Pastoral production systems and land utilisation types

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1. Introduction

The description of land use forms an integral part of the Framework for Land Evaluation (FAO, 1976) and is achieved through the classification of land utilisation types (LUT) based on data and assumptions on produce, their marketing, labour and capital intensity and the level of technology. Descriptions of LUTs also include information on land tenure, size of holdings, crop and livestock mixtures and details on infrastructure. From this data base, sets of requirements can be defined for each LUT and these can be compared and 'matched' with the qualities and characteristics of the land within which a LUT is located. Such 'matching' will lead to judgements on the suitability of land for a particular land use type (Zonneveld, 1983).

The 'matching' procedure has great merit in high-potential areas, where alternative forms of land use are possible, each LUT having specific requirements for land qualities, inputs etc. Extensive grazing systems are predominantly located in semi-arid lands that are marginal for other types of land use. Hence, it is often the only LUT adapted to that environment and 'matching', becomes unnessary, except perhaps when comparing land suitability for domestic livestock and wildlife and/or tourism. However, matching can play a role when evaluating land qualities for extensive livestock systems, that differ in species mix, herd and range resource management and produce allocation for subsistence and for trade.

It is the task of this workshop to critically examine the procedures and techniques of land evaluation when applied to pastoral production systems. There is little doubt that a thorough assessment of the physical environment and its natural resources is the first step to describe and diagnose the constraints to which existing land utilisation types are subject. However, as the description of land use constitutes the essential linkage between the land and the people that use it, it seems necessary to explore whether a) the 'LUT' approach is appropriate for livestock systems, recognises the fundamental linkages between producer objectives, their management strategies, and systems output within the physical limitations set by a given environment and b) whether the approach in its description of LUT's and subsequent diagnosis of their constraints follows a well-focused sequence of activities, leading to the identification of possible improvements design of component research for further testing their feasibility and impact, and finally the application of tested improvements in a wider setting by activating the extension services while at the same time monitoring the rate and extent at which innovations are adopted.

This paper attempts to address two major concerns. First, it will focus on

the description of livestock production systems that are characterised by a high degree of mobility as represented by transhumant pastoralism in West Africa. By briefly analysing the major characteristics of this mode of production, attention will be directed to the major elements that distinguish African pastoralism from those in cropping systems. The second part concerns the characterisation of Land utilisation types as employed by the FAO framework and see how applicable and effective this method is in covering the distinctive features of those livestock production systems.

2. Transhumant Pastoralism

The rationale to focus on production systems that are at the 'mobile' end of the continuum is derived from the contention that the FAO framework has been developed for crop production systems that exploit a fixed area of land. Thus, sedentary livestock systems are comparable to cropping in that the procedures and techniques developed within the framework are applicable, be it with certain modifications. Therefore, requirements of LUT's like ranching and settled agropastoral enterprises are more easily established. The same applies to group ranches in Kenya in which most movement is within the recognised boundaries, in the same way as ranchers rotationally graze their stock and mixed farmers move their animals seasonally within the grazing area over which the village has control. In this context, the selection of transhumant pastoralism is justified because this system is most complex: it differs in many respects from sedentary systems but at the same time it has certain elements in common because many transhumant systems have a cropping component (Table 1 and 2.).

Table 1. Characteristics of selected transhumant pastoralist production systems in West Africa.

Country Tribe	Niger Fulani Twareg	Nigeria Fulani	Mali (Delta)
Grazing zone.			
Wet season	arid	semi-arid	semi-arid
Dry season	semi-arid	sub-humid	semi arid
Annual rainfall (mm)	200-400	500-1200	400-600
Species composition of livestock			
Cattle	xx	xx	xxx
Sheep	xx	x	x
Goats	xx	x	x
Camels	x	–	–
Distance	x	x-xxx	xxx
Farming			
Dry season	–	–	xx
Wet season	–	x	x
Milk sales	x	xx	xxx

Importance: x-xxx: low to high.

