices. Table 38 projects these costs over a five-year period, assuming that all the senior posts are filled by university graduates or their equivalent, and that each senior officer has access to a four-wheel drive vehicle.

SECTION VIII

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