Table 2. Types and characteristics of pastoral production systems in tropical Africa in relation to the aridity gradient.

Indicators	Degree of aridity		
	Very high	High	Medium
Annual rainfall (mm)	0-200	200-400	400-600
Growing period (days p.a.)	0-50	50-75	75-90
Type of pastoralism pastoralism*	nomadic pastoralism*	transhumant pastoralism	agro-
Supplement to live-stock products	oasis products	wildlife	grain
Migration	erratic and long-range	medium to long-range	short-range
Lead species	camel, goat	mixed	cattle, sheep

In contrast to other regions in Africa, transhumant pastoralism is a dominant livestock production system in West Africa. This is due to a complex set of factors, the most important of which is that the region is characterized by mono-modal rainfall increasing from North to South. This rainfall regime has given rise to a zonal sequency of land use systems from pure nomadic pastoralism to smallholder farming along a continuum due a latitudinal increase in growing season for crops and rangeland resources (table 2.).

Linked with the zonal distribution of resources, inter-zonal trade between production systems has developed over centuries encouraged by centrally organised and strong governments. Trade (over short distance) between livestock and crop production systems as well as long distance trade between the coast and across the Sahara, created a vast network of inter-regional and inter-tribal linkages, which were further fostered by homogenising influences like the steady spread of Islam and the increasing predominance of trade languages (like Hausa and Bambara).
These trends were further encouraged by the age-long expansion of pastoralist Fulani, who have become a dominating force right across the width of West Africa from Senegal to the Central Africa Republic and the Sudan. Consequently, this polico-historical framework seems to have created the ideal setting for the development of transhumant resource exploitation systems, which is re-enforced by physiographic features of the region, in particular the high proportion of river basins (Senegal, Niger, Benue,

* Transhumant pastoralism is based on more or less regular seasonal migrations for a permanent homestead which is lacking in pure nomadism.
Jahnke, 1981 (table 5.1)

Logone-Chari etc.). Not only do these basins provide feed and water security during the dry season, but also, due to settled agricultural communities (exploiting flood-retreat opportunities for rice farming etc.), exchange and barter of produce. This is optimised by pastoralists arriving at the post-harvest period.
To understand the objectives that prompt seasonal movements, an analysis of the risks and advantages of different grazing orbits is essential. For instance, for three distinct modes of transhumance, movement orbits stretch across from the arid to the subhumid zone, by pastoralist with different species mixes and degrees of involvement in trade and farming (table 2.).
For many herders, the essential reason to change grazing orbits is to ensure access to better range resources in terms of quality and diversity (table 3). Twareg and Woodabe, herders in Niger, maintain that a semi-annual change of grazing location is beneficial to their stock. Moving north, higher quality forage and different species mixtures are obtained in particular for small ruminants and camels (Maliki, 1982). Also, their wet season grazing area is the locale for the 'cure salée', which appart from curing certain mineral deficiencies acts as a purge ridding stock of endo-parasites (table 3).

Avoidance and attraction are strongest for the Fulani in the Mali Delta. In this area, they have their permanent homes (in contrast to most other transhumant pastoralists who reside in their wet season grazing areas), their flood retreat rice farms, which they cultivate during the dry season with drought oxen from their own herds. During the same period they constitute itinerant (mobile) milk herds to travel around sedentary communities, providing milk in exchange for grain, securing instant movement of produce back to their villages by accompanying transport oxen (table 4).
Their long-distant move away from their home base, can better be termed an avoidance strategy than a movement dictated by the attractions of the upland pastures in Mauritania. The hazards of flooding which increasingly limit access to range resources combined with an increasing nuisance of biting flies, make the Delta inhabitable for stock. This has been shown by the low productivity of resident milk cows that are kept to feed home-resident pastoralists. (Diallo, pers. comm., 1981).
Similarly, in Nigeria, Stenning (1959) has documented the carefully planned and slow movement patterns towards the Niger and Benue flood plains, to exploit produce exchange with sedentary farmers. Their move back to their wet season grazing area, is dectated as much by disease avoidance (tsetse) as by the urge to be home for the first rains to plant millet and sorghum.

The reverse is true for pastoralists living in submontane areas like the Jos and Mambilla plateaus. Despite the favourable conditions for farming and trade on the Jos plateau (due to a dense population employed in tin mining and other urban-oriented employment), the dry season move away from the plateau season southwards to thinly populated sreas is an escape strategy to avoid over-grazing. A similar trend exists on the Mambilla plateau, where stocking density exceeds year-round carrying capacity and dry season movement to the plains is necessitated to lessen the pressure, although again better trade opportunities may play a role, considering the rather isolated location of the Mambilla plateau.

Table 3. Main reasons for transhumant mobility in West African pastoralist systems.

	Movement to dry season area			Movement to wet season area		
Country	Niger	Nigeria	Mali Delta	Niger	Nigeria	Mali Delta
Water	vv	vv	vv	v	v	–
Feed	vvv	vvv	vv	vv	v	v
Flooding	–	–	–	–	–	xxx
Disease	–	–	–	–	xx	xx
Farming	–	–	vvv	–	vv	–
Trade	v	vv	vvv	–	v	–

v – vvv low to high attraction; x – xxx low to high avoidance.

Table 4. Wet and dry season fodder resources of transhumant West African pastoralist systems.

	Wet season			Dry season		
Country	Niger	Nigeria	Mali Delta	Niger	Nigeria	Mali Delta
Annual grasses	xxx	xxx	xxx	xxx	x	x
Perennial grasses	x	xx	x	x	xx	x
Flood plain grassland	–	–	–	–	xx	xxx
Browse	xx	x	x	xx	–	–
Crop residues	–	–	–	–	xx	xx

Importance: x – xxx: low to high.

3. Livestock systems as Land Utilisation Types, general characteristics

Before discussing the relevance of the features used to characterise Land Utilisation Types (LUT) in the FAO Framework, it seems appropriate first to list the major elements that distinguish livestock from cropping systems:

– Grazing land is recognised as a public resource available to all stock owners; only for cropping land are private rights recognised. The same applies to water supplies except those that are constructed and maintained privately.

Animals are privately and individually owned; are exchanged for other forms of property; are used to acquire rights; serve as prestige and status makers

and assist in the formation and reinforcement of social ties of all kinds within society*.

Apart from serving subsistence requirements (milk and meat from home slaughter) and cash for household needs, animals are used for transport, drought for tillage and manure supply.

It is clear that several characteristics are specific to livestock systems, which make it necessary to adapt or redefine certain parameters that have been used for crop-oriented modes of production. The major parameters reviewed below are: land tenure and farm size, livestock holdings, labour intensity, income and level of technical knowledge (see FAO, 1976, table 10, p. 72).

Land tenure and farm size

The absence of a fixed area of operation and the difficulty of delineating the boundaries of extensive grazing systems and of the households within these systems poses problems. It implies that the parameters (inputs such as capital and labour intensity and outputs such as produce and income) cannot be expressed per unit area and some other unit should be found when comparisons between livestock LUT's are required. As the main means of production is the stock owned by the household, it seems that input and output should be expressed per stock unit.

However, in contrast to cropping systems which are tied to a specific geographical area, the boundaries of households (camps etc.) in terms of land, labour use or income and expenditure are difficult to define. Therefore, the management unit (see FAO, 1976) may be a useful concept but it should be realised that this unit can range from a single household managing its own stock with its own labour to a much larger cooperative group involving many households organised in tented camps (Twareg) or 'bomas' (Maasai).

A re-definition of the LUT in terms of stock holdings using a management unit (or a group of management units that operate under similar circumstances) is worth consideration. Such unit would incooperate the people and their stock, their ownership rights to crop land and private water points, their usufructuary rights to grazing and natural water supplies. However, the land they occupy would become a rather vague entity, embracing the seasonal and annual orbits within which they operate and as a consequence the need for terms like compound, multiple and seasonal LUT's would be avoided.

Replacing land and its use as the unifying concept to define and compare LUTs by a 'management unit' will affect the indicator value of most parameters; i.e. size of holdings, labour and other inputs, produce and income. A urther elaboration on these implications is thus justified.

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* According to Sandford (1982) these two main characteristics of pastoralism have created 'the Mainstream view' based on an earlier dictum of Allan (1965) that 'Nomadic pastoralism is inherently self-destructive'. Sanford (p.12) describes the rationale of this view as follows:
The individual livestock owner has a continuous incentive to increase the number of his own livestock even when this increase damages the communal grazing and land, because the damage is shared by the community at large, whereas the individual obtains a greater proportion of the total grazing through increasing his herd and the benefits from this increased proportion outweigh his share of the loss. This supposed inherent contradiction between private and public interest and the consequential over-grazing has been termed the 'Tragedy of the Commons' (Hardin, 1968).

Livestock holdings

There may be no need to emphasise that stock numbers differ greatly between pastoralist systems and as much again between management units. A major reason for this large range of holding size is that animal numbers are less governed by available labour than cropping enterprises in which the scope of operations is often proportional to available labour (see below).

Herd size is often positively related to degree of mobility (Table 5). In Nigeria large herds are found among transhumant pastoralists in particular in the less densely populated areas (NE Nigeria) and regions rich in grazing resources like the Jos and Mambilla plateau. Similarly the Fulani in the Mali Dlta have large herds when judged by counts in management units with 45% of the herds above 200 head and ontaining over 75% of all cattle in the sample (Diallo, 1983). This is in contrast to Woodabe Fulani in the pastoral zone inNiger, whose main herd size was between 10 and 25 cattle, partly because they are still suffering from the after-effects of the drought (Wagenaar, 1982). In general, agro-pastoral households have smaller herds, either because of the competitive demands for labour for cropping, but more often because they operate in densily populated areas where grazing land is becoming increasingly scarce (table 5).

Apart from the maked differences in holding size between pastoralists systems, the data in table 5 also show the large variation in stock holding within systems. This is not confined to West African pastoralists. In Maasai group ranches differences in wealth as equally pronounced ranging form 1 – 95 stock units per Male Equivalent (ILCA, 1981).

When considering herd size, distinction should be made between who owns the stock, has usufructuary rights to produce, who herds and is in charge of management*. In the Mali Delta, only 20% of the stock was owned by the actual herders, another 35% by other pastoralists outside the managemenunit, whereas the remainder was owned by absentee-investers (Diallo, 1983). Similarly in Wodaabe herds in Niger, 70% of the cattle were herder-owned, the remainder being loaned by fellow herders (12%) or by outsiders (18%). These loan arrangement have implications for disposal of milk and rights to stock offspring (Wagenaar, 1982). Therefore, it is not surprising that to understand the productivity and output of pastoral production units, the study of ownership and stock exchange and their effect on produce and income distribution is essential (Grandin, 1983).

Labour intensity

As has been indicated above, labour demands in pastoral societies differ from those in cropping operations in that certain activities increase proportionally

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* A distinction between the herd size of the individual household management unit is needed, in particular now increased use of aerial surveys for estimating distribution patterns of grazing herds in pastoral areas has increased data sets on herd size. Although such data are certainly indicative of the animal holdings of their owners, joint herding by different owners as well as herd splitting by large owners, makes careful interpretation of SRF data a necessity (Milligan and de Leeuw, 1983).

with animal numbers (milking, calf care, deticking and all work related to water extraction and delivery) whereas others (like herding, dipping, watering at ponds and rivers etc.) depend on the number of herding units rather than on their size.
Further variability is introduced due to task distribution between age groups and sexes. While in West African Fulani societies adult men take care of herding, in East Africa Maasai adults guide orbit selection and take active

Table 5. Cattle herd size distribution in pastoral systems in West Africa.*

System	Location	herd size 0-20	21-40	41-60	>60
Transhumant pastoralism	NE Nigeria	5	29	29	37
Transhumant pastoralism	Plateau Nigeria	14	28	24	34
(Semi) nomadic** pastoralism	N. Niger	83	17	–	–
Transhumant (agro) pastoralism	NW Nigeria	48	32	10	8
Agro pastoralism	NW Nigeria	74	22	3	1

* Data derived from Fricke (1979) figures 12, 13, 15 and 16.
** Data derived from Wagenaar (1982).

Table 6. Seasonal labour needs of West and East African pastoralist groups.

	WEST AFRICA				EAST AFRICA			
Pastoral groups	Woodabe Niger		Fulani Delta-Mali		Maasai Kenya		Borana Ethiopia	
Activities	WS	DS	WS	DS	WS	DS	WS	DS
Herding and trekking	xx	xxx	xx	xxx	xx	xxx	xxx	xxx
Water point construction and maintenance	x	xxx	–	x	x	x	xx	xxx
Water extraction	–	xxx	–	–	–	x(x)	–	xxx
Cropping	–	–	xx	xxx	(x)	–	(x)	–
Food preparation	x	xx	x	xxx	x	xx	?	?

Key: x – xxx Low to high importance.
WS: Wet Season, DS: Dry Season

part in watering animals, but the actual herding is left to children of both sexes (Grandin, 1982).

Although the seasonal fluctuations of labour demand appear less pronounced than for instance in rain-fed cropping (tilling, planting, replanting, weeding etc.), labour for herding and even more so for watering are nonetheless much influenced by seasons as shown in table 6 for four different types of pastoralism. Differences are much dependant on the type of water source and the amount of manual labour required for supplying stock in dry seasons and also whether additional labour is required for cultivation and food preparation (Table 6).

How labour constraints can impose enormous stress on pastoralists in N. Niger is illustrated by an analysis of required tasks during the transition period between the dry and rainy season between May and July (table 7). These high and fluctuating demands are caused by:

- A general decrease in forage supply combined with an erratic recurrence of localised green flushes and filling of ephemeral water ponds demanding a daily adaptation to variable circumstances.
- A peak in calf births demanding high-intensity care of dams and offspring in all management aspects (grazing, watering, health care).
- In spite of this calving peak, a low surplus of milk, resulting in increased visits to markets to purchase grain and increased labour for pounding of grain and cooking (including fuel wood collection).
- A rapid succession in camp movements to follow the green flush, demanding labour for breaking camp, trekking and building new camps.

Table 7. Seasonal labour profiles of wodaabe pastoralist in the pastoral zone of Niger.

Season Period Activities	Late-dry March-May	Transition May-July	Early-wet July-August
Herding	xx	xxx	xx
Watering	xxx	xxxx	x
Calf care	x	xxx	xxx
Milking	x	xxx	xxx
Food preparation	xx	xxx	x
Market transactions	xx	xxx	x
Moving camp	x(?)	xxx	xxx

(Compiled from: Maliki (1982); Swift (1982)
Loutan (1982), Wagenaar (1982), de Leeuw and de Haan (1983).
Key: x-xxxx low to very high importance

These examples show that labour intensity and use are important facets of the pastoralist economy and that a common believe that they can be classed as 'leisure seeking capitalists' is certainly untrue for many societies.

4. Income

It is generally recognised that household income and expenditure data are

useful for determining the demand of pastoralists for puchased food, other goods and social services and for assessing the terms of trade between pastoralists and the wider economy (Bekure, 1983). Unfortunately very little is known about the economics of pastoral societies at the household level, which led Eicher and Baker (1982) to conclude: 'Research on the behaviour of livestock herders in Africa is about at the same point where research was on the economics of crop production some 20 years ago – many assertions and a sparse supply of facts'.

Based on this 'sparse supply of facts' table 8 provides 'best-guess' projections of the per caput subsistence and cash income from cattle herding in semi-arid Africa. In spite of the many assumption underlying these projections, they are similar to calculations published by Jahnke (1982) and to results of herd

Table 8. Production parameters of a pastoralist economy in the Semi-arid zone of Africa.

Livestock/people/land ratios		
Tropical Livestock Unit, (kg liveweight)	:	250*
Annual stocking rate, (ha/TLU)	:	8
TLU/caput	:	5
Human Supporting Capacity, (ha/caput)	:	40
Productivity		
Milk production		
Proportion adult cows in herd, (%)	:	45
Proportion lactation cows/yr, (%)	:	50
Lactation yield for human consumption, (kg/yr)	:	250
Liveweight production		
Off-take, (% biomass)	:	12**
Subsistence and cash income per TLU and caput		
Milk		
Consumption milk/TLU/yr, (kg)	:	73
Consumption milk/caput/yr, (kg)	:	365
Subsistence (50%) consumption/caput/yr, (kg)	:	182
Cash sales & US $ 0.25/kg, ($/caput/yr.)	:	46
Animals		
Animal production, LW/TLU/yr, (kg)	:	30
Subsistence (10%) consumption/caput/yr, (kg)	:	15
Cash sales & US $ 0.50/kg, ($/caput/yr.)	:	68
Total		
Total cash income, ($/caput/yr)	:	114
Subsistence and cash income ($/ha/yr)	:	4
($/TLU/yr)	:	33

* There are 77 TLU in a herd of 100 head.

** % of total liveweight in herd.

modelling exercises for similar pastoral systems in West Africa (de Leeuw and Konandreas, 1982). Wherever comparisons between model output and the real life situation could be made, correspondence with the model was encouraging, in particular in respect of milk yield and calf growth. Simulated offtake in percentage of biomass were much higher (16 to 28%) than those assumed in table 8.

Because of the dearth of data the aggregate estimates given above cannot as yet be verified. However, recently, Bekure (1983) published tentative cash income data on a Maasai group ranch in Kenya. About 60% of the cash income was derived from cattle sales and only a small fraction of the milk production (2%) was sold. Total per caput cash income average $140 (1$ = 12 KSh), increasing with stock wealth from $80 to $190, but less than proportionally indicating that the poorer families were forced to achieve higher offtake rates than the richer ones. Average income per household amounted to $1350. Since mobility was low and grazing outside the group ranch was limited, tentative cash income/ha can be calculated: cash income/ha was c. $5/ha based pn an average livestock wealth of c. 8 TLU/caput and a human supporting capacity of c. 25 ha/person. This high productivity as compared to the data in table 8 are indicative of the relatively high potential of this semi-arid rangeland.

5. Level of technical knowledge

The inclusion of this parameter shows a typical concern with sophisticated western knowledge which may be justified when dealing with cropping systems but applies less to livestock producers. Increased productivity can often be achieved by selective application of 'high-technology' inputs like fertilisers, herbicides and insecticides, the application of which need the knowledge of application rates, exact plot size and some technical know-how of the application equipment. The same applies in livestock enterprises, where the lack of technical knowledge of the average pastoralist had resulted in the break-down of bore-hole pumps equipment, extreme fluctuations of acaridicide concentration in dipping fluids and under and overdosage of antibiotics to animals. However, emphasis on the absence of technical knowledge related to modern interventions has lead simultaneously to an underestimation of local knowledge, which could be collected at low cost and which could be of great relevance to a better understanding of pastoral production systems.

It seems worthwhile to quote from J. Swift (1981) who has given the use of local sources of knowledge much thought and predicted that better use of such knowledge is very cost-effective: he states:
If local pastoral data gathering networks can be set up, they would have the advantage in that they could give long time series data needed in (arid) areas where climatic facts – and hence plant and animal production – very widely from year to year ..... including an early warning system on environmental degradation, food shortage or famine or quite simply living standards ..... as well as data on plants and the domestic economy'.
He then refers to the detailed knowledge of pastoralists on plant species and their geographical distribution, on their value for grazing by different

domestic species by season and on their indicator value for over- and undergrazing. Such local information would be invaluable to assist in studies on range condition and trend. Swift also emphasises the added value of using local terminology for animal age and sex classes. The use of such terminologies would speed up the process of determining age/sex structures of large numbers of animals and refers to rapid survey methods involving the recording of individual life histories of stock by questioning owners.*

Swift concluded with the plea that due to the emphasis on sophisticated data gathering systems (remote sensing from satellites, short-term visiting expatriate tourists etc.) there is a danger of driving out local information and consequently there is a challenge to devise a network of pastoral informants which are part of a comprehensive research 'coalition'.

Discussion

The methodology used to describe land utilisation types is oriented to the physical characterisation of land, being an integral component of a land evaluation framework. This has led to land utilisation types that focus on crop and cropping practices and technology in order to identify the qualities of land that these crops require, subsequently to determine the suitability of land for a particular cropping system and identify what improvements are feasible to increase crop productivity. This approach has led to land and crop-oriented sets of land use within the target region and a listing of the relevant parameters. However, that these different land types of utilisation are often executed within the same household or management unit has received little emphasis in the framework. There is also the impression that desirable crop options are deduced from the matching of crop requirements and land qualities independently without fully considering the existing land use system and that recommendations for optimal land use envolve 'in vacuo'.

Another essential element of the approach is its hierarchical structure of evaluation stages (see fig. 5, p.53 in FAO, 1976) which procedes from reconnaissance to detailed activities. It is contended that the approach is effective at these higher levels and that the conduct of 'global farm surveys' as a complementary activity to the assessments of land capability and suitability is sufficient to provide the needed information on land use. The primary aim of these higher-level stages is to produce development plans for large areas and assist in the formulation of projects and the initial testing of their feasibility. It is at the detailed level that an adjustment of the approach is most needed, and it is at this level that a producers orientation should be combined with a focus on land.

The proposed adaptation of the framework would equate it in essence to Farming Systems Research (FSR) as employed by several Centres of the IARC group (CIMMYT, IRRI, ICRAF, ILCA etc.). In FSR a similar sequence from reconnaissance to detailed level is followed with the object of finally identifying a target population of farmers that operate under similar

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* Rapid appraisal of livestock productivity is frequently used by ILCA (see Wilson and Wagenaar, 1982; Peacock 1983).

circumstances; in other words, to determine the 'recommendation domains', within which a representative sample of farmers is selected for further research. However, the aims of this approach is research – rather than planning oriented as it leads to the identification of researchable components within the farming systems. Thus, farm system research consists of a sequence of stages, designed to identify the constraints in a cropping or livestock system and through experimentation identify possible solutions. These are then tested in a sample of producer situations, initially under researcher control but later with increasing producer participation.

ILCA has been engaged in testing this FSR approach for application in livestock systems and continues to explore which modifications are needed. This effort is carried out at two levels:
a) to determine the nature and the extent of the information required i.e. to identify the parameters that are essential for the description, constraint diagnosis and identification of possible improvements and innovations;
b) to develop a data-gathering methodology that is both rapid and cost-effective.

It is anticipated that the establishment of a sound fund of essential knowledge generated by this research methodology will assist in the planning and execution of development projects, will provide the required stimulus and guidance for government extension service and will assist national research organisations to determine their research priorities based on the real needs and constraints of their clientele, the pastoralists, who should be the beneficiaries of these concerted efforts.

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